



DEVELOPMENT OF SIPAT CARD MEDIA BASED ON EDUCATIONAL GAMES TO IMPROVE THE NUMERACY SKILLS OF GRADE 2 ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

Numeracy skills are a fundamental competency essential for elementary school students in understanding number concepts, performing arithmetic operations, and solving mathematical problems in daily life. However, there are still students who experience difficulties in understanding addition and subtraction operations and solving simple word problems. This study aims to develop and determine the effectiveness of SIPAT (Siap Hitung Cepat) card media based on educational games in improving the numeracy skills of grade 2 elementary school students. The research employed the Research and Development (R&D) method with the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. The research subjects were 29 grade 2 students at SDN in Tasikmalaya. Data were collected through observation, documentation, and pretest and posttest assessments. The data were analyzed using descriptive quantitative and qualitative analysis techniques. The results showed that the use of SIPAT card media was able to improve students' numeracy skills, as indicated by an increase in the average score from 66.55 on the pretest to 70.68 on the posttest, or an increase of 6.20%. In addition to improving arithmetic skills, the SIPAT media was also able to enhance students' motivation, self-confidence, and active engagement in mathematics learning. Thus, the SIPAT card media can serve as an engaging alternative numeracy learning medium suited to the characteristics of elementary school students.

Keywords: elementary school; media development, numeracy, SIPAT card.

1. Introduction

Numeracy is a very important competency for every individual at various age levels, including elementary school students, because numeracy is not only related to counting skills alone, but also encompasses the ability to understand the meaning of numbers, the relationships between numbers, and their application in various contexts of daily life. (Halolo, 2023). In elementary schools, numeracy activities are carried out with the aim of equipping students with various abilities to understand, use, and reason about numbers and quantitative information encountered in real life, so that students are able to interpret simple data, solve problems related to numbers, and make logical and rational decisions (Sutama,



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et al., 2024). Thus, numeracy plays a role as an important foundation in shaping students' critical and systematic thinking, as well as serving as a life skill that is relevant to daily needs and students' future development (Purwoko, 2025).

Numeracy is one of the basic competencies that plays an important role in an individual's life because it is related to the ability to understand, use, and interpret mathematical information in various real situations (Díez Palomar, J et al., 2023). According to the OECD (2019), numeracy skills as part of mathematical literacy is not only related to the ability to perform calculations, but also an individual's ability to formulate, use, and interpret mathematics to solve problems in daily life. This view shows that numeracy skills must be developed from basic education because they serve as the foundation for building logical thinking, critical thinking, and problem solving abilities.

In the practice of mathematics learning in elementary schools, achieving students' numeracy skills remains one of the main challenges. Based on interviews with the grade 2 teacher at SDN in Tasikmalaya, it was found that some students still experienced difficulties in performing basic arithmetic operations, particularly addition and subtraction involving numbers up to 20. The difficulties were not only related to calculating results but also to understanding the concepts underlying these operations. Some students experienced challenges in determining appropriate calculation strategies, understanding number relationships, and applying arithmetic procedures correctly. In addition, several students faced difficulties when solving subtraction problems that required the concept of borrowing and addition problems involving carrying over numbers. These conditions indicate that students' understanding of basic arithmetic concepts and number sense still needs to be strengthened.

Furthermore, students also encountered difficulties in solving mathematical word problems because they were not yet able to interpret mathematical sentences and connect information presented in written problems with appropriate mathematical concepts (Dai et al., 2022). Students' limited experience in reading contextual mathematical situations often causes difficulties in identifying important information, determining the required operation, and representing everyday situations into mathematical expressions. Therefore, numeracy development at the elementary school level requires learning experiences that bridge abstract mathematical concepts with concrete representations. According to Piaget (1976), children aged 7–11 years are in the concrete operational stage, where they begin to develop logical thinking abilities but still require concrete objects and real experiences to construct understanding. Therefore, the use of visual and manipulative learning media is important to support students in understanding numbers, arithmetic relationships, and contextual mathematical problems in a more meaningful way. Number sense ability is an important aspect in early numeracy development because it relates to students' ability to understand the meaning of numbers, recognize relationships between numbers, and choose effective counting strategies. Therefore, learning media that provide opportunities for students to explore numbers through visual representations and interactive activities are needed to strengthen early numeracy skills. Research by Lee et al. (2021) shows that learning interventions specifically designed to improve number sense ability in early elementary school students can have a positive impact on the development of basic mathematical skills. These findings indicate that strengthening numeracy in the early stages of education is very important because it serves as the foundation for successful mathematics learning at subsequent levels (Conte, M. M., et al., 2025).

In research conducted by Harlin (2023), a question card game medium was developed that can help students develop numeracy skills. However, this medium has not

been specifically designed to develop early numeracy skills involving number understanding, arithmetic operations, and contextual mathematical problem solving among grade 2 elementary school students. In addition, the question card game medium was designed with a game mechanism resembling the UNO game, which is considered less relevant and less suitable for the developmental characteristics and learning needs of grade 2 elementary school students (Harlin, 2023).

Research by Debrenti (2024) shows that mathematical games at the elementary school level can support the development of conceptual understanding and student engagement because game activities provide opportunities for students to explore mathematical concepts through direct experience. Therefore, the use of simple game media such as educational cards can be an appropriate alternative learning strategy to improve the numeracy skills of elementary school students.

Therefore, the researcher developed SIPAT (Siap Hitung Cepat) as an educational game-based card medium designed to improve early numeracy skills among grade 2 elementary school students. The media focuses on strengthening students' understanding of number concepts, arithmetic operations, and contextual problem solving through interactive game activities. The SIPAT medium is designed with a simpler, more systematic playing style that is appropriate for the cognitive developmental characteristics of elementary school students, especially grade 2, so that it is easy to understand and use in the learning process. Through play while learning activities, this medium is expected to hone number sense abilities, improve mental arithmetic skills, and help students understand numeracy concepts more meaningfully. Thus, the development and implementation of the SIPAT medium is expected to become one of the effective learning solutions in improving students' numeracy skills at SDN in Tasikmalaya. Based on these considerations, this study aims to develop SIPAT card media based on educational games and examine its effectiveness in improving the numeracy skills of grade 2 elementary school students.

2. Method

This research uses the Research and Development (R&D) method to develop SIPAT (Siap Hitung Cepat) card media as an educational game-based learning medium to improve students' early numeracy skills. The development focuses on three aspects of numeracy skills: understanding number concepts, performing basic arithmetic operations, and solving contextual mathematical problems. Development research was chosen because it aligns with the research objective, namely to produce a learning product that can be used to help students understand the concepts of basic arithmetic operations, particularly addition and subtraction up to 20. According to Scherer et al. (2020), the development of learning innovations needs to consider the relationship between student needs, material characteristics, and the effectiveness of the media used in order to provide meaningful learning experiences.

This research was conducted at SDN in Tasikmalaya, Purbaratu District, Tasikmalaya City, from November to December 2025. The research subjects were 29 grade 2 students. The development of the SIPAT card media followed the ADDIE model, consisting of analysis, design, development, and implementation stages with continuous evaluation conducted throughout each stage. The evaluation process was used to improve the product quality and assess the effectiveness of SIPAT media in supporting students' numeracy skills. The ADDIE model was used because it has systematic stages that allow the media development process to be carried out based on needs analysis, product design, implementation testing, and evaluation of the effectiveness of the developed product. According to Branch and Dousay (2022), the ADDIE model is one of the flexible

instructional development models widely used in learning media development because it provides a structured framework from problem identification to product evaluation.

The analysis stage was carried out through activities to identify the numeracy learning needs of students. At this stage, Initial observations and interviews with the grade 2 teacher were conducted to identify students' numeracy difficulties, including understanding number concepts, performing arithmetic operations, and interpreting information in simple contextual problems that supports the mathematics learning process. The assessment instrument was designed based on numeracy skill indicators, including number concept understanding, basic arithmetic operations, and contextual mathematical problem solving abilities. The test instruments were designed to measure students' ability to understand number concepts, perform addition and subtraction operations, and solve simple story based mathematical problems. The development stage is the process of creating and refining the SIPAT card media product based on the design that has been made. The SIPAT media was developed in the form of game cards containing numeracy questions, supporting illustrations, and game mechanisms that allow students to learn through interactive activities. Product validation was conducted by material experts and media experts using a validation questionnaire with a five point Likert scale. The validation instrument assessed content suitability, numeracy material accuracy, clarity of instructions, visual design, attractiveness, and usability of the media.

The implementation stage was carried out through the application of SIPAT card media in mathematics learning for grade 2 at SDN in Tasikmalaya on December 8, 2025. The implementation was conducted through educational game-based learning activities using a hands on practice method. Students used SIPAT cards in groups to solve various numeracy problems provided on the cards. Evaluation was conducted continuously throughout the ADDIE development process. The effectiveness evaluation was performed by comparing students' pretest and posttest scores after the implementation of SIPAT media. Observation results and teacher feedback were also analyzed to evaluate students' engagement and the practicality of the developed media.

The assessment of the feasibility of SIPAT card media was conducted through product validation before the learning implementation stage. Validation involved media experts and content experts to assess aspects of appearance, content suitability, clarity of game instructions, and the relevance of the media to numeracy learning objectives. The validation questionnaire consisted of indicators covering:

- (1) content validity,
- (2) alignment with numeracy learning objectives,
- (3) accuracy of mathematical concepts,
- (4) media appearance,
- (5) ease of use, and
- (6) clarity of game instructions.

The validation results were used as a basis for product improvement so that the developed media would have an appropriate level of feasibility for use in the learning process. This validation process is in line with the principles of learning media development that emphasize the importance of product feasibility testing before application to end users (Scherer et al., 2020).

In addition to analyzing learning outcome improvement, this study also considered the practicality aspect and student engagement during the use of SIPAT card media. Observation data on learning activities were used to determine students' responses to the use of game-based media, including participation, enthusiasm, cooperation skills, and

involvement in completing numeracy activities. An evaluation approach that combines cognitive and affective aspects is necessary because the effectiveness of learning media is determined not only by improvements in academic scores but also by the media's ability to create active and meaningful learning experiences (Hui & Mahmud, 2023).

Table 1. Expert Validation Assessment Scores

Category	Score
Very Worthy	5
Worthy	4
Quite Worthy	3
Not Worthy	2
Very not Worthy	1

The validation results from material experts, media experts, and other validators were analyzed quantitatively using a feasibility percentage formula. This analysis was conducted to obtain an overview of the validity level and feasibility of the learning media developed before being applied in the learning process. The validation score values then became the basis for making revisions and product improvements so that the resulting media aligns with learning needs and the characteristics of students.

$$p = \frac{\sum x}{\sum xi} \times 100$$

Information:

x: Score of answers by respondents

xi: Highest answer score

P: Percentage of validity level

Based on the cumulative scores obtained from expert evaluations, the feasibility level of the developed product can be determined. The assessment results are subsequently categorized according to the predetermined learning media feasibility criteria. The classification of feasibility categories is presented systematically in the following table to facilitate the interpretation of validation results and to determine the quality of the developed media before its implementation in the learning process.

Table 2. Eligibility Interpretation Criteria

Percentage	Criteria
81% 100%	Very interesting
61% 80%	Interesting
41% 60%	Quite interesting
21% 40%	Less Interesting
0% 20%	Very Uninteresting

ADDITION AND SUBTRACTION MATERIAL	
Name: _____ Class: _____ 1. Neni has 13 chocolates. When she met Andi, Andi gave her 4 chocolates. How many chocolates does Neni have in total? A. 17 B. 12 C. 15 2. There are 18 students in grade 2 at SDN 2 Sukamarak. If there are 10 male students, how many female students are there in grade 2? A. 5 B. 16 C. 8 3. Bina has 6 candies, then Rida gave her 4 more candies. So how many candies does Bina have in total? A. 8 B. 10 C. 12 4. Mother bought 14 eggs, then mother cooked 6 eggs. How many eggs does mother have left now? A. 20 B. 8 C. 18 5. Lina has 4 boxes, each box contains 3 pencils. How many pencils does Lina have in total? A. 8 B. 7 C. 12	6. Fani has 20 marbles, she gave 8 marbles to Rofi. How many marbles does Fani have left? A. 12 marbles B. 28 marbles C. 18 marbles 7. Father gave Fehi 10 pieces of cake, then Fehi ate 7 pieces of cake. How many pieces of cake are left now? A. 17 pieces of cake B. 3 pieces of cake C. 20 pieces of cake 8. In class, 12 children like playing ball and 8 children like reading. Which one is more? A. Like playing games B. Like reading C. Like playing ball 9. A hen lays 2 eggs every day, how many eggs are there in 6 days? A. 6 eggs B. 12 eggs C. 18 eggs 10. There are 15 children bringing rice in their packed meal and 5 children bringing bread. Which packed meal is more? A. Bread packed meal B. Banana packed meal C. Rice packed meal

Figure 1. Pretest and Posttest

The instrument for measuring students' numeracy skills was a 10 item multiple choice test. The instrument measured three indicators: (1) understanding number concepts, (2) performing addition and subtraction operations, and (3) solving contextual mathematical problems. The test was administered before and after the implementation of SIPAT media to determine students' numeracy improvement. This instrument was developed to assess the basic numeracy abilities of grade 2 elementary school students after the implementation of the SIPAT card media. The test consisted of 10 items covering several indicators of numeracy skills, including understanding number concepts, performing addition and subtraction operations, and solving contextual mathematical problems. The questions in the instrument were designed using contexts that are closely related to students' daily lives, such as calculating the number of objects, determining the remaining quantity after an object is used, comparing the number of objects, and solving simple problems that require appropriate arithmetic strategies. For example, students were asked to determine the total number of chocolates after receiving additional items, calculate the number of students based on given information, and determine the remaining quantity after subtraction.

Data were analyzed using descriptive quantitative and qualitative analysis. Quantitative data obtained from expert validation and students' pretest and posttest scores were analyzed to determine the feasibility of SIPAT media and the improvement of students' numeracy skills. Qualitative data from observations and teacher feedback were analyzed descriptively to describe students' responses and learning activities during the implementation of SIPAT media.

3. Results and Discussions

3.1 Results

The analysis stage showed that grade 2 students experienced difficulties in understanding number concepts, addition and subtraction operations, and solving contextual mathematical problems. Based on classroom observations and teacher interviews, several students still depended on finger counting and teacher assistance. Curriculum analysis was conducted by identifying numeracy learning competencies in grade 2, particularly understanding numbers, performing basic arithmetic operations, and applying mathematical concepts in daily life situations.

The design stage focused on designing the concept, visual appearance, content structure, and game mechanism of the SIPAT card media. The design process was developed based on the results of the needs analysis and curriculum analysis, considering the characteristics of grade 2 elementary school students who require concrete, visual, and interactive learning experiences. SIPAT card media was designed in the form of an educational game consisting of 80 cards containing numeracy problems, including number concepts, addition, subtraction, and simple contextual mathematical problems. Each card was equipped with visual illustrations, number symbols, and clear instructions to support students in understanding mathematical concepts. The cards were also designed with answer information on the back side to provide immediate feedback during learning activities.

The visual design process of SIPAT card media was developed using Canva application. Canva was used to create card layouts, arrange illustrations, select typography, and organize visual elements to produce an attractive and child friendly learning medium. The design emphasized consistency between learning objectives and game elements so that students could develop numeracy skills through enjoyable play based activities. The storyboard design of SIPAT media consisted of several components, including learning objectives, card format, question content, visual illustrations, game rules, and feedback mechanisms.

Table 3. Storyboard

Component	Description
Media format	Educational card game
Number of cards	80 cards
Content	Addition, subtraction, contextual problems
Visual design	Illustration and numerical symbols
Game mechanism	Group competition and point system

The design of the SIPAT media was developed by considering the cognitive developmental characteristics of grade 2 elementary school students who are in the age range of 7–8 years. At this developmental stage, students still require concrete and visual representation assistance to understand abstract mathematical concepts. The use of images and manipulative activities in the SIPAT cards provides opportunities for students to connect number symbols with real situations that are easier to understand. This is in line with Piaget's (1976) opinion regarding the concrete operational stage, that elementary school aged children learn concepts more optimally through direct experience and representation of real objects.

Initial observation results showed that some students still experienced difficulties in solving basic arithmetic operations (Raupu, S., et al., 2023). Several students still used finger assistance when performing simple calculations and tended to ask for help from friends or teachers when facing story problems. For example, when given the problem "there are 12 apples, then 7 apples are eaten, how many apples remain?", several students were not yet able to determine the correct mathematical operation to solve the problem. This condition indicates that students' understanding of number concepts and number sense still needs to be strengthened.

These problems indicate that students not only need arithmetic practice, but also need media capable of providing concrete learning experiences. Research by Carbonneau et al.

(2021) explains that the use of concrete representations in mathematics learning can help students build conceptual understanding because it provides a direct connection between real experience and mathematical symbols. Thus, learning media based on hands on activities is one effective alternative to support the development of early numeracy skills. After the implementation of the SIPAT card media, positive changes were observed in learning activities. Students showed higher enthusiasm when participating in the game, were more active in discussing with group members, and tried to solve problems in a shorter time. The game mechanism in the form of point cards and burden cards provided a stimulus for students to be more careful in calculating. Students who gave correct answers received point cards, while students who answered less accurately kept the cards as a form of game challenge.

These activities created a competitive yet enjoyable learning atmosphere. Students had the opportunity to receive direct feedback from the teacher and peers so that the process of correcting mathematical concepts could take place during the game. This finding reinforces the results of research by Hui and Mahmud (2023), which stated that game-based learning can increase students' learning engagement, motivation, and understanding of mathematical concepts through interactive activities that provide meaningful learning experiences. The initial abilities of these students indicate that most students already have a basic understanding of the concept of numbers, but still need reinforcement in applying these concepts to more contextual situations. The difficulties found are mainly related to the ability to translate word problems into mathematical operations. This shows that numeracy learning requires not only mastery of calculation procedures, but also the ability to understand the relationship between numbers, symbols, and the problems encountered. According to Scherer et al. (2020), effective mathematics learning needs to provide learning experiences that allow students to build conceptual understanding, not merely memorize solution procedures. Therefore, learning media that can provide active learning experiences and help students understand mathematical concepts through various representations are needed.

The improvement in numeracy skills after the use of SIPAT card media shows that game-based learning activities provide opportunities for students to practice counting repeatedly in a more engaging atmosphere. During the game process, students not only practice obtaining correct answers, but also learn to choose calculation strategies, discuss with group members, and receive immediate correction of the mistakes made. This finding strengthens the results of research by Hui and Mahmud (2023) which states that a game-based learning approach in mathematics learning can increase student engagement and support the development of cognitive abilities through interactive learning activities. Therefore, the use of SIPAT card media has the potential to become one of the alternative learning strategies to strengthen the early numeracy skills of elementary school students. These data can be seen in Table 4 below.

Table 4. pretest and Posttest Scores

	pretest	Posttest	Percentage Increase
Overall Average	66,5	70,68	6,20%

The increase in student engagement during learning using SIPAT cards is also related to the characteristics of the media that provide opportunities for students to carry out an active learning process. In elementary school mathematics learning, direct involvement in manipulative activities and problem solving is an important aspect because it helps students

build connections between abstract concepts and concrete experiences. Research by Sailer and Homner (2020) through a meta analysis shows that a game-based learning approach has a positive impact on cognitive learning outcomes, motivation, and social aspects of students. Therefore, the use of SIPAT cards that combine elements of games, visualization, and repeated numeracy practice can be a relevant approach to support the development of basic arithmetic skills of elementary school students. Furthermore, Nguyen et al. (2024) explain that mathematics game media at the elementary school level have the potential to improve problem solving skills and learning motivation because students are directly involved in the process of concept exploration. Although the study primarily examines digital games, the main principles identified are also relevant to the use of concrete game media such as SIPAT cards, namely the presence of challenge, interaction, repetition, and feedback

3.2 Discussion

The results of the study showed that the use of SIPAT (Siap Hitung Cepat) card media had a positive influence on the learning activities and numeracy skills of grade 2 students at SDN in Tasikmalaya. The development of SIPAT card media was carried out not only as an intervention to improve students' numeracy skills but also as an effort to produce an educational game-based learning medium that responds to students' learning needs. Based on the analysis stage, students experienced difficulties in understanding number concepts, performing arithmetic operations, and solving contextual mathematical problems. These findings became the basis for designing SIPAT as a concrete, visual, and interactive learning medium. Through the ADDIE development process, SIPAT was designed by integrating numeracy materials, illustrations, game mechanisms, and feedback features to create a meaningful mathematics learning experience for grade 2 elementary school students.

The findings of this study are in line with the research of Andini et al. (2025), which showed that the use of picture card media in mathematics learning can improve students' numeracy skills through game activities involving elements of challenge and competition. Competition in games provides encouragement for students to be more active in completing tasks, increases intrinsic motivation, and builds engagement during the learning process.

Based on the results of observations during the implementation of the SIPAT media, there were changes in students' learning behavior before and after the use of the media. At the early stage of learning, some students still showed hesitation in determining answers and tended to depend on the teacher or friends to confirm their calculation results. However, after several rounds of the game, students began to show increased independence in solving problems. Students began to try various counting strategies, discuss with group members, and re check the answers obtained.

These behavioral changes indicate that the SIPAT media not only has an impact on cognitive aspects but also supports the development of students' affective aspects. Game activities involving decision making, problem solving, and direct feedback encourage the emergence of independent attitudes and critical thinking skills. This is in line with the research of Hui and Mahmud (2023), which explained that game-based learning can increase student engagement through active, collaborative learning experiences and provide opportunities for students to reflect on their thinking processes.

Independence is seen when students begin to be able to choose problem solving strategies without always waiting for teacher instructions, while critical reasoning skills are seen when students analyze information in story problems before determining the arithmetic operation to be used. The results of simple reflections after the activity showed that students felt more confident in performing quick calculations and solving numeracy problems. The

main product developed in this research is the SIPAT card media, which consists of 80 learning cards. Each card contains addition and subtraction problems as well as simple numeracy problems equipped with visual illustrations and answers on the back of the card. This design aims to provide a more engaging learning experience while helping students understand the relationship between number concepts and real life situations. Unlike conventional mathematics worksheets, SIPAT card media integrates learning content and game mechanisms in one product. The combination of visual illustrations, challenge cards, and reward systems makes the media not only a tool for practicing calculations but also an instructional medium that encourages active participation and meaningful learning.

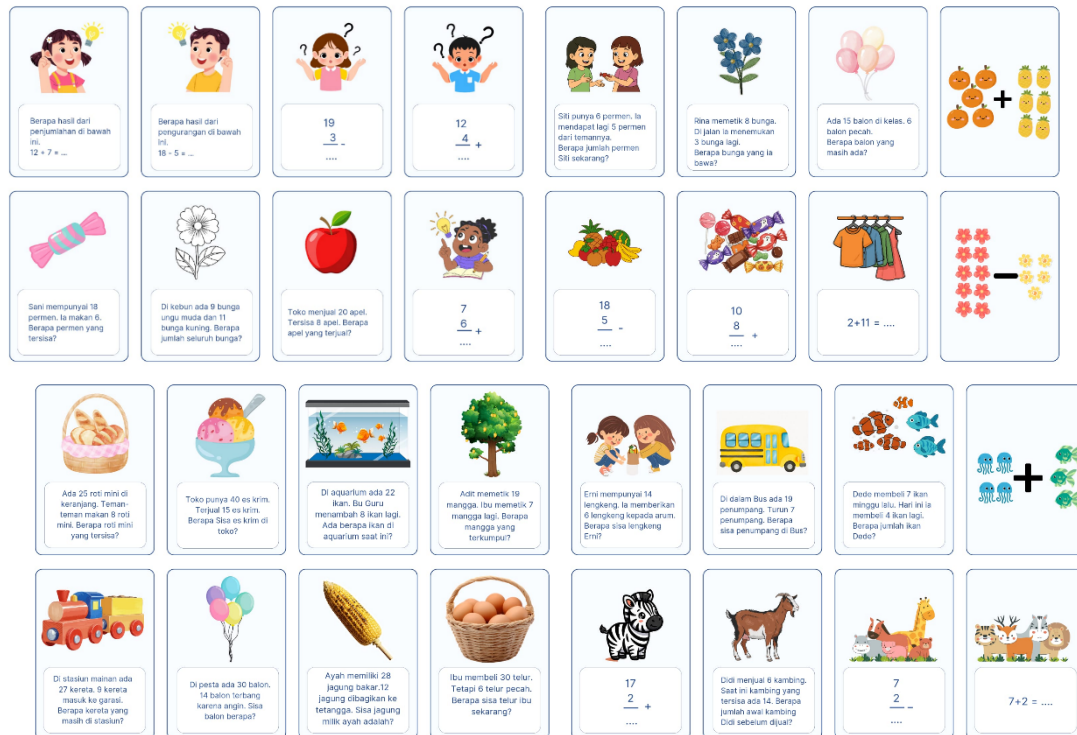


Figure 2. SIPAT Card Media

It can be used directly by teachers without requiring additional technological devices. Teachers only need to arrange the game mechanism and adjust the difficulty level of the problems to the students' abilities. This condition makes the SIPAT media easy to apply in various learning situations, especially in schools with limited digital facilities.

Second, the SIPAT media was developed based on the cognitive development characteristics of learners aged 7–8 years. The use of card based media is appropriate for young learners because it provides concrete representations that bridge abstract mathematical concepts with real learning experiences. Therefore, SIPAT does not only deliver mathematical exercises but also functions as a learning environment where students construct understanding through interaction and play. The use of images, number symbols, and manipulative activities in the game aligns with the needs of learners who are still at the concrete operational stage. According to Carbonneau et al. (2021), the use of concrete representations in mathematics learning can help learners build conceptual understanding through the connection between real experiences and mathematical symbols. Thus, SIPAT cards serve as a bridge that helps learners understand abstract concepts through visual experiences and hands on activities. Third, the SIPAT media is able to increase learners' active engagement during learning. Game elements such as challenges, competition, and the

provision of rewards in the form of point cards create a more enjoyable learning atmosphere. This finding is reinforced by Chen et al. (2022), who state that game-based learning in mathematics can increase student engagement because it provides interactive learning experiences, clear goals, and immediate feedback.

Although it has a positive impact on numeracy learning, the implementation of the SIPAT card media still has several limitations. First, the use of this media requires teacher readiness in managing game activities. Teachers need to understand the rules of the game, organize group division, and provide guidance during the learning process. Under certain conditions, limited learning time can become an obstacle to implementing the game optimally. Second, the varying initial literacy and numeracy abilities of learners cause some students to need more time to understand game instructions or complete problems. Therefore, teachers need to adjust the difficulty level of the cards and provide additional guidance to learners who still face difficulties.

These limitations indicate that the use of game media still requires appropriate learning strategies from the teacher. Learning media do not merely function as aids but must be integrated with suitable learning approaches so that learning objectives can be achieved optimally. According to Nguyen et al. (2024), the success of game-based learning in primary education is influenced by game design, the teacher's role as a facilitator, and the suitability of activities to learners' characteristics. Overall, the research results show that the SIPAT card media has potential as an alternative numeracy learning medium that is simple, practical, and easy to replicate. The improvement in numeracy ability of 6.20% after using the media in a single session shows that game activities can make a positive contribution to learners' understanding of counting concepts.

In addition to enhancing cognitive aspects, the use of SIPAT media also has an impact on students' psychological aspects, such as increased learning motivation, self confidence, and reduced dependence on teacher assistance. This shows that game-based learning innovations can create a more positive mathematics learning environment and reduce the perception that mathematics is a difficult subject. The development of SIPAT media is also relevant to the implementation of the Merdeka Curriculum, which emphasizes active, contextual, and student centered learning. Through play while learning activities, students have the opportunity to explore mathematical concepts independently and develop critical and collaborative thinking skills.

Besides having an impact on basic arithmetic skills, the use of SIPAT card media also shows changes in students' learning interaction patterns. During the learning process, students not only act as recipients of information but are also involved in the process of knowledge construction through group discussions, decision making, and collaborative problem solving. These activities show that game media can create a more collaborative learning environment and support the development of students' social skills. This finding is in line with the research of Sailer and Homner (2020), which states that game-based learning has a positive influence on the learning process because it can increase student engagement, social interaction, and motivation in achieving learning objectives. In the context of numeracy learning, interaction during games allows students to acquire various problem solving strategies from peers, thereby broadening their understanding of mathematical concepts.

Through a game-based approach, mathematical concepts are presented in the form of activities that are simpler, more engaging, and suited to children's learning experiences. This supports the findings of Tokac et al. (2020), which show that a game-based mathematics learning approach can improve students' positive attitudes toward mathematics and help

improve learning outcomes through active involvement in the learning process. Therefore, SIPAT media not only serves as a tool to improve numeracy skills academically but also plays a role in building a more enjoyable mathematics learning experience and increasing students' self confidence. The success of implementing the SIPAT card media also demonstrates that the effectiveness of a learning medium is not solely determined by the form or appearance of the product, but also by the alignment between the media design and the learning needs of students. The SIPAT media was designed by considering the level of cognitive development, initial numeracy skills, and learning characteristics of lower grade elementary school students. The presentation of problems in the form of simple cards, equipped with visual illustrations, and combined with play activities provides students with the opportunity to understand mathematical concepts gradually. This is in line with the research of Pellas et al. (2022), which explains that game-based learning design needs to consider user characteristics, learning objectives, and the level of activity complexity in order to produce an effective learning experience. Thus, the development of the SIPAT media shows that simple learning innovations can have a positive impact when designed based on the actual needs of students.

In addition, the implementation of the SIPAT media provides important implications for mathematics learning practices in elementary schools, particularly in efforts to create student centered learning. In using this media Teachers act as facilitators who guide students during game-based learning activities. This change in the teacher's role is important in numeracy learning because mathematical ability develops not only through the delivery of material, but also through opportunities for students to explore, try, and make mistakes as part of the learning process. This finding is reinforced by research by Schmidt et al. (2021) which shows that active learning approaches supported by appropriate media can increase student engagement and strengthen understanding of mathematical concepts at the elementary education level.

The use of SIPAT cards demonstrates that developing numeracy skills at the primary school level requires a gradual and continuous learning process. The 6.20% score increase observed in this study indicates a positive trend following the use of the tool, even though the implementation was limited to a single session. These results suggest that game-based tools have the potential for further development through long term use, allowing for a deeper analysis of their impact on numeracy skills. According to Rodríguez Aflecht et al. (2021), consistent mathematics instruction involving interactive, learner centered activities can strengthen conceptual understanding and enhance problem solving abilities. Therefore, the repeated and integrated application of SIPAT cards in mathematics lessons could yield more optimal results, particularly in developing students' basic arithmetic skills and number sense.

Thus, the SIPAT card media not only serves as a tool to improve numeracy learning outcomes, but also as a learning innovation that supports the creation of meaningful learning experiences. The development of simple game-based media such as SIPAT shows that learning innovation does not always depend on high technology, but can begin with media that suits the needs and characteristics of elementary school students.

4. Conclusions

Based on the results of the research on the development and implementation of the SIPAT (Siap Hitung Cepat) card media at SDN in Tasikmalaya, it can be concluded that this educational game-based learning media is able to make a positive contribution to improving the numeracy skills of grade 2 elementary school students. The SIPAT media helps students understand number concepts, perform addition and subtraction operations up to 20, and solve simple mathematical problems related to everyday life contexts. The SIPAT card media

represents an educational game-based learning innovation developed through the ADDIE model. Besides improving students' numeracy skills, the media provides a practical, interactive, and student centered learning resource that supports mathematics learning in elementary schools.

The improvement in numeracy skills was demonstrated through measurement results using pretest and posttest instruments. The average score of students increased from 66.55 before using the media to 70.68 after the implementation of the SIPAT media, with a percentage increase of 6.20%. Although the media implementation was carried out in a single meeting, this improvement shows that the SIPAT card media has potential as an alternative learning media that can support elementary school students' understanding of basic numeracy concepts.

Besides impacting cognitive abilities, the use of SIPAT media also influences the affective aspects of learners. Game activities involving elements of challenge, competition, and immediate feedback can enhance learning motivation, independence, and learners' self confidence in performing mental calculations. SIPAT card media is also suitable for the cognitive developmental characteristics of elementary school learners who still require concrete and visual learning experiences. Presenting problems through images, numerical symbols, and manipulative activities helps learners understand mathematical concepts gradually from concrete experiences toward symbolic understanding.

Based on the research findings, SIPAT card media can serve as a simple, practical numeracy learning innovation suited to the needs of elementary school learners. This media not only plays a role in improving mathematics learning outcomes but also supports the creation of active, contextual, and learner centered learning in accordance with the principles of implementing the Merdeka Curriculum.

Nevertheless, the implementation of SIPAT media still has several limitations. The use of this media requires teacher readiness in managing the game, organizing learning time, and providing guidance according to the diverse abilities of learners. Therefore, teachers need to make adjustments to the game mechanics, the level of question difficulty, and learning strategies so that all learners can be optimally engaged, especially for students who still experience difficulties in understanding basic numeracy concepts.

Future research is recommended to implement the SIPAT card media over a longer period of time with a greater number of meetings and a broader range of research subjects so that the effectiveness of the media can be analyzed in greater depth. In addition, the development of the SIPAT media can be extended to other numeracy topics, such as multiplication, division, measurement, and mathematical problem solving. Developing the media in digital form or as a combination of concrete media and technology can also be an alternative to increase the flexibility of media use in elementary school mathematics learning. Which shows that mathematics game media, both digital and non digital, has the potential to increase learning engagement and support the achievement of students' mathematical competencies when designed according to user characteristics.

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