E ISSN : 2620-8911
P ISSN : 2620-8903

EDUMATIKA

Jurnal Riset Pendidikan Matematika

Published by :
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Institut Agama Islam Negeri
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Vol. 8 No. 2 (2025): November 2025, Edumatika : Jurnal Riset Pendidikan Matematika

In November 2025 (Volume 8 Issue 2), EDUMATIKA: Jurnal Riset Pendidikan Matematika (EJRPM) published articles that were written by researchers from various affiliations in Indonesia and Philippines such as Universitas Negeri Surabaya, Universitas Negeri Padang, Universitas Singaperbangsa Karawang, Universitas Muhammadiyah Prof. Dr. HAMKA, Universitas Jambi, Universitas Pendidikan Indonesia, and Central Luzon State University. In addition, as of November 2025, EJRPM articles have been cited by more than 80 articles on Scopus.

DOI: https://doi.org/10.32939/ejrpm.v8i2

PUBLISHED: 2025-10-30

ASSESSMENT IN MATHEMATICS EDUCATION

Developing and Validating MCA-Equivalent Summative Assessment in Combinatorics Using Aiken's V Method

Nurjihan Nabilah[(1)], **Sovy Dia Permata Sari**[(2)], **Yurizka Melia Sari**[(3)],

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114-128

PDF

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Abstract views: 122 |

THINKING AND SKILLS IN MATHEMATICS EDUCATION

The Interaction between Mathematical Problem-Solving Skills and Mathematical Communication Skills of Junior High School Students: A Qualitative Approach

Hamdani Syaputra[(1)], **Armiati Armiati**[(2)], **Yulyanti Harisman**[(3)],

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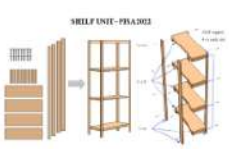

Revealing the Numeracy Skills of Eighth-Grade Students in Solving PISA 2022 Quantity Content Problem

Jihan Adi Pradypta[(1)], **Duano Sapta Nusantara**[(2)], **Ranisa Junita**[(3)], **Florante P Ibarra**[(4)],

(1) Universitas Jambi, Indonesia

181-194

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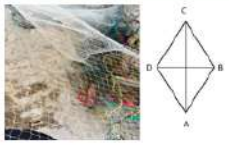

Exploring of Ethnomathematics in the Local Culture of North Karawang Coastal Fishermen for Elementary School Mathematics

Diah Pitaloka[(1)], **Indrie Noor Aini**[(2)],

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REALISTIC CONTEXTS IN MATHEMATICS EDUCATION

Modifying Uno Cards as Learning Media for Enhancing Numeracy Skills of Elementary Students in Whole Number Topic

Sherly Dwi Octaviani[(1)], **Ima Mulyawati**[(2)],

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DOI : https://doi.org/10.32939/ejrpm.v8i2.5849

Emergent Modeling in Probability Learning: A Learning Trajectory Using Spinning Top Game (Gasing) Context

Endah Nawang Wulan[(1)], **Sugiman Sugiman**[(2)], **Minarni Minarni**[(3)], **Rira Jun Fineldi**[(4)],

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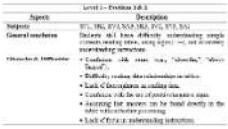
PSYCHOLOGY IN MATHEMATICS EDUCATION



Students' Obstacles and Difficulties in Mathematical Literacy Based on Skill Levels and Learning Styles

Irma Amelia[(1)], **Tatang Herman**[(2)], **Lukman Lukman**[(3)],

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P-ISSN : 2620-8903

Modifying Uno Cards as Learning Media for Enhancing Numeracy Skills of Elementary Students in Whole Number Topic

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DOI: https://doi.org/10.32939/ejrpm.v8i2.5849

Keywords: Elementary Education, Mathematics Learning Media, Modified Uno Cards, Numeracy Skills, Whole Number

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ABSTRACT

Numeracy is a fundamental competence that supports students' ability to apply mathematical concepts in everyday situations. However, many elementary school students still face difficulties in understanding whole number concepts, which are essential for developing higher-order numeracy. This study aims to develop and validate a modified Uno card game called Party Math as a learning media to enhance students' numeracy skills in the topic of whole numbers. The research employed a Research and Development (R&D) approach adapted from the ADDIE model, consisting of the stages of Analysis, Design, Development, Implementation, and Evaluation. Data were collected through expert validation questionnaires, student response questionnaires, and pre-test and post-test results. The data were analyzed using descriptive and quantitative techniques. The results show that the modified Uno card game meets the criteria of validity, practicality, and effectiveness. Expert evaluations from subject matter specialists, media experts, and teachers indicated that the media is highly suitable for classroom use. Student responses also revealed that the game is engaging, easy to play, and helps them understand whole number operations. Therefore, the Party Math card game can be recommended as an effective and enjoyable tool to strengthen numeracy learning in elementary schools.

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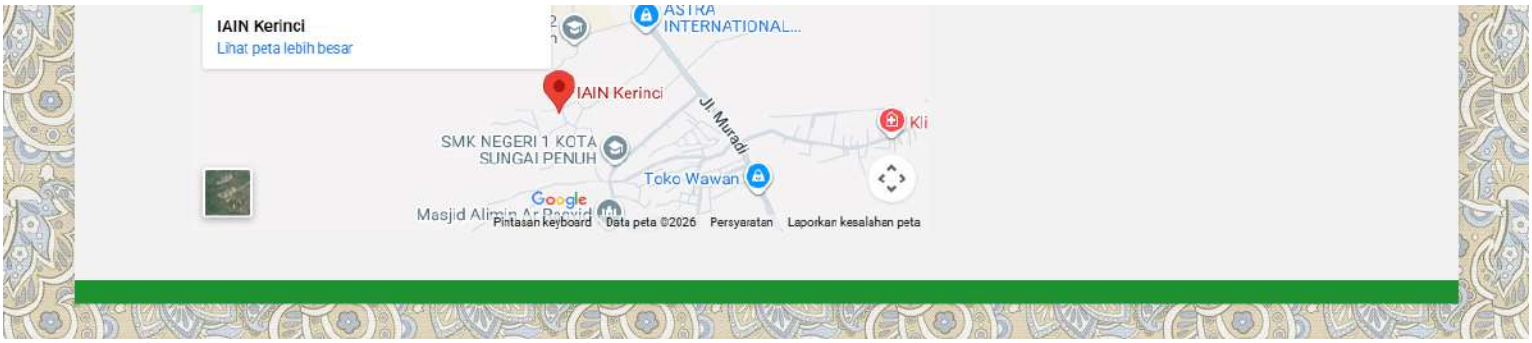
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Modifying Uno Cards as Learning Media for Enhancing Numeracy Skills of Elementary Students in Whole Number Topic

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Abstract. Numeracy is a fundamental competence that supports students' ability to apply mathematical concepts in everyday situations. However, many elementary school students still face difficulties in understanding whole number concepts, which are essential for developing higher-order numeracy. This study aims to develop and validate a modified Uno card game called Party Math as a learning media to enhance students' numeracy skills in the topic of whole numbers. The research employed a Research and Development (R&D) approach adapted from the ADDIE model, consisting of the stages of Analysis, Design, Development, Implementation, and Evaluation. Data were collected through expert validation questionnaires, student response questionnaires, and pre-test and post-test results. The data were analyzed using descriptive and quantitative techniques. The results show that the modified Uno card game meets the criteria of validity, practicality, and effectiveness. Expert evaluations from subject matter specialists, media experts, and teachers indicated that the media is highly suitable for classroom use. Student responses also revealed that the game is engaging, easy to play, and helps them understand whole number operations. Therefore, the Party Math card game can be recommended as an effective and enjoyable tool to strengthen numeracy learning in elementary schools.

Keywords: Elementary Education; Mathematics Learning Media; Modified Uno Cards; Numeracy Skills; Whole Number

Abstrak. Kemampuan numerasi merupakan kompetensi dasar yang mendukung kemampuan siswa dalam menerapkan konsep matematika dalam situasi kehidupan sehari-hari. Namun, banyak siswa sekolah dasar masih mengalami kesulitan dalam memahami konsep bilangan cacah, yang menjadi dasar penting dalam pengembangan kemampuan numerasi tingkat lanjut. Penelitian ini bertujuan untuk mengembangkan dan memvalidasi permainan kartu Uno yang dimodifikasi bernama Party Math sebagai media pembelajaran untuk meningkatkan kemampuan numerasi siswa pada materi bilangan cacah. Penelitian ini menggunakan pendekatan Research and Development (R&D) yang diadaptasi dari model ADDIE, yang terdiri atas tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Data dikumpulkan melalui angket validasi ahli, angket respons siswa, serta hasil pre-test dan post-test, kemudian dianalisis menggunakan teknik deskriptif-kuantitatif. Hasil penelitian menunjukkan bahwa permainan kartu Uno yang dimodifikasi memenuhi kriteria valid, praktis, dan efektif. Penilaian dari ahli materi, ahli media, dan pendidik menunjukkan bahwa media yang dikembangkan sangat layak digunakan dalam pembelajaran di kelas. Respons siswa juga mengindikasikan bahwa permainan ini menarik, mudah dimainkan, dan membantu mereka memahami operasi bilangan cacah. Dengan demikian, permainan kartu Party Math dapat direkomendasikan sebagai media pembelajaran yang efektif dan menyenangkan untuk memperkuat kemampuan numerasi di sekolah dasar.

Kata Kunci*:* Bilangan Cacah; Media Pembelajaran Matematika; Modifikasi Kartu Uno; Numerasi; Pendidikan Dasar

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Email: edumatika@iainkerinci.ac.id
DOI: https://doi.org/10.32939/ejrpm.v8i2.5849

EDUMATIKA: Jurnal Riset Pendidikan Matematika *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

INTRODUCTION

In Indonesian education, mathematics is one of the subjects that must be studied from the elementary level to higher education. It helps students learn to think logically, critically, objectively, and carefully from an early age (Maskar et al., 2020). Mathematics is also very essential as the foundation for other subjects and for solving daily problems. However, many students still percieve mathematics as a boring and difficult subject due to its abstract and difficult to understand and boring subject. Based on this assumption, mathematics will continue to be something to be feared, making students less interested in learning mathematics and prone to boredom (Anderha & Maskar, 2021). This difficulty arises because mathematical concepts are often presented without sufficient contextualization. In addition, the lack of variety in learning approaches makes mathematics learning boring. As a result, interest in learning mathematics decreases, which has a direct impact on students' numeracy skills.

Numeracy skills are essential because they enable students to understand number concepts and apply them meaningfully in everyday situations. According to Setiawan & Sukamto (2021), numeracy is a basic ability to help students in understanding the number concepts and arithmetic operations in daily contexts. Similarly, Nurhayati et al., (2022) define numeracy as the ability to apply number concepts and arithmetic skills in real-life situations, such as household tasks, community activities, or interpreting quantitative information around us. Whole numbers up to 1000, defined as a group of integers without negative numbers or as a group of natural numbers including 0 (Purwaningrum & Ahyani, 2024), are fundamental in developing numeracy competence**.** Although students frequently encounter such numbers in daily life, they often fail to grasp the underlying concepts of calculation, leading to low numeracy performance in mathematics.

Preliminary observations at an elementary school in South Jakarta showed that students often found mathematics lessons on integer operations boring. Students showed low participation in classroom and had difficulty solving problems involving numbers operation. Interviews with classroom teachers revealed that students' numeracy levels varied widely, particularly in topics related to integer operations. Furthermore, the numeracy scores of third-grade students were below the minimum mastery criteria (KKM). Based on the results of students' numeracy in 2023 and 2024 AKM (Minimum Competency Assessment) in Figure 1, the average numeracy score for 2023 was 29.48, while the numeracy score for 2024 was 24.56. These results indicate problems in concept comprehension and suggest that the learning process has not been running optimally. If not addressed immediately, it can hinder students' academic progress, both in the short and long term. One of the main causes was the lack of varied learning approaches and interactive learning media. Therefore,

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there is a need for innovative learning methods that engage students and at the same time help student understand integer operations easily.

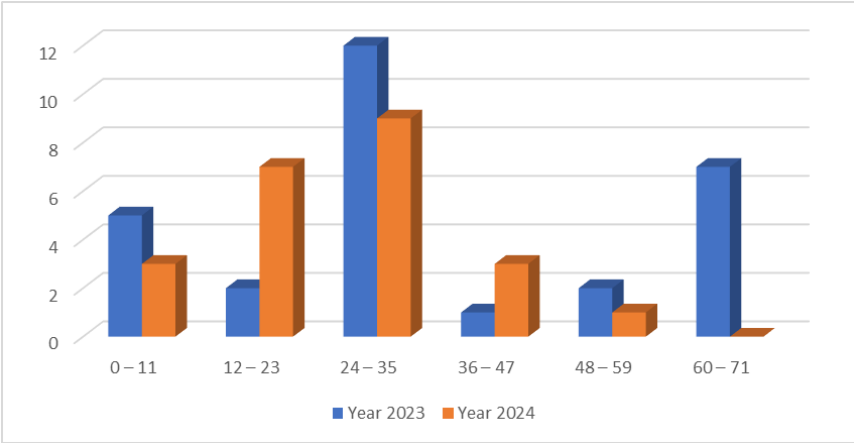

Figure 1. Students Score in 2023 and 2024 AKM (Minimum Competency Assessment in Indonesia)

Learning media plays an important role in helping students learn material more easily and enjoyably. With the right approach, the media can bridge the gap between abstract concepts and concrete experiences of students, so that the learning process becomes more effective and meaningful. According to Wahab et al. (2021), media refers to all means used to disseminate information, while learning is an effort to teach students through the interaction of human elements, materials, facilities, equipment, and procedures to achieve learning goals. Learning media is a learning resource that can assist teachers in teaching and learning process so that the learning objectives can be achieved effectively and efficiently. Teachers can use various types of learning media to provide knowledge to students (Kustandi & Darmawan, 2020). Developmental learning media is anything that can be used to convey messages or learning information specifically designed to improve students' understanding and skills. Therefore, the selection and development of suitable learning media can significantly enhance the quality of teaching and learning and can help students achieve their maximum learning potential.

In response to these needs, the researcher developed learning media in concrete form called Party Math that inspired from Uno cards. Uno cards game is one of the most famous family card games in the world, with fairly easy rules for people over the age of seven (Harahap et al., 2022). The Party Math card game is created through a printing process that results in text, graphics, and photos or images, making it fall under the category of visual-based print media. Each card, measuring 6 x 9 cm, incorporates a picture introducing Indonesian culture. The visual appeal and cultural integration make the cards more engaging while also serving as a playful way to strengthen students' numeracy through problem-based cards.

Based on an analysis of previous studies, educational media derived from Uno cards have been proven effective, practical and feasible for mathematics learning. Harahap et al. (2022), found that

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Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

Uno-based media were effective and practical for teaching the concepts of flat shapes; Harlin & Arini (2023), proved the feasibility and positive impact on learning outcomes on the unit of weight topic; and Tutriani et al. (2023), found that Uno media was effective in improving integer operation skills. This research has similarities with the third study regarding the use of Uno-based media and adopting a development model, which includes expert validation and effectiveness testing through pre-test and post-test designs. However, few studies have developed Uno-based media that integrate Indonesian culture elements. Therefore, this research aims to develop learning media namely Party Math, a modified Uno Cards, and to assess its validity, practical, and effective in improving numeracy skills.

METHODS

This study employed a Research and Development (R&D) approach using ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model was chosen because according to the product development steps, it is more rational and more complete (Maydiantoro, 2021). This model also can be used for various types of product development, including models, learning strategies, methods, media, and teaching materials (Rayanto, 2020). This study developed concrete learning media namely Party Math, a modified Uno Cards, and to test its effectiveness in improving numeracy skills. Figure 2 illustrates the ADDIE development model.

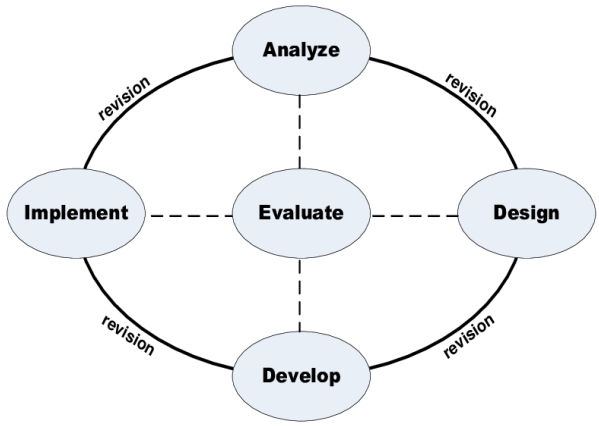

Figure 2. The ADDIE Development Model

At the analysis stage, the researcher identified the needs of students and teachers to update and create appropriate media. Initial observations, pretest, and interviews were conducted with third-grade teachers to analyze classroom challenges in numeracy learning, especially regarding small numbers topic. The examples of problems in pretest are presented in Table 1. In the design stage, the initial product is designed according to needs such as planning the content of the numeracy material for small numbers in accordance with the learning outcomes of the Merdeka Curriculum. The design process included designing the appearance and rules of the card game, and preparing research

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instruments such as validation questionnaires and pre- and post-test problems. These instruments were designed to assess content quality, usability, and learning effectiveness.

Table 1. Problems in Pre-test and Its Indicators

No	Problems	Indicators Measured	Learning Objectives	Format
1	Dina has 3 boxes containing different numbers of marbles. Count the total number of marbles and divide them equally among 6 friends.	Solve mixed operations with whole numbers in the context of division.	Students are able to calculate the total of mixed numbers and divide them evenly.	Description
2	Mr. Budi brought 3 boxes of bottles with different numbers and divided them among 12 classes.	Completing mixed calculations (addition and subtraction) and division in the context of everyday life.	Students are able to calculate the total number of objects and divide them proportionally.	Description
3	The library has 125 books. Each month, 15 are borrowed and 10 are returned over a period of 3 months.	Use repeated calculations (subtraction and addition) to determine the remaining number of items.	Students are able to calculate changes in the number of items over a certain period of time.	Short answer
4	Toni arranges blocks in a pattern that increases by 5 each row (5, 10, 15, ...).	Determining number patterns based on simple arithmetic sequences.	Students are able to recognize and continue number addition patterns.	Short answer
5	Siti plants flowers every day with a pattern of increasing by 2 flowers per day.	Identify and determine sequential number patterns.	Students can identify growth patterns and calculate the next value.	Short answer
6	The janitor arranges chairs in the hall (5, 10, 15, ...).	Determine the pattern and total number in a simple number sequence.	Students are able to analyze patterns and calculate the total number of objects.	Description
7	Competition scoring system: correct +3, incorrect -1, no answer 0. Calculate Rana's total score.	Using mixed calculations with positive and negative numbers.	Students can determine the assessment results based on the point rules.	Description
8	Rani saves an additional Rp1,000 every day (1,000, 2,000, 3,000, ...).	Determine the pattern of repeated addition in the context of money.	Students are able to find the amount of savings based on the daily increase pattern.	Short answer
9	Lani has 3 pencil boxes, gives some away, and buys more.	Using mixed calculations (multiplication, subtraction, addition).	Students are able to solve everyday problems using mixed operations.	Short answer
10	A farmer picks apples at a constant rate every day.	Determine the number pattern and calculate the total yield based on the number sequence.	Students are able to explain and calculate the pattern of daily harvests.	Description

At development stage, the design that has been made was implemented by researchers and subsequently validated by two media experts and one material expert. The media experts were lecturers in educational technology who understands the principles and characteristics of learning media design for elementary school children. While the material expert was a lecturer in elementary mathematics education who understands numeracy and elementary school curriculum. The validation instrument was questionnaires using a 5-point Likert scale, including aspects of content feasibility, presentation, language, and media display. The validation questionnaire consisted of 15 items for

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Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

material experts and 12 items for media experts. The instruments were first tested for content validity through expert judgment and for reliability using the Cronbach's Alpha formula. Table 2 presents the criteria for assessing media suitability.

Table 2. Criteria for Media Suitability

Presentase	Kriteria
80%-100%	Very Suitable
60% - 80%	Suitable
40% - 60%	Moderately Suitable
20% - 40%	Less Suitable
0% - 20%	Very Unsuitable

The implementation stage was conducted with 20 third-grade students under the guidance of one classroom teacher. The learning session used Party Math cards in small groups. To evaluate students' learning outcomes, a pre-test and post-test were administered, each consisting of ten multiple-choice problems related to numeracy concepts. Additionally, response questionnaires were distributed to both students (10 items) and educators (8 items) using a 5-point Likert scale. These instruments were also validated for reliability and content validity.

Lastly, the evaluation was conducted formatively throughout the development process and summatively at the end. The evaluation results include quantitative data from expert validation, student and teacher responses, and pre-test and post-test scores. The data was analyzed using descriptive-quantitative method to determine the feasibility and effectiveness of the learning media in improving numeracy skills in the whole numbers topic.

RESULTS AND DISCUSSION

Analysis

At this stage, two main activities were carried out: task analysis and needs analysis. In the task analysis, the school identified several key problems such as students' weak conceptual understanding, limited connection between materials and real-life situations, and low classroom engagement. These issues were confirmed by the low pre-test scores, as shown in Figure 3.

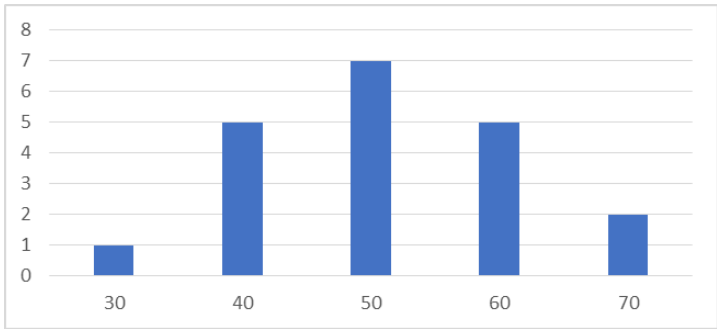

Figure 3. Pre Test Score Results

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Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

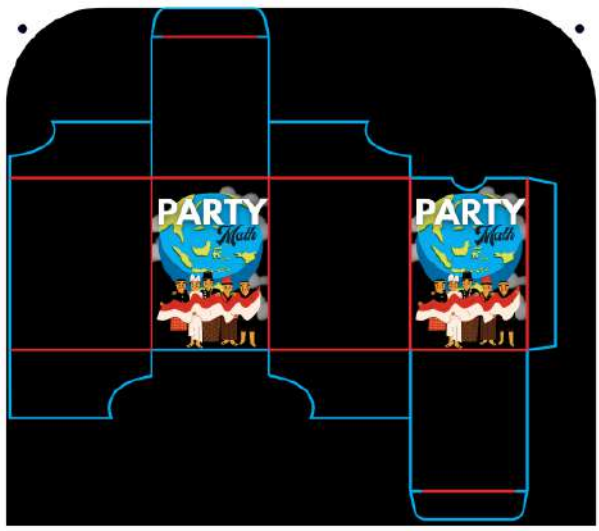
The low pre-test results indicate three main learning challenges: insufficient understanding of integer operations, lack of student interest in mathematics, and limited use of interactive learning materials. Students' written responses also showed errors in applying mixed arithmetic operations. Meanwhile, in the needs analysis, mathematics learning on integer material was found to rely heavily on conventional approaches such as lectures and textbook exercises. Learning resources were limited to worksheets and teacher explanations, resulting in passive learning. Interviews with teachers confirmed that students struggled to understand integer operations and exhibited low numeracy performance.

These findings showed that students lacked interest in conventional mathematics learning and experienced difficulties understanding basic concepts. Therefore, developing modified Uno cards called Party Math cards, was considered necessary to increase students' engagement and conceptual understanding. According to Piaget's constructivist theory, children learn best through play-based experiences that allow them to construct knowledge meaningfully. Vygotsky's sociocultural theory emphasizes the importance of social interaction in learning, which can be fostered through games. Additionally, multimedia learning theory explains that learning is more effective when students receive information in both visual and verbal forms simultaneously (Akbar et al., 2023). The Party Math cards integrate numbers, symbols, colors, and cultural illustrations, stimulating both visual and verbal processing.

Design

Designing the Packaging of the Party Math Cards

To make learning media more interesting and effective, the Party math packaging design was created. This packaging design combines elements of Indonesian culture with educational illustrations that aim to strengthen local identity and increase students' desire to learn. The prototype packaging design that will be used to store the game cards for greater practicality and durability is shown in Figure 2.



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Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

Figure 4. Packaging Design Combines Elements of Indonesian Culture

Designing the Shape of the Cards

Using a fun and contextual approach, the Party Math card design aims to help students learn numeracy. Local values are incorporated into the learning materials through the use of numbers, symbols, and images of Indonesian culture on each card (see Figure 5). To help students learn logical thinking, there are story-based contextual problem cards. Students are more motivated to learn because the selection of colors, icons, and visual characters is based on readability and visual appeal.

Determining the Appropriate Font

To create the Party Math cards, the Raleway font was used. This font was chosen because it has a clean, contemporary look and is easy for elementary school students to read. The bold yet friendly appearance of the Raleway font helps to clarify the numbers and text on the cards. This reduces confusion and improves students' focus on the learning material. In addition, Raleway supports a simple yet attractive visual design style that is in line with the cultural representation displayed on the cards. Educational design strategies consider readability, visual comfort, and learning appeal when selecting this font.

Determining the Images to Be Used

This stage is a key element in the instructional media design process, as the images selected influence visual appeal, message relevance, and communication effectiveness. In developing the Party math instructional materials, images were carefully selected to fulfill two main objectives: fostering mathematical concept understanding and integrating local Indonesian cultural values. Image selection is guided by instructional design principles such as relevance, simplicity, and visual contrast. The illustrations used reflect Indonesia's cultural diversity through traditional costumes and buildings from various regions, fostering emotional connections and pride in students' local identities (see Figure 5). Furthermore, images must be easily recognizable and free from confusing visual elements to align with the cognitive development of elementary school students.

Designing the Contents of the Cards

This stage aims to systematically compile educational content presented in cards and align it with learning objectives. Party Math card content is designed not only to be visually appealing, but also to incorporate useful, contextual, and age-appropriate mathematical elements for elementary school students. Each card is designed with the following key elements: local cultural illustrations as contextual markers, numbers or arithmetic operations with whole numbers as the main focus, and simple instructions or contextual story tasks that encourage students to think and calculate.

The cards are designed using a scaffolding approach, with problems and exercises arranged from easy to more complex levels. This aligns with Vygotsky's Zone of Proximal Development

EDUMATIKA: Jurnal Riset Pendidikan Matematika *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

(ZPD) theory, which emphasizes the importance of learning support tailored to students' abilities. To make the card content easy to understand and relevant, simple language, age-appropriate numbers (counting up to 1000), and integration between text and images were also considered. Therefore, the content of Party Math cards not only helps you learn to count, but also helps you understand numeracy concepts in real-world situations.

Instructions for Using the Party Math Cards

Instructions for use are an important component of learning media because they serve as guidelines for teachers and students to use the media appropriately and effectively. The instructions for use for Party Math media are systematically organized, concise, and easy to understand, and are tailored to the needs of elementary school students.

Development

In this phase, before becoming the final form ready for use in learning, the Party Math media was developed through several stages of design revision. These revisions were made based on the suggestions of two media experts and one subject matter expert. The initial design was still conceptual, focusing on the structure of the content and the function of the cards, but did not consider visual appearance, readability, and the needs of elementary school students. In the initial design, the cards appeared simple and lacked supporting visual elements such as contrasting colors or cultural illustrations. The font, icons, and text size were also not adapted to the visual needs of children. The packaging of the media was also unattractive and impractical.

After the revision stage, the learning media created by the researcher was already in physical form or had undergone the printing process. A set of Party Math card media after the printing process, as shown in in Figure 5.

Figure 5. A Set of Party Math Cards Including Cards, Package Box, and Instruction of Usage

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

In this study, the Party Math card game differs from the Uno card game in terms of both its objectives and gameplay rules. While Uno focuses on the strategy of completing cards by matching numbers or colors, Party Math is designed as an educational game that emphasizes mathematical skills such as addition, subtraction, multiplication, or division, thereby not only entertaining but also supporting the learning process. Party Math cards aslo differ from Uno cards in rules. First, when this card appears, students must describe the calculation that yields the number on the card. Second, problem cards are separate from number cards, so students do not immediately receive a problem when they draw a number card. And third, to draw a problem card, students must first obtain a symbol card, which in the Uno game is usually located next to the number.

Media Validation

In media validation, researchers conducted media validation with two validators. The validators conducted assessments toward the design, usability, and suitability of the media were the components evaluated in the learning media. Table 3 presents the judgements from each validators.

Table 3. The Summary of Media Validators Judgements

No.	Assessment Aspect	Indicator	Validator 1	Validator 2	Total	Percentage	Criteria
1	Design	The overall appearance of the media can attract students to learn	5	4	9	90%	Highly Suitable
2	Design	Appropriate font size that makes it easy for students to read	4	4	8	80%	Highly Suitable
3	Design	Consistency with size and media material	5	4	9	90%	Highly suitable
4	Usage	Ease of use	5	4	9	90%	Highly suitable
5	Usage	information on how to use it	5	4	9	90%	Highly Suitable
6	Usage	Image compatibility with text	5	4	9	90%	Highly suitable
7	Usage	Facilitates understanding of learning materials	5	4	9	90%	Highly suitable
8	Usage	The product instructions are clear and easy to follow	4	4	8	80%	Highly suitable
9	Suitability	Product suitability for learning objectives	5	4	9	90%	Highly suitable
10	Suitability	Product suitability with materials	5	4	9	90%	Highly suitable

The media validation results show the average score for each aspect assessed: design appearance scored 86.7%, usability scored 88%, and suitability scored 90%. These average scores indicates that the developed product is categorized as highly suitable. This type refers to the quantitative interpretation offered by Setyaningsih & Arini (2025), which states that validation scores

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

from 81% to 100% are considered highly valid and suitable for use in the learning process without significant revisions. In addition, both validators also provided qualitative recommendations and comments on the learning media developed. The feedback covered aspects of material suitability, learning objectives, and content presentation in the media. In detail, Table 4 shows the inputs provided by the validators and its follow-up revisions.

Table 2. Input from Validators along with Subsequent Revisions Made

Aspects	Validator's Suggestions	Pre-Revision Version	Revisions After Revision
Visual appearance	The background color is too bright and not easy on the eyes.	The background uses a combination of bright red and yellow.	Replaced with pastel colors (light blue and white) to make it more pleasing to the eye.
Clarity of instructions	Add more detailed instructions for use and make the display attractive so that students will want to read the instructions.	There are only navigation icons without text explanations, and the instructions are displayed as plain text without any decoration.	Added a special panel containing usage instructions in text form and added illustrations to attract students.
Presentation of material	The order of the material needs to be more systematic, with emphasis on important keywords.	The material is presented in long paragraphs without highlighting keywords.	The material was summarized into bullet points and keywords were printed in bold.
Consistency of appearance	Some pages are inconsistent in layout and font type.	The main page uses a different font from the quiz page.	All pages were standardized using the League Spartan font in proportional size.

In this study, validity means that the media has been thoroughly tested and meets the evaluation instrument criteria in terms of content, appearance, language, and field use (Putra et al., 2018). Validation encompasses aesthetic aspects as well as the alignment of content with learning objectives, meaningfulness, and the effectiveness of the media in enhancing learning outcomes. Safitri & Huda (2022) express their support for the importance of validating educational media. They state that well-validated media tend to have a greater impact on students' understanding, particularly in abstract subjects such as numeracy. The Cone of Experience theory also supports the importance of valid media, stating that concrete, visual, and interactive learning media will enhance students' absorption and retention of the taught material (Yunaini & Winingsih, 2022). Efforts to ensure that the media can bring abstract concepts into more meaningful learning experiences are reflected in the media validation conducted in this study. This media not only provides information but also helps people learn through its navigation structure, systematically presented material, and interactive activities.

Material Validation

The material and learning aspects were also reviewed in the developed media. Table 5 show the material validator judgement based on curriculum, materials, and effectiveness of use. The curriculum aspect validation results show a score of 100%, the material aspect shows a score of 100%, and the effectiveness of use aspect validation results show a score of 100%. Thus, the average

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

score is 100%, and they are categorized as highly valid. Qualitative data was also collected from the responses, suggestions, and comments of the validators.

Table 3. The Summary of Material Validator Judgement

No	Assessment Aspect	Indicators	Validator Score	Amount	Percentage	Criteria
1	Curriculum	Product suitability with learning outcomes	5	5	100%	Highly suitable
2	Curriculum	Product compatibility with learning objectives	5	5	100%	Highly Suitable
3	Materials	Product compatibility with learning materials	5	5	100%	Highly suitable
4	Materials	Ease of understanding information	5	5	100%	Highly suitable
5	Materials	Ease of understanding the material	5	5	100%	Highly suitable
6	Effectiveness of Use	Improving students' numeracy skills	5	5	100%	Highly suitable
7	Effectiveness of Use	Makes the learning environment interactive	5	5	100%	Highly suitable

All items received the highest score on the curriculum aspect. This shows that the material has been planned to meet the Learning Outcomes (CP) and the real-life context of the students. It also shows that Pancasila student profile values, such as critical and independent thinking, have been prioritized in the material arrangement. The validators also stated that the material was developed based on numeracy learning principles and supports the learning objectives of the Merdeka Curriculum. Not only is the content conceptually appropriate, but it is also presented in a structured, logical manner and aligns with the cognitive abilities of elementary school students. This aligns with constructivist learning theory Davis & Arend (2023), which emphasizes that high-quality learning materials can build students' understanding through their connection to real-world experiences and daily situations.

Additionally, the effectiveness of use was highly rated because the media provides concise materials accompanied by examples and application problems, enabling students to learn independently or in groups. This is in line with the research Setyaningsih & Arini (2025), which states that valid materials will support adaptive and meaningful learning. Therefore, the learning media is considered highly valid in terms of content and suitable for use in numeracy learning in whole number topic. Although the display design received a good overall score, the teacher advised on layout consistency and ease of navigation between pages. This was improved by aligning fonts and colors, as well as simplifying the navigation button flow to make it easier to understand.

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

Implementation

The implementation of Party Math card was carried out in third-grade elementary school in a face-to-face learning. Students were seen actively participating in learning activities delivered through cards, both in small group discussions and numerical games (see Figure 6).

Figure 4. The Implementation of Party Math Card

During the implementation stage, product testing was conducted. After the product was implemented, it was be evaluated by teacher and 20 third-grade students to obtain feedbacks that would be used to assess the developed Party Math card media.

Results of Teacher Questionnaire

The results of the teacher questionnaire with average scores according to the aspects evaluated. The curriculum aspect validation results show a score of 100%, the design aspect shows a score of 93.3%, and the results for the effectiveness of use aspect show a score of 100%. These average scores indicates that the developed product is categorized as highly valid. This score shows that Party Math cards are a highly suitable learning tool for use in the classroom.

Results of Student Questionnaire

The results of the students' questionnaire were analyzed using the Pearson Product Moment correlation technique with a total of 20 respondents (N). The calculation results show that most of the questionnaire items show a correlation value (r-count) greater than the r-table of 0.444 at the 5% significance level and the significance value (Sig. 2-tailed) is less than 0.05, which indicates that most of the items have high validity and are suitable for use.

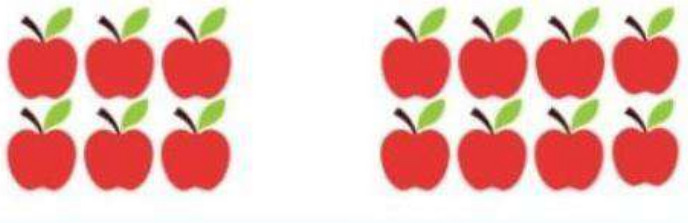
Evaluation

After using Party Math cards during the learning process, students were given a post-test focusing on numeracy skills related to daily life that presented in Table 6. The purpose of this test was to evaluate students' ability to understand and use number concepts, arithmetic operations, and contextual problem solving.

Table 6. Numeracy Problems in Post-Test to Examine the Effectiveness of Party Math Cards

No.	Problems
1.	Dina has 3 boxes containing marbles.

EDUMATIKA: Jurnal Riset Pendidikan Matematika *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

No.	Problems
	The first box contains 25 marbles. The second box contains 80 more marbles than the first box. The third box contains the same number of marbles as the first and second boxes combined, minus 56. Dina wants to distribute all the marbles equally among her 6 friends. How many marbles does each friend receive? Explain your steps to solve this problem!
2.	On Friday, Mr. Budi brought 3 boxes of drinking bottles to school. The first box contains 144 bottles. The second box contains 36 more bottles than the first box. The third box contains 48 fewer bottles than the second box. All of the bottles will be distributed evenly among 12 classes. How many bottles will each class receive? Explain how you solved this problem step by step!
3.	A library has 125 storybooks. Every month, 15 books are borrowed and 10 books are returned. If this happens for 3 months, how many storybooks will remain in the library?
4.	Toni arranged blocks in a pattern of increasing by 5 each row. The first row had 5 blocks, the second 10, the third 15. How many blocks were in the fifth row?
5.	Siti plants flowers every day. On the first day she plants 2 flowers, on the second day 4 flowers, on the third day 6 flowers, and so on. Question: How many flowers did Siti plant on the fifth day? What is the pattern of increase in the number of flowers each day?
6.	The school janitor arranged chairs in the school hall. The first row had 5 chairs, the second row had 10 chairs, and the third row had 15 chairs. How many chairs are in the sixth row? What is the pattern of increase in the number of chairs in each row? Add up all the chairs from the first, second, and third rows.
7.	In a competition, each question will receive points as follows: Correct: 3 points Incorrect: -1 No answer: 0 If there are 20 questions and Rani only answers 13 correctly, 5 incorrectly, and leaves 2 blank, how many points does Rani get? Explain!
8.	Rani saves money using the following pattern: on the first day, she saves Rp1,000; on the second day, she saves Rp2,000; on the third day, she saves Rp3,000; and so on. How much will Rani have saved on the fifth day? Explain!
9.	Lani has 3 boxes of pencils. Each box contains 12 pencils. She gave 10 pencils to her younger sibling and bought 8 new pencils. How many pencils does Lani have now?
10.	A farmer collects apples picked every day with the following pattern:  How many apples were collected on the 5th day? Explain the growth pattern. Add up the total harvest obtained by the farmer

The post-test results showed that students had a better understanding of whole numbers than pre-test results. It indicates that Party Math is effective in improving students' numeracy skills after the learning process. The post-test results show that the use of media improves students' scores (see Figure 7). Most students successfully completed the test with the right strategies and answers, indicating that the media used successfully helped students understand numeracy concepts.

EDUMATIKA: Jurnal Riset Pendidikan Matematika *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

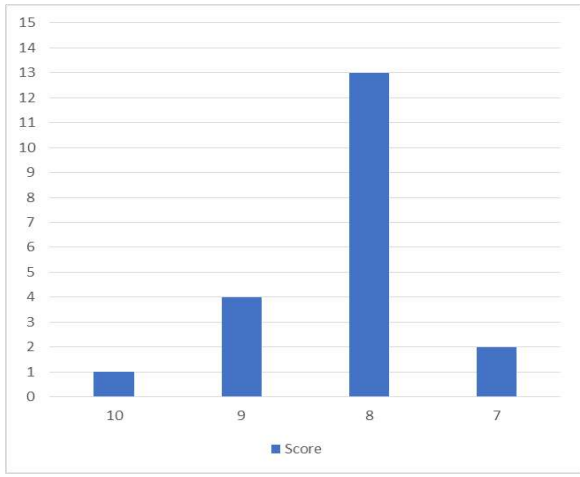


Figure 5. Post Test Score Result

Reliability Results

The questionnaire instrument was declared consistent and reliable as a data collection tool in this study, and the reliability test was carried out using the Cronbach's Alpha technique. The analysis results showed a Cronbach's Alpha value of 0.723, well above the minimum limit of 0.6. Thus, the questionnaire instrument is considered consistent and reliable.

Normality Results

The pretest and posttest results were tested for data normality using the One-Sample Kolmogorov-Smirnov test (see Table 7). This normality test aims to ensure that the data meets the requirements for the paired sample t-test to be used. Therefore, the results of the analysis used to compare pretest and posttest scores can be trusted and in accordance with applicable statistical rules.

Table 7. Normality Result

		Unstandardized Residual
N		20
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.51157533
Most Extreme Differences	Absolute	.170
	Positive	.170
	Negative	-.111
Test Statistic		.170
Asymp. Sig. (2-tailed)		.133

The results show that there is a significance value of 0.133, which is greater than 0.05. Therefore, the basic assumption can be used for parametric statistical analysis because the pre- and post-test residual data has a normal distribution. The normality test shows that the data has a normal distribution because the significance value is greater than 0.05.

T-test Results

The results of the paired sample t-test revealed a significance value of 0.000 ($p < 0.05$), as shown in Table 8, indicating a significant difference between the pre-test and post-test scores. The mean score

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

increased from 5.10 before treatment to 8.20 after treatment, with a mean difference of -3.10. These results demonstrate that the intervention had a statistically significant positive effect on students' learning outcomes. The narrow confidence interval (95% CI: -3.46883 to -2.73117) and low standard deviation (0.78807) further support the consistency of the improvement across participants.

Table 8. T-test Result

Pair	Std. Deviation	Std. Error Mean	95% Confidence Interval		t	df	Sig. (2-tailed)
			Lower	Upper			
Pretest-Posttest	.78807	.17622	-3.46883	-2.73117	-17.592	19	.000

This finding suggests that the implementation of Party Math, an interactive and contextualized learning medium, effectively enhanced students' numeracy skills. The media's engaging features—such as games, challenges, and visual representations—encouraged students' active participation and facilitated a deeper understanding of mathematical concepts. These results align with Piaget's constructivist theory, which emphasizes that children learn best through active exploration and hands-on experiences within their learning environment (Yolanda et al., 2024).

N-Gain Result

The N-Gain analysis showed that students' average scores increased by 0.6377 (63.77%) after the treatment. According to the classification by Fathurohman et al. (2023), this value falls into the medium category, indicating that the learning process improved student outcomes. Although it has not reached the high category, the intervention helped students understand the material better than before. In addition, with a standard deviation of 0.12713, the distribution of N-Gain values was relatively uniform, suggesting that the improvement occurred among most students. This finding supports the paired sample t-test results, which showed a significant difference between pre-test and post-test scores ($p = 0.000 < 0.05$). The average score increased from 5.10 to 8.20, demonstrating that the learning intervention was effective in improving students' numeracy skills evenly.

According to Hazimah & Sutisna (2023), to improve students' numeracy skills, there are several important components that students must have. First, students must have a deep and rich understanding of mathematical concepts and ideas to solve problems. Second, they must have the reasoning or logical thinking to understand how concepts and situations relate to the problem at hand. Third, they should be able to formulate mathematical problems, create strategies to examine information, and use numerical information to find solutions. Finally, emotional elements such as self-confidence and active involvement are very important to encourage students to do their best in problem-solving tasks.

Similarly, Perdana & Suswandari (2021) emphasize that understanding various related numeracy competencies is an important component in improving students' numeracy skills. These skills include thinking and reasoning skills, which means being able to ask mathematics-based questions related to the problem. Mathematical argumentation skills are also important, as students

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

are trained to understand and evaluate mathematical ideas logically. The next ability is modeling, which means being able to interpret and relate mathematical models to real-world circumstances. Finally, problem-solving skills are essential. It includes the process of formulating, defining, and solving problems with a variety of appropriate techniques. These four abilities are essential for improving overall numeracy skills.

Brunner's constructivist theory has been influenced by earlier research on cognitive theory by Jean Piaget and Lev Vigotsky. These theories argue that students have the ability to develop or create new ideas from what they know. According to Hatip & Setiawan, (2021), there are three important stages in the presentation of material that must be considered when using this theory. They are enactive stage, iconic stage, and symbolic stage. In enactive stage, knowledge is mostly in the form of motor responses, so students can better demonstrate physical work than describe the same task precisely; in this stage, students still need concrete objects of something. In iconic stage, iconic presentation is based on internal thoughts, knowledge is mostly formed from visual images to generate new information; knowledge is presented by a set of images that represent a concept, but do not define the concept as a whole. And in symbolic stage, knowledge has been constructed through mathematical symbols and language. One's willingness to pay more attention to prepositions or statements rather than objects that give concepts a hierarchical structure and possible alternatives in a combinatorial way indicates symbolic presentation.

According to the theory of constructivism Piaget (1970), explains these findings. This theory states that students construct their own understanding through active interaction with their environment, concrete experiences, and a process of reflection on prior knowledge. Students in this study did not just passively receive information, but also engaged in contextual problem-solving activities. These activities encourage them to create new mental schemas about ideas about numeracy. As explained by Piaget, learning activities that involve active engagement and making meaning of the material allow students to absorb and accommodate the knowledge they have previously learned.

Bruner's cognitive development theory divides learning into three phases: enactive, iconic and symbolic. In the enactive stage, students are focused on participating directly in physical activities or actions. The iconic stage involves understanding through images or visuals, and the symbolic stage involves using symbols or abstract concepts such as numbers and letters. These three stages are well integrated in the “Party math” card media. Students are enactively involved in activities such as selecting, shuffling and playing cards during play. The iconic stage is supported by the visualization of the cards, including cultural symbols, colors, and mathematical images. In addition, the symbolic stage is supported by counting operations, mathematics symbols, and the use of numbers on the cards.

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 2, November 2025 *p-ISSN 2620-8903*

Constructivism also emphasizes that learning experiences that are appropriate to the stage of cognitive development of students are very important (Yunaini & Winingsih, 2022). This study found that the contextual approach in numeracy learning can help primary school students understand abstract concepts through real-world situations. This is in line with the idea that elementary-aged children are at the concrete operational stage, where real and meaningful situations help them understand mathematical concepts. Therefore, the findings of this study support the idea that constructivism, particularly the learning approach established by Piaget, can serve as a strong theoretical basis for creating effective numeracy lesson plans.

CONCLUSION

The study found that Party Math cards are valid, practical, and effective learning media for improving the numeracy skills of elementary school students. Expert assessments in content and media validity, teacher evaluations, and field trials confirmed the media high validity and practicality. Furthermore, students' post-test results also showed significant improvement, indicating Party Math cards effectively promote students' engagement and enhance their understanding of concepts in a fun and meaningful way. These findings imply that Party Math cards can serve as an innovative alternative for numeracy instruction, especially in topics related to integers. Teachers are encouraged to adopt and adapt this media to create enjoyable, culturally relevant, and student-centered learning experiences. For future research, it is recommended to expand the implementation to different grade levels and subjects, enhance the design and game mechanics, and explore the media's impact on students' motivation, engagement, and collaborative skills. Such studies would strengthen evidence-based practices and contribute to the continuous improvement of mathematics education quality.

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