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# Development of Digital Comic Learning Media on Multiplication of Two Numbers to Facilitate Numeracy Skills of Year 3 Primary School Students

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**A B S T RAK**

*Latar belakang yang mendorong penelitian ini adalah bahwa siswa merasa kesulitan dalam menghitung materi perkalian, serta pembelajaran yang monoton membuat siswa kurang senang dan kurang nyaman mengikuti pembelajaran. Tujuan penelitian ini adalah untuk mengetahui pengembangan, validitas, dan kepraktisan media pembelajaran komik digital dalam pembelajaran matematika materi perkalian pada siswa kelas 3 sekolah dasar. Jenis penelitian yang digunakan dalam penelitian ini adalah penelitian dan pengembangan (Research and Development) dengan model ADDIE. Populasi dan sampel dalam penelitian ini adalah siswa kelas 3. Teknik analisis data pada penelitian ini menggunakan analisis kualitatif dan kuantitatif. Hasil penelitian menunjukkan bahwa media pembelajaran komik digital dinyatakan valid. Hasil validasi yang diberikan oleh ahli media berkategori sangat layak. Hasil validasi yang diberikan oleh ahli materi juga memenuhi kategori sangat layak. Media pembelajaran komik digital mendapat respons yang baik dari guru dan siswa. Dilihat dari hasil respons, guru memperoleh persentase sesuai dengan kriteria sangat layak dan praktis. Dengan demikian, media dinyatakan valid dan praktis untuk digunakan di kelas.*

**A R T I C L E I N F O**

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**A B S T R A C T**

*The background for this research was that students found multiplication difficult to calculate, and monotonous learning made them less enthusiastic and less comfortable participating in learning. The objectives of this study were to determine the development, validity, and practicality of digital comic learning media for teaching multiplication to third-grade elementary school students. This study used a research and development*

***Keywords:***
*Learning Comics*
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| | | |
|---|---|---|
| *(R&D) approach with the ADDIE model. The population and sample in this study were third-grade students. The data analysis techniques used in this study were qualitative and quantitative analyses. The results of the study indicate that the digital comic learning media is valid. The validation results provided by media experts were categorized as highly suitable. The validation results from subject matter experts also fell into the highly suitable category. The digital comic learning media received positive feedback from teachers and students, as evidenced by teachers' responses, which showed a high percentage meeting the criteria for being highly suitable and practical. Therefore, the media is deemed valid and practical for classroom use.* | | |



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## 1. INTRODUCTION

The role of the teacher is very important in the teaching and learning process. In carrying out their duties, teachers must be able to identify learning opportunities for students and improve their teaching strategies. Therefore, there is a demand for changes in how lessons are conducted in the classroom, including the use of teaching methods and strategies, and the teacher's attitude during the learning process. Teachers must also be able to create an engaging and enjoyable learning environment (Mbagho, 2021). Mathematics is essential in daily life and plays an important role in various scientific disciplines, advancing human thinking. Rahmata (2020) states that mathematics is an important subject because it is highly useful in science and technology and essential in everyday applications, and that it should be introduced as early as possible. Mathematics serves as the parent of the sciences due to its numerous applications across other scientific fields, both as a supporting tool and in their development. That aligns with Arrafi (2020), who states that mathematics is a subject that students must master because it is closely related to everyday life. However, in reality, many students still find it difficult to learn mathematics, especially multiplication, due to a lack of conceptual understanding. Sometimes students still calculate multiplication by adding on their fingers because they have not memorized the multiplication tables from 1 to 10 (Kusumasari, 2021).

In the digital era, characterized by rapid developments in information and communication technology, there are significant opportunities to transform mathematics learning into a more interactive, contextual, and enjoyable experience through digital learning media. One form of digital learning media that has the potential to facilitate students' numeracy skills is digital comics (Toh et al., 2018). Digital comics, which integrate visual narration with interactive elements, can serve as an effective bridge to enhance learning. Learning media are the primary tools to support the learning process. They are also methods or tools that assist in implementing teaching and learning activities. This can facilitate communication between teachers and students when conveying information. The use of media in the teaching and learning process can make students more challenged, more interested, and more engaged in understanding the subject matter. Learning media play an important role in supporting classroom teaching and learning. With media, students can better understand the material the teacher explains. Therefore, teachers are required to utilize media in the teaching process. The use of digital comics in multiplication lessons cannot only improve understanding of mathematical concepts but also develop students' digital literacy from an early age. Students will become accustomed to digital technology and use it as a tool to support their learning, an essential skill in this digital era (Prensky, 2021). Well-designed learning media can be used in the learning process; one example is comics, which many children and even adults still enjoy reading. Comic learning media can be considered engaging because comics consist of several storylines that can serve to attract the reader’s attention or be complemented with many images rather than text, thus helping to overcome boredom when reading (Suliastika, 2025). Additionally, they help concretize abstract mathematical concepts.

Digital interactive comics can provide students with the opportunity to actively engage in the learning process, not only as passive recipients of information but as active participants who can explore mathematical concepts through various scenarios and activities (Sari & Wijaya, 2021). Nuraini et al. (2021) found that using digital comics in primary school

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mathematics learning can increase student engagement by up to 78% and conceptual understanding by up to 65% compared with conventional methods.

The development of effective learning media requires a systematic approach based on solid learning theories. In the context of developing digital comics for learning multiplication, Mayer's multimedia learning theory is highly relevant as a theoretical foundation (Mayer, 2021). This theory emphasizes the importance of harmonious integration between visual and verbal elements in learning media to optimize students' cognitive processes. Additionally, it provides an essential basis for understanding the importance of supportive learning in helping students reach their maximum developmental zone (Vygotsky, 2020). Digital comics can be designed to provide adaptive support through interactive features such as prompts, feedback, and progress tracking, all tailored to individual students' abilities.

The facts on the ground, as observed, indicate that teachers who teach mathematics in schools use conventional teaching methods, namely the lecture method. The teacher acts as the center of the learners' activities; the teacher appears more active in the learning process as the provider of knowledge to students, but is less involved in students' active participation. The most common problem found is that teachers do not use appropriate learning media during the learning process. This leads to students having a limited understanding of mathematical concepts overall, especially during multiplication lessons in primary schools. To facilitate students' multiplication calculations, this study addresses the above issues by implementing a strategy that uses digital comic media to practice multiplication problems. Based on the above explanation, the researcher is interested in developing a digital comic learning media as an innovative solution.

## 2. METHOD

The research approach used in this study is research and development (R&D). R&D is used to produce a specific product and test its effectiveness (Sugiyono, 2013). Producing a particular product can involve needs analysis, research, and testing its effectiveness to ensure it functions in the wider community. This study develops digital comic media for mathematics learning, specifically multiplication material for third-grade students, using the ADDIE model. The ADDIE model has five stages: Analysis, Design, Development, Implementation, and Evaluation.

Development research is a thorough, critical investigation or testing effort conducted to seek facts or principles using specific steps (Insani et al., 2023). This development research aims to produce a specific product and to test its validity and effectiveness in practice. The product to be developed in this study is digital comic learning media on multiplication to facilitate the numeracy skills of third-grade primary school students. The comic is developed through validation stages, including evaluation and revision by validators, resulting in an educational comic that is valid, Suitable, effective, and practical for use in classroom learning.

Observations and interviews were conducted to gain an in-depth understanding of the school's educational situation. The research subjects were 31 third-grade students, consisting of 13 girls and 18 boys. The focus of this research was the development of comic-based learning media for multiplying two numbers. The research was carried out on 24 July 2025. The data collection instruments used to support the smooth running of this research were questionnaires. There are two types of questionnaires: validation and response. These data will be analyzed using a Rating Scale assessment.

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**Table 1.** Guidelines for Rating Scale Assessment

| No. | Description | Score |
|---|---|---|
| 1. | Very Good | 4 |
| 2. | Good | 3 |
| 3. | Less | 2 |
| 4. | Very Poor | 1 |

After the percentage score is calculated, the next step is to determine the criteria in Table 2 as follows.

$$P = \frac{\sum R}{N} \text{x } 100\%$$

Description: P is the percentage score, ∑R is the total number of answers given by the validator, and N = the maximum score.

**Table 2.** Range Percentage and Qualitative Criteria

| No. | Percentage | Category |
|---|---|---|
| 1. | 81% - 100% | Very Suitable |
| 2. | 61% - 80% | Suitable |
| 3. | 41% - 60% | Quite decent |
| 4. | 21% - 40% | Not Suitable |
| 5. | 0% - 20% | Very Unfit |

Based on Table 2, the determination of success indicators is considered valid or suitable for use if they fall within the 81% - 100% range for the category 'Very Suitable' and the 61% - 80% range for the category 'Suitable'.

## 3. RESULT AND DISCUSSION

The research process produced an educational comic on multiplication, intended for third-grade primary school students. This aligns with Sudjana and Rifai (2011), who state that comic media in the teaching and learning process create interest among students, make the learning process more effective, increase interest in learning, and stimulate their appreciation. The results of this development research are comic learning media for multiplication to facilitate the numeracy skills of third-grade elementary school students. The learning media was created using the Canva application after first developing a storyline. Then, voice-over and background music were added to serve as narration, dialogue, or sound effects that enhance the visual dimension. In contrast, the background music creates the appropriate atmosphere and emotion for each scene.

This research and development of learning media uses the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The ADDIE stages are as follows:

### 1. Analysis

At this stage, a literature review is conducted to establish the theoretical foundation of the research. At the same time, data are collected through direct classroom observation and in-depth interviews with students and teachers to obtain more comprehensive information about the issues faced. The results obtained from this stage reveal several important findings, namely that students experience significant difficulties in understanding multiplication material due to abstract concepts that are hard to grasp, the absence of concrete learning media that can help

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students visualize and understand multiplication concepts more easily during the learning process, and that the teaching process remains monotonous with conventional methods that lack variety, thus failing to create an enjoyable learning atmosphere and unable to optimally increase students' motivation to learn.

**2. Design**

In the planning stage, the developer begins by creating a storylane as a framework for the story, facilitating understanding of the learning concept while maintaining the visual appeal of a comic.

**Figure 1.** Characters in the Mathematics Comic

Character design encompasses visual design and personality development that support the delivery of material. The storyline is crafted progressively from basic concepts to complex applications, integrating entertainment with solid educational substance. The development of digital comic materials for multiplication learning requires a pedagogical foundation grounded in the integration of learning outcomes, learning objectives, and numeracy indicators into the curriculum.

**Table 3.** Achievements, Learning Objectives, and Numeracy Indicators

| Learning Achievement | Learning Objectives | Numeracy Indicator |
|---|---|---|
| At the end of Phase B, students demonstrate an understanding and intuition of number sense with whole numbers up to 10,000. They read, write, determine place value, and perform composition and decomposition of these numbers. | 1. Enhancing understanding and skills in multiplication, as well as its proper use.<br>2. Learning various methods of multiplication, including paying attention to place value, using basic calculations such as multiplication tables, and performing long multiplication. | 1. Use of various numbers and symbols.<br>2. Information analysis.<br>3. Interpretation of analysis results.<br>4. Mathematical modeling.<br>5. Mathematical communication.s. |

Learning achievements guide visual and narrative content to attain the expected competencies. Specific learning objectives serve as a guide for designing activities and dialogues in comics. Alignment with numerical indicators ensures that mathematical concepts are accurate, relevant to students' cognitive development, and presented in everyday contexts to support meaningful conceptual understanding.

**3. Development**

In this development stage, the researcher developed and tested the designed product. The product was developed to create an engaging learning medium that makes it easier for students

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to understand and calculate multiplication. In developing this learning media, it was adjusted based on numeracy indicators, including the use of various numbers and symbols, the ability to analyze information, interpret analysis results, model mathematics, and communicate mathematically (Kusumah et al., 2020).

**Table 4.** Comic Design for Mathematics Learning

| Numeracy Indicator | Comic Design |
|---|---|
| The use of various numbers and symbols |   |
| Interpretation of the Analysis Results |   |
| Information Analysis |   |

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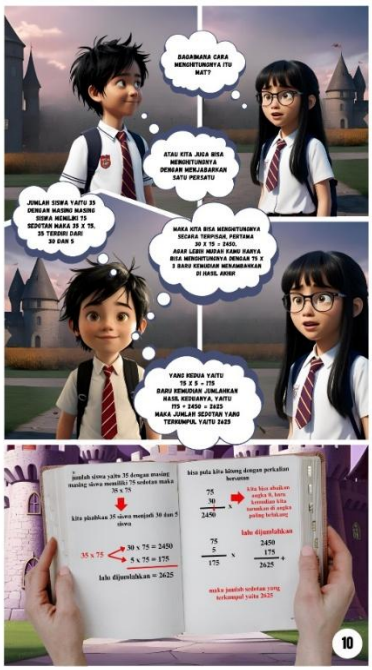
| | |
|---|---|
| Mathematical Modelling |  |
| Mathematical Communication |  |

The researcher conducted a comprehensive testing phase of the developed product or design to determine whether the product is valid and suitable for use in the classroom learning process. This product validation was carried out through two main components: expert validation of the material, which is explained in detail in Table 5 and covers important aspects such as an attractive visual appearance appropriate to the learners' characteristics, the alignment of the material's content with the curriculum and the set learning objectives, and the usefulness of the comic mathematics learning media in improving students' understanding and interest in learning. Additionally, there is expert validation of the media, which is explained in detail in Tables 6 and 7, covering the alignment of the learning material with the competency standards and basic competencies that must be achieved, as well as the appropriateness of the content

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within the comic mathematics learning media with the learners' learning needs and cognitive development level. Through this systematic and thorough validation process, it can be ensured that the developed product meets the eligibility criteria in both content and learning media before being implemented in actual teaching and learning activities.

a. Media expert

**Table 5.** Media Expert Validation Results

| No | Aspects being assessed | Score |
|---|---|---|
| **1** | **Aspect of Display/Visual Design** | |
| | 1) The suitability of letter size and shape for primary school students. | 4 |
| | 2) The suitability of color selection with the characteristics of primary school students. | 4 |
| | 3) Clarity and quality of images/illustrations. | 4 |
| | 4) Consistency of design between pages. | 4 |
| | 5) An attractive and well-organized layout. | 4 |
| | 6) Suitability of character with the age of primary school students. | 4 |
| **2** | **Aspects of Media Suitability With The Characteristics Of Primary School Students** | |
| | 7) Language suitability with the student's developmental level. | 4 |
| | 8) The duration/length of the comic that matches the level of concentration. | 4 |
| | 9) Visual interest to motivate learning. | 4 |
| | 10) Suitability of the theme with the world of primary school students. | 4 |
| **3** | **Aspect of Benefit** | |
| | 11) Digital comic media helps students understand multiplication material. | 4 |
| | 12) Digital comic media makes learning multiplication material more interesting and enjoyable. | 4 |
| | 13) Digital comic media can make it easier for teachers to deliver multiplication material. | 4 |
| | **Total** | **52** |
| | **Percentage** | **100%** |
| | **Assessment Criteria** | **Highly Suitable** |

Based on the data in the table above, the results from media experts regarding the digital comic learning media, in terms of assessment aspects, were rated by the validator as highly Suitable, with a total score of 52 and a percentage of 100%. This was then converted to a 4-point scale, placing it in the 'Very Suitable' category. Based on the evaluation results, several important recommendations for improving the learning media were identified. The main

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suggested revision is to add the developer's identity at the beginning of the video to provide credibility and clear information for users, as shown in Figure 2. The next evaluation concerns the font size, which should be enlarged to make it easier for students to read, as shown in Figure 3. The final media expert evaluation involved providing a pause sheet to the teacher; this guide helps teachers determine the appropriate time to pause during the comic media being played in the lesson, as shown in Figure 4. The aim is for students first to try answering the displayed questions, thereby encouraging classroom interaction and making the learning process lively and enjoyable.


**Figure 2.** Front Cover Before and After Repair

The cover is evaluated with a focus on the developer's identity, which must be clearly stated and easily recognizable, so that the comic has strong credibility and can be protected against misuse, such as plagiarism, unauthorized use, or illegitimate claims of ownership.

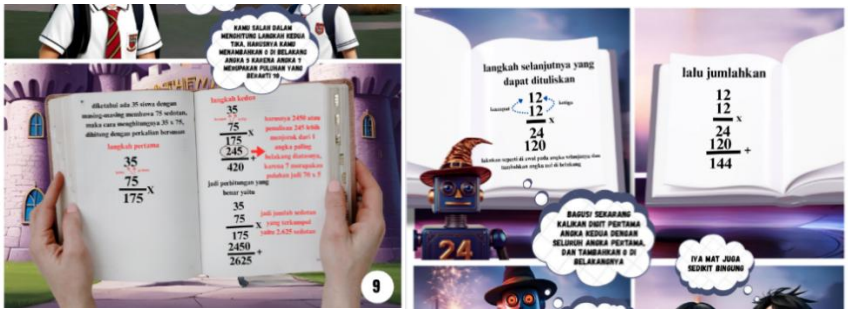


**Figure 3.** Enlarging The Size of Numbers in Multiplication Practice

The next evaluation concerns the use of font in the multiplication learning comic, where the font size should be significantly increased to make the text easier to read and more clearly understood by students. This is to prevent difficulties or obstacles in the process of understanding the multiplication learning material presented through the comic media, as good text readability is a crucial factor that can influence the effectiveness of information delivery and ensure that students can access the learning content optimally without experiencing eye strain or difficulty in identifying the letters and numbers in the comic's dialogue or narration. This way, students' focus can be fully directed toward understanding the mathematical concepts of multiplication being studied.

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**Figure 4.** Pause Guide Sheet in Comics

The pause guide sheet for comics is an essential learning tool for teachers implementing the teaching and learning process in the classroom. This guide is designed to help teachers identify the appropriate and strategic moments to pause comic media during instruction. The main goal of this pause guide is to allow students first to attempt to answer questions or solve problems that appear at certain points in the comic. Through this approach, a dynamic and meaningful interaction will be fostered in the classroom between teachers and students, as well as among students themselves, ultimately making the learning atmosphere more lively, active, and certainly enjoyable for all parties involved in the educational process.

b. Material Expert

Material experts provide validation for two criteria, namely in comics and in learning. Table 6 presents the validation for comics.

**Table 6.** Expert Material Validation Results in Comics

| No | Aspects being assessed | Score |
|---|---|---|
| **1** | **Conformity Indicator** | |
| | 1. The suitability of material in digital comic media with multiplication material in the Merdeka curriculum at elementary schools. | 4 |
| | 2. The suitability of material in digital comic media with the CP in the Merdeka curriculum at primary schools. | 3 |
| | 3. The suitability of material in digital comic media with the characteristics of third-grade elementary school students. | 4 |
| | 4. Suitability with the numerical indicators | 3 |
| **2** | **Suitable Indicator** | |

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| | | |
|---|---|---|
| | 5. The material presented in learning with digital comic media makes it easier for students to understand multiplication. | 4 |
| | 6. The material presented in learning with digital comic media broadens students' insights or knowledge. | 4 |
| | 7. The material presented in learning with digital comic media enhances students' understanding of multiplication material. | 3 |
| **3** | **Competency Indicator** | |
| | 8. The material in digital comic media can increase students' interest in mathematics lessons. | 4 |
| | 9. The material in digital comic media can help students understand multiplication in everyday life. 9 | 4 |
| | **Total** | **33** |
| | **Percentage** | **91,7%** |
| | **Assessment Criteria** | **Very Suitable** |

Next, here is Table 7 which contains the Validation Results from Subject Matter Experts in Learning

**Table 7.** Validation Results from Subject Matter Experts in Learning

| No | Aspects being assessed | Score |
|---|---|---|
| **1** | **Aspect of Material Appropriateness** | |
| | 1. Suitability of the material with the achievement and learning objectives. | 3 |
| | 2. Suitability of the material with the characteristics of primary schools. | 3 |
| | 3. The material is in accordance with the principles of differentiated learning in the Merdeka curriculum. | 4 |
| | 4. Examples and questions in accordance with the principles of numeracy indicators in mathematics. | 4 |
| **2** | **Aspect of Alignment With Student Characteristics** | |
| | 5. Language appropriate to the student's age and cognitive development. | 4 |
| | 6. Interesting and easy-to-understand material for third-grade elementary school students. | 3 |
| | 7. The questions are arranged from simple to complex according to the third grade of elementary school. | 3 |
| **3** | **Aspect of Material Completeness** | |
| | 8. Main material, examples, and evaluation questions are available. | 3 |
| | 9. There are worksheets and assessment rubrics. | 4 |

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| | |
|---|---|
| 10. The material includes questions with various cognitive levels (C2-C4). | 4 |
| **Total** | **35** |
| **Percentage** | **87,5%** |
| **Assessment Criteria** | **Very Suitable** |

Based on the data in the table above, the results from experts on the digital comic learning media and the learning material were rated by the validator as very suitable, with an overall score of 68 and an overall percentage of 89.4%. This was then converted to a 4-point scale, placing it in the 'Very Suitable' category. Based on the evaluation of the digital comic mathematics learning media, the multiplication material requires improvements in several visual aspects. The main recommended revision is to replace the image choices in one of the digital comic columns on the second page, as the image is considered inappropriate for primary school students to view. The revision changes can be seen in Figure 5.

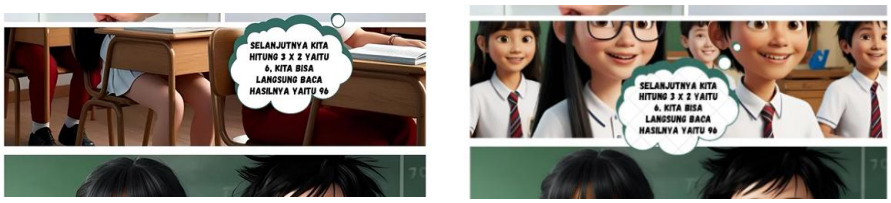


**Figure 5.** Before and After Revision

## 4. Implementation

The implementation of digital comic learning media development is a crucial stage in this process, involving 28 third-grade students as research subjects. During the trial, the developer serves as an observer, monitoring and recording the learning process, while the classroom teacher serves as the primary facilitator (see Figure 6). The teacher's role is very important because they understand students' learning needs and can integrate learning media with the teaching methods they typically use. This approach allows for the collection of objective data on the effectiveness and suitability of the learning media in real classroom conditions.

**Figure 6.** Implementation in Class

In its implementation, the mathematics learning process for multiplication begins with a 10-minute introductory activity, in which the teacher opens the class with a warm greeting, checks students' well-being, takes attendance, and assesses readiness to learn. The teacher then encourages the students through clapping or singing to create a positive atmosphere. After that,

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one student leads the prayer recitation, followed by the teacher emphasizing the importance of praying before starting learning activities to instill faith in Almighty God. Next, the teacher delivers an aperception through a series of questions to explore students' interest in today's lesson, particularly mathematics, and to connect it with the concepts of discussion and solving story problems, before finally conveying the learning objectives and explaining the activities and assessments that will be carried out.

The main activity lasts for 50 minutes and is divided into five systematic stages. It begins with the orientation phase, where students are reminded of the properties of multiplication, followed by the display of a mathematical story problem on an LCD for students to observe and analyze. Then, the teacher discusses and solves the problem together with the students, encouraging some students to express their opinions and strategies for solving it. This is followed by a contextual explanation of the multiplication material, asking students to answer questions and write down examples of multiplication applications in daily life. The second stage involves organizing students for learning: the teacher prepares a comic strip on multiplication, which students read in small groups while highlighting key information. They actively discuss the comic's content with their seatmates, alternating explanations and summarising the main idea of the story. The teacher provides additional explanations and clarifications through open-ended questions or short quizzes, then distributes worksheets (LKPD) for teacher-guided group work, with feedback provided by the teacher. The third stage involves individual or group guidance during investigation, in which the teacher provides intensive assistance to students struggling with the LKPD. The fourth stage is to develop and present the results of the LKPD through a joint discussion between students and the teacher. The fifth stage involves analyzing and evaluating the problem-solving process, in which the teacher confirms students' answers to ensure a proper understanding.

The learning session concluded with a 10-minute closing activity that provided students with the opportunity to ask questions about material they did not understand. Afterward, the teacher and students summarised the day's learning and reflected on the activities by asking the students about their feelings and which activity was most enjoyable. Before ending the entire learning sequence, the teacher invited students to complete a questionnaire assessing their responses to the digital comic used to teach multiplication, focusing on the appropriateness and content of the media.

The application of digital comic media in mathematics education demonstrated a significant positive impact on students' numeracy skills. Through a visual and interactive approach, students could master the use of numbers and mathematical symbols in various contexts, analyze quantitative information visually, interpret the results of the analysis with the help of narration, apply mathematical modeling concepts to real-world problem-solving, and enhance mathematical communication through dialogue between comic characters. The learning process became more enjoyable, meaningful, and holistic, making it easier for students to understand and apply numeracy concepts in everyday life.

As part of the implementation stage, in-depth interviews were conducted with students to assess the media's effectiveness. The interview recap can be seen in Table 8 below.

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**Table 8.** Interview Results with Students

| Student Code | Positive | Negative |
|---|---|---|
| Student 1 | Exciting adventure storyline | Explanation of 12×12 is too quick |
| Student 2 | Interesting, want to keep reading | The dialogue is too long and complex. |
| Student 3 | Funny character, motivation to study | The font is too small |
| Student 4 | I like stories about the world of mathematics | The explanation of the abacus lacks detail. |
| Student 5 | More fun than the usual method | Explanation of 84×7 is too fast |
| Student 6 | Peer-like character | Difficult calculation steps to understand |
| Student 7 | Exciting like an adventure film | Still do not understand the concept of adding a zero. |
| Student 8 | Bright colours, cute characters | Text too dense per page |
| Student 9 | Challenging question variations | The explanation of the clock is too quick |
| Student 10 | Nice, cute robot | The story transition is too fast |
| Student 11 | Interesting illustration | Multiplying large numbers is still difficult |
| Student 12 | Unique robot, understands the concept. | - |
| Student 13 | Enjoyable, understanding multiplication | - |
| Student 14 | Nice colour | Small writing is not visible |
| Student 15 | Happy reading | Want more practice questions |
| Student 16 | Exciting adventure storyline | 35×75 explanation is difficult to understand |
| Student 17 | Peer-like character | The letters are too small |
| Student 18 | The teacher's explanation is clear | Do not show the mistake first |
| Student 19 | A story like an adventure fairy tale | Many numbers at once are confusing |
| Student 20 | Interesting, fun learning | The story is too long, exhausting |
| Student 21 | Interaction with the robot is interesting | Two ways of solving too much information |
| Student 22 | Very helpful | Want more female figures |
| Student 23 | Understand faster than a regular book | Complex length calculations are exhausting |
| Student 24 | Mastering multiplication by stacking | Want color variations, a shorter story |
| Student 25 | Cool robot picture | Want more explanations about the abacus |
| Student 26 | Creative, motivated to learn | Still confused about the order of steps in counting |
| Student 27 | Funny story, not boring | Calculation of large complex numbers |
| Student 28 | Very good, clear explanation | - |

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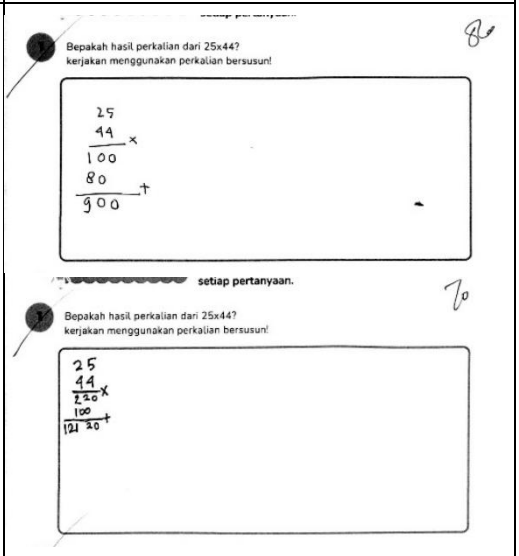
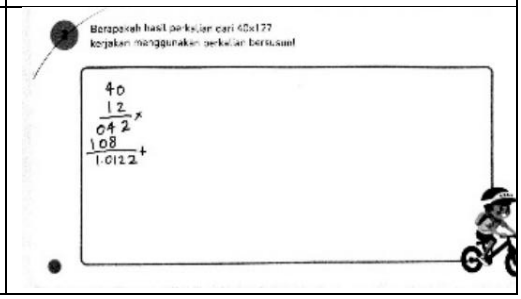
The interview revealed that students highly appreciated the comic's visualization and storyline, which made learning feel engaging. Students felt motivated by the cute character designs and bright colors. However, some complained about the small font size, text density, the speed of explanations, and the need for more systematic instruction, especially on complex topics such as multiplying large numbers and using the abacus. Some students also suggested adding animations, using color coding to differentiate calculation steps, and providing additional practice questions at the end of the story.

The individual work results showed an average score of 81.78, indicating the media's success in helping students understand and apply multiplication concepts. However, an analysis of student errors indicated that carelessness in calculations and a lack of understanding of instructions remain challenges. Errors often occurred in multi-digit multiplication involving tens and in questions requiring information analysis or interpretation of results. The students' errors can be seen in Table 9 below.

**Table 9.** Student's Errors in Completing Evaluation Questions

| **Numeracy Indicator** | **Questions** | **Student Errors** |
|---|---|---|
| The use of various numbers and symbols | What is the result of multiplying 25 by 44? Solve using long multiplication! |  |
| | What is the result of multiplying 40 by 12? Do it using long multiplication! |  |

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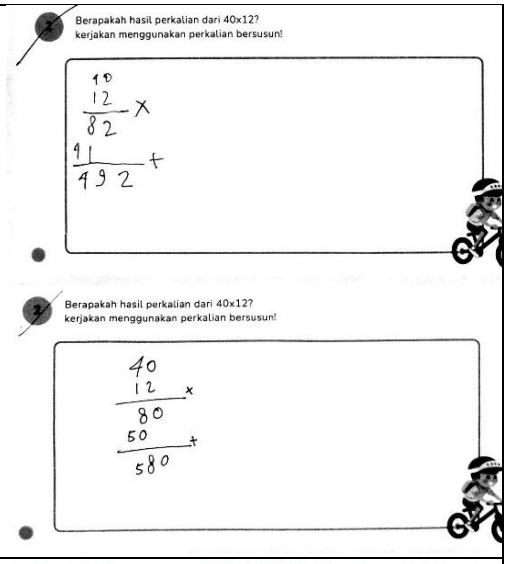
<td> 
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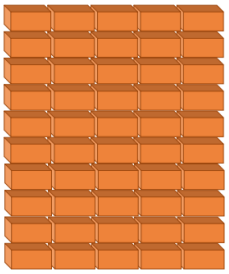
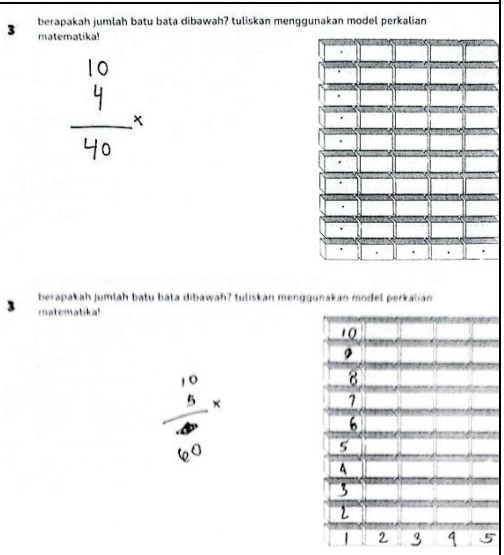
<td>Information Analysis</td>
<td>What is the number of bricks below? Write it using a multiplication model!<br>  </td>
<td> 
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<table>
<tr><th>Nama</th><th>Jumlah kelereng per kotak</th><th>Kotak yang dimiliki</th></tr>
<tr><td>Budi</td><td>11</td><td>10</td></tr>
<tr><td>Intan</td><td>20</td><td>7</td></tr>
<tr><td>Sari</td><td>18</td><td>14</td></tr>
</table>
Look at the table above! How many marbles does Intan have?</td>
<td>
<table>
<tr><th>Nama</th><th>Jumlah kelereng per kotak</th><th>Kotak yang dimiliki</th></tr>
<tr><td>Budi</td><td>11</td><td>10</td></tr>
<tr><td>Intan</td><td>20</td><td>7</td></tr>
<tr><td>Sari</td><td>18</td><td>14</td></tr>
</table>
4 perhatikan tabel diatas!<br>berapakah jumlah kelereng yang dimiliki oleh intan?</td>
</tr>
<tr>
<td>Interpretation of the Analysis Results</td>
<td>
<table>
<tr><th>Nama</th><th>Jumlah kelereng per kotak</th><th>Kotak yang dimiliki</th></tr>
<tr><td>Budi</td><td>11</td><td>10</td></tr>
<tr><td>Intan</td><td>20</td><td>7</td></tr>
<tr><td>Sari</td><td>18</td><td>14</td></tr>
</table>
Pay attention to the table above! From the table above, who has the most marbles?</td>
<td>
<table>
<tr><th>Nama</th><th>Jumlah kelereng per kotak</th><th>Kotak yang dimiliki</th></tr>
<tr><td>Budi</td><td>11</td><td>10</td></tr>
<tr><td>Intan</td><td>20</td><td>7</td></tr>
<tr><td>Sari</td><td>18</td><td>14</td></tr>
</table>
5 perhatikan tabel diatas!<br>dari tabel diatas, siapakah yang memiliki kelereng paling banyak? Intan</td>
</tr>
</table>

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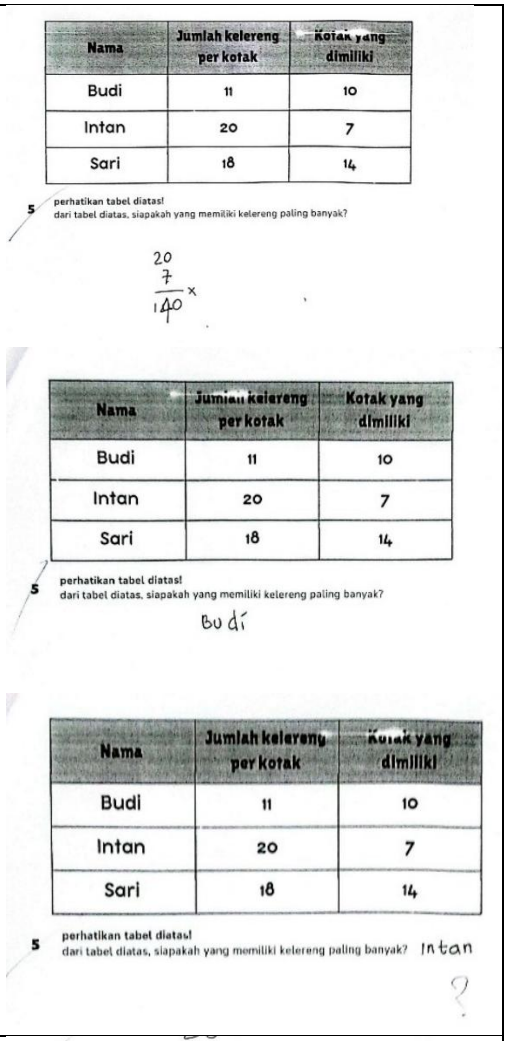

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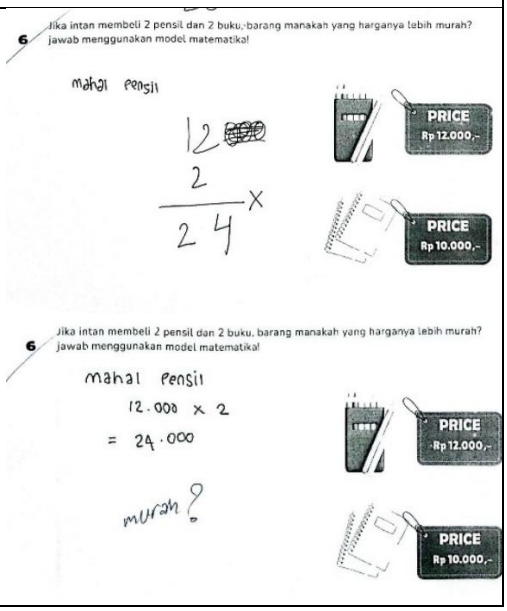
<td></td>
<td>If Intan buys 2 pencils and 2 books, which item is cheaper? answer using the model matematika!




</td>
<td>


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| | | |
|---|---|---|
| | | 6 Jika intan membeli 2 pensil dan 2 buku, barang manakah yang harganya lebih murah? jawab menggunakan model matematika!<br>12<br>10 ×<br>12<br>12<br>24<br>  |
| Mathematical Modelling | Mr. Budi has 4 chicken coops, and each coop contains 20 chickens. What is the total number of chickens Mr. Budi has? Write it in multiplication form! | All students can answer correctly |
| | He cycles 11 kilometers every day. If he cycles for 31 days, what is the total distance Doni has covered? | 8 oni bersepeda sejauh 11 kilometer setiap hari. Jika ia bersepeda selama 31 hari, berapa total jarak yang sudah ditempuh Doni?<br>11<br>31 ×<br>11<br>13 +<br>151<br>8 oni bersepeda sejauh 11 kilometer setiap hari. Jika ia bersepeda selama 31 hari, berapa total jarak yang sudah ditempuh Doni?<br>11<br>31 ×<br>11<br>31 +<br>42 |
| Mathematical Communication | Draw a marble using the 11x6 multiplication model! | 9 Gambarkanlah kelereng dengan model perkalian 11x6! |

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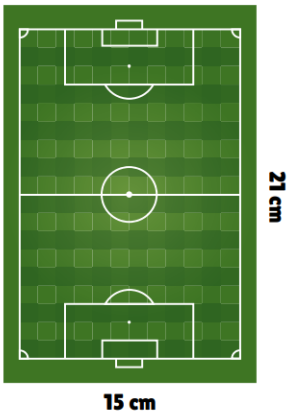
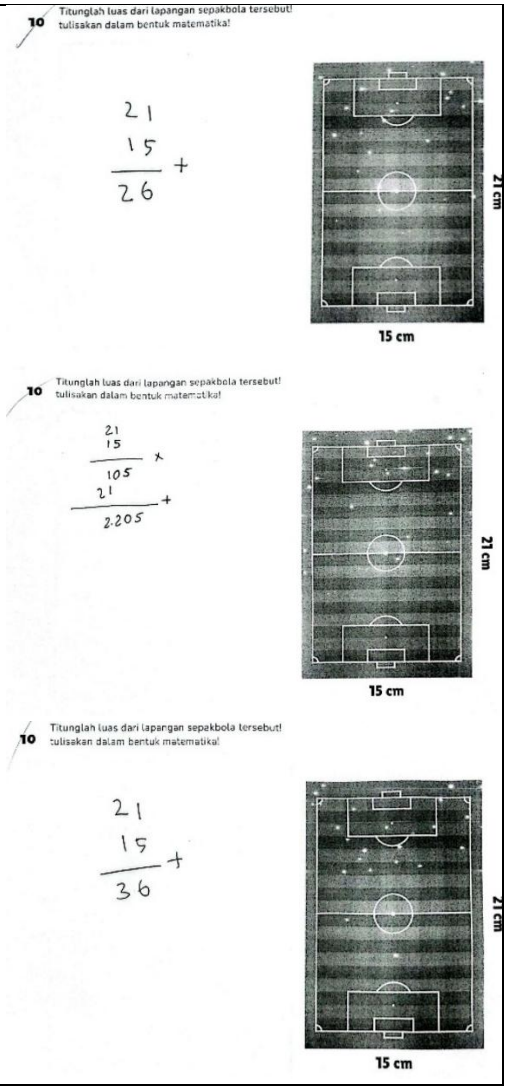
| | | |
|---|---|---|
| | Calculate the area of the football field! Write it in mathematical form!<br>  <br> |  <br> |

This finding confirms that although students' conceptual understanding is quite good, their practical execution skills and attention to detail need improvement. Factors such as rushing through questions, failing to recheck, and weak reading comprehension are the main causes. Therefore, a learning strategy that combines digital comic media with systematic procedural exercises, reinforcement of question-reading skills, and greater focus on accuracy will better optimize learning effectiveness. With these improvements, digital comic learning media has the potential to become an innovative tool that not only enhances understanding of mathematical concepts but also fosters careful, interactive, and enjoyable learning habits for primary school students.

## 5. Evaluation

At the evaluation stage, the final part of the learning process, systematic improvements are made to the educational comic based on feedback and suggestions from structured interviews with students on elements still considered to have shortcomings and requiring further refinement.

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**Table 10.** Student Evaluation of Digital Comic Learning Media

| Before revision | After Revision |
|---|---|
|   |   |
|  |  |
|  |  |

Furthermore, at this stage, an analysis of the practicality of comic media was conducted by administering questionnaires to third-grade students and teachers. The results of the third-grade teachers' responses showed a percentage of 84.72% with the criterion of 'Very Practical', and the students' responses showed a percentage of 95.53% with the criterion of 'Very Practical'. This research provides a comprehensive overview of the benefits, effectiveness, and practicality of using digital comic learning media for multiplication topics to facilitate the numeracy skills of third-grade primary school students. Thus, the multiplication learning comic media has produced a product that is valid, Suitable, effective, and practical for use in the

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learning process of third-grade primary school students. The following is a recap of teachers' responses, as shown in Table 11

**Table 11.** Summary of Teacher Response Questionnaire

| Jumlah aspek yang dinilai | Perolehan skor | Presentase rata-rata |
|---|---|---|
| 18 | 61 | 84,72 |

Meanwhile, the student response recap is shown in Table 12.

**Table 12.** Recapitulation of Student Response Questionnaires

| Jumlah aspek penilaian | Jumlah siswa | Presentase rata-rata | kategori |
|---|---|---|---|
| 12 | 28 | 95,53% | Sangat praktis |

The results of the practicality analysis, showing a teacher response rate of 84.72% and an average student response of 95.53%, confirm that comic mathematics learning media for multiplication is highly practical for use as a teaching medium in Grade III elementary schools. These findings are consistent with several recent studies indicating the high effectiveness of comic media for mathematics learning at the elementary level. A similar study on the use of comic media in learning, Astuti & Rahayu (2023), also reports consistent findings on the acceptance and effectiveness of comic media in mathematics education. The high percentage of positive responses from students, 95.53%, suggests that the visual and narrative characteristics of comics can create strong engagement in the learning process, in accordance with multimedia learning theory, which states that the combination of text and images can enhance understanding of abstract mathematical concepts, making them more concrete and easier to remember. Meanwhile, the teacher response rate of 84.72% indicates that comic media is not only appealing to students but also considered practical from a pedagogical perspective, as it facilitates the delivery of material, saves preparation time, and aligns with the characteristics of elementary school learning. Developmental research on mathematics comic media (Danaswari et al., 2024) further supports the validity of these findings. These results also confirm that comic mathematics media meet the criteria of practicality in implementation, including ease of use, curriculum suitability, time efficiency, and the ability to increase motivation and student learning outcomes, thus making it a viable alternative innovative, and effective learning media to support the achievement of mathematics competencies at the elementary school level.

## 4. CONCLUSION

Based on the problem formulation developed through research and development, it can be concluded that the development of the digital multiplication learning comic media has been carried out comprehensively using the ADDIE development model. The process spans from the needs analysis stage through the design stage, including collecting reference books and designing comic layouts in Canva. After designing the media, the supervising lecturer and validators from the media and material expert groups conducted checks and revisions to ensure suitability for student needs. Each step was completed effectively to create creative and innovative learning media. The validity and feasibility of the mathematics learning comic

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media have been demonstrated through assessments from both material experts and learning media experts. This media is considered "Very Suitable" for use in the learning process. This confirms that the development of multiplication learning comics makes a significant contribution to improving the quality of learning. The effectiveness of comic learning media in facilitating the numeracy skills of third-grade elementary school students has been shown to be significant. The practicality of digital comic learning media for multiplication material is evident from the positive responses received from teachers and third-grade elementary school students. This educational comic learning media is not only effective in improving social skills but also practical to use in the learning process.

Thus, the development of digital comic learning media for multiplication material to facilitate the numeracy skills of third-year students has produced a valid, Suitable, effective, and practical product for use in the learning process of third-year primary school pupils. This involved media experts and subject matter specialists in the validation process, and the product has proven to meet quality standards to support the numeracy abilities of third-year primary school pupils. For future researchers interested in further exploring the use of technology in mathematics education, digital comic learning media has demonstrated significant ease in the multiplication learning process. Therefore, it is hoped that third-year teachers in primary schools can adopt and implement this digital comic learning media optimally in classroom teaching activities, so that students can be more motivated, their interest in learning multiplication can be increased, and ultimately, they can achieve better learning outcomes in line with the set learning objectives. Additionally, teachers are expected to continue developing creativity and innovation in designing, developing, and implementing various more diverse learning media that suit students' characteristics to support the learning process in the classroom, including utilising increasingly advanced digital technology to create more meaningful and effective learning experiences for students.

## 5. REFERENCES

Arrafi, M. F. (2020). Peningkatan pemahaman konsep perkalian melalui media pembelajaran interaktif. *Jurnal Pendidikan Matematika*, 8(1), 45–53.

Astuti, R., & Rahayu, D. (2023). Efektivitas penggunaan media komik dalam pembelajaran matematika sekolah dasar. *Jurnal Ilmiah Pendidikan Dasar*, 7(2), 101–112.

Danaswari, P., dkk. (2024). Media komik matematika untuk meningkatkan kemampuan berhitung siswa sekolah dasar. *Jurnal Pendidikan Dasar Indonesia,* 9(1), 23–34.

Insani, F., Kurniawati, E., & Wibowo, T. (2023). Pengembangan media pembelajaran berbasis digital pada pembelajaran matematika. *Jurnal Teknologi Pendidikan*, 11(2), 56–65.

Kementerian Pendidikan dan Kebudayaan. (2020). *Kurikulum Merdeka Belajar: Panduan pelaksanaan di Sekolah Dasar*. Jakarta: Kemendikbud.

Kusumah, Y. S., Nisa, A., & Putra, R. A. (2020). Analisis numerasi dalam pembelajaran matematika sekolah dasar. *Jurnal Riset Pendidikan Matematika*, 7(1), 12–24.

Kusumasari, D. (2021). Analisis kesulitan siswa dalam menghafal perkalian dasar. *Jurnal Pendidikan Dasar*, 6(2), 88–96.

Mayer, R. E. (2021). *Multimedia learning* (3rd ed.). Cambridge University Press.

Mbagho, Y. (2021). Peran guru dalam pembelajaran matematika di sekolah dasar. *Jurnal Pendidikan*, 15(3), 211–220.

DOI: http://doi.org/ 10.17509/j-mer.v7i1.937
e- ISSN 3047-1095

Nuraini, A., Suryani, I., & Wahyuni, T. (2021). Penggunaan komik digital dalam pembelajaran matematika sekolah dasar. *Jurnal Inovasi Pendidikan Matematika*, 12(2), 155–167.

Prensky, M. (2021). *Teaching digital natives: Partnering for real learning*. Corwin Press.

Rahmata, A. (2020). Pentingnya matematika dalam kehidupan sehari-hari. *Jurnal Pendidikan Matematika dan Sains*, 5(1), 34–42.

Sari, R., & Wijaya, H. (2021). Komik digital interaktif untuk meningkatkan keterlibatan siswa dalam pembelajaran matematika. *Jurnal Teknologi dan Pendidikan*, 3(4), 45–53.

Sudjana, N., & Rivai, A. (2011). *Media pengajaran*. Sinar Baru Algensindo.

Sugiyono. (2013). *Metode penelitian pendidikan pendekatan kuantitatif, kualitatif, dan R&D.* Alfabeta.

Suliastika, R. (2025). Media komik sebagai inovasi pembelajaran matematika. *Jurnal Pendidikan Dasar Nusantara*, 10(1), 77–86.

Toh, T. L., Ho, S. Y., & Koh, N. K. (2018). Digital comics in mathematics learning. *International Journal of Mathematical Education in Science and Technology*, 49(6), 922–940.

Vygotsky, L. S. (2020). *Mind in society: The development of higher psychological processes.* Harvard University Press.

DOI: http://doi.org/ 10.17509/j-mer.v7i1.937
e- ISSN 3047-1095