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USING MANIPULATIVE MEDIA IN IMPROVING STUDENTS' ABILITIES IN OPERATIONS TO CALCULATE THE ADDITION OF INTEGERS IN MADRASAH

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ABSTRAK

Penelitian ini bertujuan menganalisis tentang penerapan media manipulatif dengan menggunakan kartu remi untuk meningkatkan kemampuan operasi hitung penjumlahan bilangan bulat pada siswa di madrasah. Penelitian ini menggunakan pendekatan studi kasus kualitatif. Data diperoleh dari wawancara, observasi, dan dokumentasi. Analisis data dilakukan: pengumpulan data, reduksi, display data, dan penarikan kesimpulan. Pengecekan keabsahan data dilakukan melalui membercheck, transferabilitas, dependabilitas, dan konfirmabilitas. Hasil penelitian menunjukkan bahwa penerapan media manipulatif di Madrasah Ibtidaiyah Al-Hanafiyah Kotaanyar melalui tiga tahapan yaitu menyiapkan kartu permainan, menyampaikan aturan main, dan memulai permainan. Keterampilan berhitung siswa meningkat dari penerapan media manipulatif, dan dibuktikan dengan skor rata-rata sebelum penerapan media menjadi 55,38. Setelah dipelajari, hasilnya adalah 87,31. Kajian ini memberikan implikasi tentang pentingnya desain pembelajaran yang harus dilakukan guru dengan memanfaatkan berbagai macam media dan sumber belajar yang ada disekitarnya..

ABSTRACT

This study aims to analyze the implementation of manipulative media using playing cards to improve the ability of arithmetic operations to add integers to students in madrasah. This research uses a qualitative case study approach. The data were obtained from interviews, observations, and documentation. Data analysis is carried out: data collection, reduction, data display, and conclusions. Checking the validity of the data is done through member check, transferability, dependability, and confirmability. The results showed that the application of manipulative media at Madrasah Ibtidaiyah Al-Hanafiyah Kotaanyar went through three steps: preparing playing cards, conveying the rules of the game, and starting the game. The students' numeracy skills increased from the manipulative media application, and the average score evidenced this before applying the media to 55.38. After learning, the result is 87.31. This study provides implications about the importance of learning design that teachers must carry out by utilizing various kinds of media and learning resources around them.

INTRODUCTION

Mathematics is one subject requiring media or teaching aids in learning (Ismail et al., 2022). Mathematics is given to all students from elementary school to the university level (Segarra & Julià, 2022; Marchisio et al., 2022). It is intended to equip students with the ability to think logically, analytically, systematically, critically, and creatively and work together (Prasasti et al., 2020; Deringol, 2022). According to Oktavianingtyas (2015) teaching children about mathematical concepts from an early age is very important because mathematics lessons used are logic which is an indicator of children's intelligence abilities. The purpose of studying mathematics is to acquire abilities in using algorithms, performing mathematical manipulations, making interpretations of geometric shapes, understanding measurements and

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their units, making sentences or mathematical models, and using calculating tools and other tools in mathematics to solve problems (Deogratias, 2022; Maher et al., 2022).

Mathematics is one of the subjects that are feared and considered problematic by some students. Most students have difficulty applying mathematics to real-life situations (Evi, 2011; Subrahmanyam, 2021). This is not because mathematics is complex, but the mindset or mindset of students towards mathematics is always negative, and the teaching aids are inadequate; they always assume that mathematics is a complex and tedious lesson. Therefore the mindset must be changed so that the mindset of students about mathematics is no longer harmful.

Teaching aids in learning mathematics can be used as a medium for delivering subject matter, making it easier for students to understand learning. Based on Bruner's theory, in the learning process, children should be allowed to manipulate objects (props) to make it easier to understand a mathematical concept (Atiaturrahmaniah et al., 2017; Shunhaji & Fadiyah, 2020). With the help of props, students can see the patterns in their objects. Because mathematics, an abstract science with a specific branch of science, is different from other sciences. Mathematics does not study objects that can be captured directly by the human senses like other sciences.

According to the OECD (2015), mathematics includes the ability to write, read, calculate, and so on (Wulandari et al., 2020). The ability to count operations is one of the competencies that must be possessed by all students, especially students at Madrasah Ibtidaiyah Al Hanafiyah. The importance of students learning arithmetic operations is as a start in continuing the level of thinking and capital to continue higher education. Because mathematics is a hierarchical lesson, each sub-chapter will closely relate to the next sub-chapter.

In mathematics, good arithmetic operations skills are needed to get the correct answer in working on the problem. However, sometimes students have difficulty understanding the arithmetic operation of adding integers in Mathematics at Madrasah Ibtidaiyah Al Hanafiyah, Kotaanyar, and Probolinggo. This is because the correct understanding of the problem's concepts is not mastered. Without understanding the problems and concepts or materials, the next step to solving problems, such as reasoning and communicating ideas, will be difficult . Integers consist of positive integers (-), zero integers (0), and positive integers (+) (Krisnadi, 2007). Mulyani (2018) suggests that learning integer operations is often tricky because positive and negative signs are included.

The difficulty is also due to the student's mindset, which is always hostile towards mathematics. In addition, learning in the classroom still uses conventional learning and only the assignment method. Using this method makes students less enthusiastic and feel bored, thus making students less enthusiastic about learning the material provided. The learning media relies only on textbooks' pictures (Yudistira & Rabbani, 2020). Such conditions make learning mathematics unattractive and unpleasant, so it is not optimal to help students to acquire mathematical concepts.

Mita (2020) conducted a study that aimed to know students' difficulties in solving arithmetic operations problems of addition, subtraction, multiplication, and division of integers. Based on the data collected, the researcher resulted that these difficulties were due to the student's lack of understanding of the concept, students ignored the teacher because learning was not enjoyable, and students did not memorize basic multiplication. Students did not understand how to determine the final result of positive and minus signs. To overcome this, teachers need to overhaul the learning methods used. Based on research conducted by Mulyani (2018) aims to describe the abilities and difficulties students face in solving integer arithmetic operations. The results of this study indicate that student learning activities are classified as good, with a percentage of 83.47% of students in the high category, with a total of 34 students. This is because the teacher uses teaching aids in learning and evaluates them at the end of each lesson.

To convey the material, appropriate methods and media are needed in learning so that students easily understand it. Teachers must use various methods to give assignments and other methods that emphasize active, creative, practical, and fun learning (Tuluk & Kepceoğlu, 2019; Muharlisiani et al., 2019; Akdemi & Özçelik, 2019). For this reason, as educators, teachers must be creative and active in finding new ways to present a pleasant atmosphere that can make students more enthusiastic about learning mathematics. Teachers must also dare to make changes that can provide progress in education.

A teacher must be able to overcome students' problems because a teacher's task is to educate and transfer knowledge with various methods (Çetin, 2021). Many students have not been able to determine the final result correctly. They only guess whether the final result is positive or negative. The method used by the teacher in explaining the operation of counting integers usually uses profit and loss, but the facts in the field, even though the teacher uses so many methods, it turns out that there are still so many students who cannot yet understand the material even if it is simple.

Based on the problems above, one of the methods used by the teacher of Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo is mathematical manipulation techniques. The ability of mathematical manipulation itself is the ability of students to work on or solve a mathematical problem in a certain way so that the desired goal is achieved, which in this case is assisted by playing card media.

Wulandari et al., (2020) conducted a similar study on manipulation techniques, which stated that students' thinking development at the SD/MI level was at the level of concrete operational thinking. Thus, students begin to think logically with natural objects and cannot think abstractly. Therefore, in introducing the concept of mathematical numbers to early childhood, it is better to use concrete media to make children easier to understand and understand. They can add, subtract and change, assisted by concrete objects.

From the explanation above, it can be explained that the manipulation technique is an exciting form of learning and makes it easier for students to complete the tasks given by the teacher, including the material for counting integer operations. Situations like this make it possible to improve student learning outcomes because, with student interest in this technique, students are more interested and excited to participate in learning mathematics.

A similar study was also conducted by Saputro et al., (2020) which stated that manipulative media positively impacted student learning outcomes, motivation, pleasant learning atmosphere, and the character of appreciating mathematics. The same research was also conducted by who said that learning using manipulative media materials from paper can increase the mathematics learning activities of third-grade students at SD Negeri 12 Api-Api, Bayang District, such as asking, responding/answering questions, discussing, solving problems, help friends who are having trouble, and take notes. Trianti & Endaryono (2020) also studied a similar theme and obtained research results that manipulative media significantly influenced numeracy skills in children aged 4-5 years.

This research differs from some of the studies mentioned above, in which the researcher, in this case, focuses more on the use of manipulative media in improving student learning outcomes in madrasah Ibtidaiyah. Manipulative media is very much needed in mathematics learning activities to obtain maximum value for students, especially in improving the ability of arithmetic operations to add integers. The novelty of this research is that the researcher uses playing cards as a manipulative medium to achieve predetermined learning targets. Therefore, this research focuses on improving the ability of arithmetic operations to add integers through manipulation media at Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo.

RESEARCH METHOD

This research uses the qualitative research method of case study type. This research focuses on implementing manipulation techniques as a form of effort to improve the ability of arithmetic operations to add integers to students at MI Hanafiyah Kotaanyar. Observations and interviews are a way for researchers to obtain data. Researchers determine the focus of research, go into the field, analyze data, and make reports for three months, from February to April 2022. Various data obtained by researchers are then systematically narrated, then reduced, and adjusted to research needs, making it easier for researchers to reach conclusions. To obtain valid and accountable data, the researchers interviewed several informants using a purposive sampling technique, consisting of three people, namely Erma Kusumawati as the principal, Umarujus as a mathematics teacher, and Siska Dwi Elok Permata is a student at MI Al-Hanafiyah Kotaanyar Probolinggo. Researchers provide structured explanations, as well as facts in the field, which can also be measured regarding the existing conditions at the research location, both in the form of the object being studied as well as facts related to these conditions and to conclude later (Nana & Elin, 2018). This research is expected to fully and comprehensively describe the marketing strategy of educational services in increasing the competitiveness of schools at MI Hanafiyah Kotaanyar. Data analysis concerns the concepts (Milles & Huberman, 2014) namely data collection, data reduction, data display, and conclusions. Checking the validity of the data is done through member check, transferability, dependability, and confirmability

RESULTS AND DISCUSSION

In practice, several things are done by mathematics teachers at Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo, including preparing playing cards as a form of manipulative media. The teacher conveys the game's rules, and finally, the implementation of learning the operation of counting integer addition using manipulative media playing cards. This was conveyed by the mathematics teacher of Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo in his interview as follows:

> "One of the efforts that I have made in improving students' ability to operate counting integers and additions is to use manipulative media, such as the use of playing cards. For these steps, the first thing you need to prepare is the playing card, then convey the game's rules and start playing. After its implementation, I think this manipulative media is quite adequate because students are given a concrete form, not just imagining numbers, Ms.

From this explanation, it can be understood that the steps for implementing mathematics learning operations for counting integers at the Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo are carried out in three stages, namely preparing playing cards, conveying the rules, and carrying out the game.

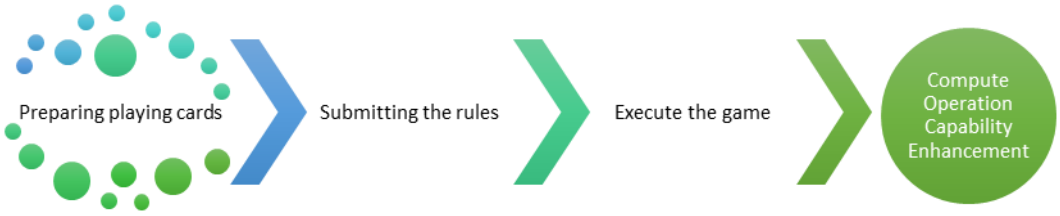


Figure 1: Manipulative Media Utilization Design

1. Preparing Playing Cards as Media

The first step by mathematics teachers in improving the ability to operate counting integers with the help of playing card manipulative media is to prepare the playing cards in advance. This was conveyed by the mathematics teacher of Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo in his interview as follows:

Informan 1	"First, of course, by preparing the playing cards, Ms. I usually use one box; Ms. It sits on my desk, stacked as it is. Because without being prepared, it will not work effectively later, Ms.
Informan 2	"In addition to preparing the cards, preparing or conditioning students and teachers is also important, is before starting learning."

From the explanation, it can be understood that implementing manipulative media in the form of playing cards to improve the numeracy skills of MI Hanafiyah students is to prepare playing cards and everything in advance. In addition to preparing playing cards, what is also important to prepare is the condition of the student's and the teachers' readiness. It can be understood that the teacher's readiness and the students' condition are also things that need to be prepared in carrying out this playing card-assisted learning media.

2. Determine the Rules of the Game

The next step taken by the mathematics teacher in applying manipulative media using playing cards is to determine and convey the rules of the game to students; this is as conveyed by the mathematics teacher MI Hanafiyah in her interview as follows:

> "After the playing cards are prepared, convey the game's rules to the students. The goal is that when learning begins, students can follow this learning according to expectations, not playing alone. Erm, one of the provisions is in the playing card's color; Ms. So, the red one is likened to a positive number while the black one is a negative number.

From this explanation, it can be understood that the rules of the game in learning are things that must be conveyed and then mutually agreed upon with students. It is also intended that students can take part in learning with this card media as expected. The game is a means of interaction between children in which there are fun things and rules to achieve specific goals.

In addition to informing about the rules, the teacher is the first to practice how to play; this is conveyed by the mathematics teacher at Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo in his interview as follows:

> "After explaining the game's rules, Ms. I put it into practice; I took two cards which I then showed the students. Then I count the number of shapes on the two cards I choose by applying the rules that I said earlier."

From the explanation, it can be understood that the rules that have been submitted need to include examples of their application. In this case, the mathematics teacher at MI Hanafiyah practices learning with manipulative media by playing cards on integer counting operations material. Everything that can make students better understand and understand what is being conveyed.

3. Starting Learning by Playing Cards Manipulative Media

Learning with manipulative media in the form of playing cards begins with the teacher calling students to take two playing cards each. Then students are instructed to count the number of shapes in the playing cards they get. With the playing conditions, the red color is a positive numeric value, and the black color is a negative value. This was conveyed by one of the sixth-grade students of Madrasah Ibtidaiyah Al Hanafiyah Kotaanyar Probolinggo in his interview as follows:

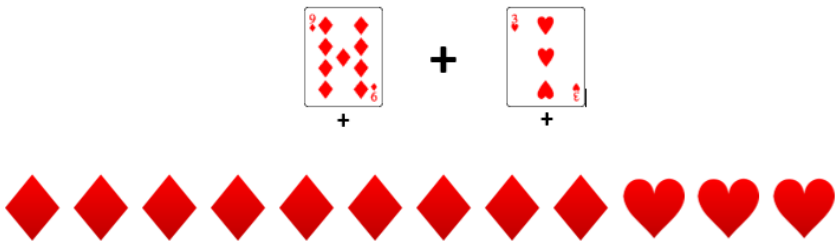
> “Yes, come forward to take two playing cards, and then ask the teacher what the answer is. Tell them to count the number of playing cards that were taken earlier. If it is red, it is a plus, and if it is black, it is a minus, the teacher said when she was told how to play it.”

From this explanation, it can be understood that learning using manipulative media in the form of playing cards in the material for counting integer operations begins with taking playing cards by students of two cards each and then adding them up. Integers are an

extension of whole numbers. The set of integers consists of the set of natural numbers, namely {1, 2, 3, 4, ...} from now on referred to as positive integers, zero, and the set of opposites of natural numbers, namely {-1,-2, -3, -4, ...}, from now on referred to as the set of negative integers (Unaenah et al., 2020).

The manipulation tool used is playing cards. Playing cards are used for addition in the unit range of positive and negative numbers. Playing cards consist of 13 numbers with four shapes: diamonds, curls, love, and waru. The cards used are only cards from numbers 1-9. In this card, the operation of adding integers begins to increase in the tens digit. The teacher will distinguish cards based on their type; students are then asked to take two cards randomly from the given pile. In this card, red cards (diamonds and love) will be used as positive numbers, and black cards (curly and waru) will be used as negative numbers.

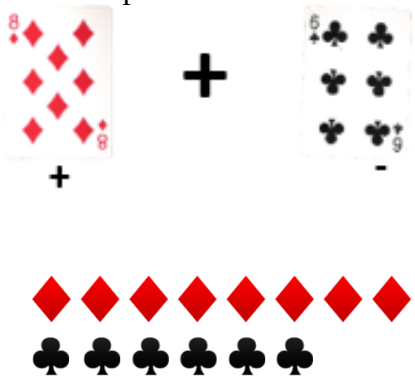
The first example of the addition operation of the card selection results



9 + 3 = 12

The cards obtained are nine diamonds and three love, and both cards are red. A red card will be analogous to a positive number. Because both are positive numbers, the two cards will be added as usual, which results in 12. To facilitate the addition calculation operation, you can calculate the diamond and love shapes listed on the card. The number of shapes on each card corresponds to the numbers listed. A positive number added to a positive number will produce a positive number.

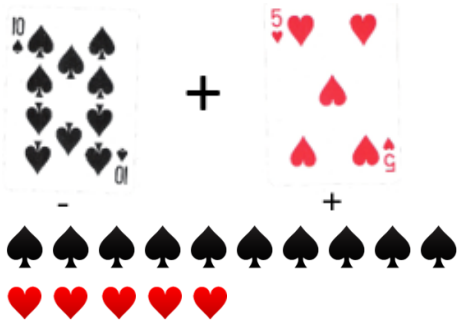
The second example of the addition operation of the card selection results



8 + (-6) = 2
8 – 6 = 2

The cards obtained are eight diamonds and six curls; the mandatory card is a red card, and the curly card is a black card. Red cards will be analogous to positive numbers, and black cards will be analogous to negative numbers. A second card is a negative number so that to facilitate the arithmetic operation, the sign of the operation can be changed to subtraction and produces 2. To facilitate the arithmetic operation, you can count the diamond and curly shapes listed on the card. The number of shapes on each card corresponds to the numbers listed. If the negative number is greater than the positive number, the final result is a negative number. A final result is a positive number if a positive number is more significant than a negative one.

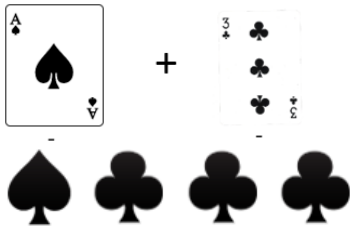
The third example of the addition operation of the card selection results



-10 + 5 = -5

The cards obtained are ten waru and five love, where the two cards are not red. Black cards will be analogous to negative numbers, and red cards will be analogous to positive numbers. To facilitate arithmetic operations, you can count the shapes of hibiscus and love listed on the card. The number of shapes on each card corresponds to the numbers listed. If the negative number is greater than the positive number, the final result is a negative number. A final result is a positive number if a positive number is more significant than a negative one.

The fourth example of the addition operation of the card selection results



-1 + (-3) = -4

The cards obtained are ace waru worth 1 and 3 curls, and both are black. A black card will be analogous to a negative number. Since they are both negative numbers, the two cards

will be added, resulting in -4. To facilitate the operation of addition calculations, you can calculate the shape of the waru and curls listed on the card. The number of shapes on each card corresponds to the numbers listed. A positive number added to a positive number will produce a positive number.

The use of manipulative media in the form of playing cards in the teaching material of integer counting operations with this implementation can improve the numeracy skills of class VI students of MI Hanafiyah Kotaanyar; the scores evidence this before and after the application of manipulative media in the form of playing cards.

These results indicate that the student's ability to perform arithmetic operations with the addition of integers has increased significantly. Based on the results of the pretest given before the learning process with ten questions from 26 students, the class average was 55.38. After learning and doing a post-test with the same questions from 26 students, the class average was 87.31.

Table 1: Comparison table

Objek	Before	After
Siswa Kelas VI 26 Orang	55,38	87,31

In looking at the level of students, learning completeness can be analyzed from the test results. Students can be said to be complete if they have met the prerequisites for the Minimum Completeness Criteria (KKM). KKM set in this study is 70. Students can be said to be complete if the score can exceed 70 or equal to 70 (≥ 70). To compare the results by calculating the average of each class. The class average is calculated by adding up the total value of each class and dividing it by the total number of students in each class. From the table above, it can be concluded that playing card manipulative media can improve students' ability to count integer operations. The average result of grade VI students is smaller than the result after the application of manipulative media, which has a higher average score.

DISCUSSION

Manipulative media are objects, tools, or concrete models, which can be touched, and moved by students to assist in understanding the problem-solving process related to a mathematical concept or topic (Anjani et al., 2021). Manipulative media in learning mathematics in elementary schools are learning aids that are used primarily to explain mathematical concepts and procedures (Kristin, 2016). Manipulative media can be manipulated for the delivery of material by the learning objectives to be achieved (Martiasari & Kelana, 2022).

Manipulative media have characteristics that can be used to streamline time in the delivery of material (Amelia et al., 2022). Learning media in education is never separated from advantages and disadvantages. Likewise, with manipulative media (Saputro et al., 2020). The advantages of manipulative media include increasing self-confidence, increasing interest in discussion and motivation in the learning process, providing opportunities for collaboration and multisensory, and creating variations in learning.

Playing card manipulative media is a collection of hand-sized cards used for card games (Yulia et al., 2021). Playing cards are card games for two or more people, each of whom tries to win by collecting 3 or 4 cards of the same type or sequence by successfully doing it the first time. Usually, this game is played by adults (Wulandari et al., 2020). Playing cards are a game that provides positive benefits for the players (Purwanto et al., 2020). These benefits include learning motivation, critical thinking, and increasing concentration (Pertiwi, 2019). Thus, playing card games are not always synonymous with negative things and have significant benefits for the players.

In its use, this learning media must experience obstacles, especially at the elementary school level (Istiqlal, 2018). Constraints that often exist in the use of learning media are the conditioning of students and a teacher's readiness (Myori et al., 2019). In addition to student conditioning, another obstacle is teacher readiness. Learning activities will not run smoothly when the teacher does not have mature readiness. Although the media used is very interesting (Rahma, 2019). So teacher readiness is critical so that learning objectives can be achieved by expectations (Anggraini, 2021). Teacher preparation in learning includes lesson plans, teaching materials, learning resources, learning media, the curriculum used, and implementing assessments.

Nopiyanto & Pujianto (2022) revealed that in every game, there must be playing rules that serve as guidelines or guidelines for the game (Qurrotaini et al., 2021). All the rules that are made must be mature and not have defects that can lead to conflicts due to inequality or injustice that is sometimes experienced by the actors in educational and learning activities in the classroom.

CONCLUSION

From the explanation above, it can be concluded that the application of manipulative media in the form of playing cards at MI Al-Hanafiyah Kotaanyar Probolinggo is carried out in three steps, namely, preparing playing cards, conveying the rules of play, and starting the

game. The students' numeracy skills increased from the manipulative media application, and the average score evidenced this before applying the media to 55.38. After learning, the result is 87.31. This shows that manipulative learning media can improve students' numeracy skills in madrasas. The results of this study cannot be generalized to all educational institutions to improve students' numeracy skills because it is only based on the character of student learning, students' social and geographical conditions, and teacher readiness in preparing simple and effective teaching materials.

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