

Teacher Strategies in Developing Mathematical Literacy Skills in Second-Grade Elementary School Students

Strategi Guru dalam Membangun Kemampuan Literasi Matematika pada Peserta Didik Kelas II Sekolah Dasar

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Abstract

Mastering mathematical literacy is essential aspect of mathematics education, significantly improving students' ability to learn and apply mathematical concepts, solve problems, communicate clearly, think logically, and develop an attitude of respect. This study will reveal how Grade II instructors help students improve their mathematical literacy through various learning strategies. A descriptive approach with qualitative methods was used in this study, with the research subjects being educators working with grade II students. The results showed that in the preparation stage, teachers design teaching materials by making flexible lesson plans that align with students' needs. Teachers also utilize icebreakers to increase students' interest in learning, both inside and outside the classroom, and use learning media and other teaching aids to support the learning process. During learning activities, teachers use relevant materials, give oral and written exams as evaluations, and provide remedial programs for students who have not understood the material. The conclusion of this study shows that the teacher's role in designing dynamic and interactive learning dramatically contributes to improving the mathematical literacy of grade II students by providing meaningful learning experiences and motivating students to learn more actively.

Keywords: Fraction, mathematical literacy abilities, teacher strategy.

Abstrak

Menguasai literasi matematika merupakan aspek penting dalam pendidikan matematika, terutama untuk meningkatkan kemampuan siswa dalam mempelajari dan menerapkan konsep matematika, memecahkan masalah, berkomunikasi dengan jelas, berpikir logis, serta mengembangkan sikap menghargai. Penelitian ini bertujuan untuk mengungkap cara instruktur kelas II membantu siswa meningkatkan literasi matematika mereka melalui berbagai strategi pembelajaran. Pendekatan deskriptif dengan metode kualitatif digunakan dalam penelitian ini, dengan subjek penelitian adalah pendidik yang bekerja dengan siswa kelas II. Hasil penelitian menunjukkan bahwa pada tahap persiapan, guru merancang bahan ajar dengan membuat Rencana Pelaksanaan Pembelajaran (RPP) yang fleksibel dan sesuai dengan kebutuhan siswa. Guru juga memanfaatkan icebreaker untuk meningkatkan minat belajar siswa, baik di dalam maupun di luar kelas, serta menggunakan media pembelajaran dan alat bantu pengajaran lainnya untuk mendukung proses pembelajaran. Selama kegiatan pembelajaran, guru menggunakan materi yang relevan, memberikan ujian lisan dan tertulis sebagai evaluasi, serta menyediakan program remedial bagi siswa yang belum memahami materi. Kesimpulan penelitian ini menunjukkan bahwa peran guru dalam merancang pembelajaran yang dinamis dan interaktif sangat berkontribusi dalam meningkatkan literasi matematika siswa kelas II, dengan memberikan pengalaman belajar yang bermakna dan memotivasi siswa untuk belajar lebih aktif.

Kata Kunci: Literasi matematika, pecahan, strategi guru.

1. Introduction

Mathematical literacy, as an indicator of mathematical competence, has improved due to the influence of the OECD (Organization for Economic Cooperation and Development) through PISA (Program for International School Assessment) in various countries. However, fundamental problems related to reading and writing skills are still found in basic mathematics. Mathematical literacy for young people is a goal and a fundamental priority in teaching mathematics in basic education (UNESCO, 2021). Therefore, integrating basic mathematics into the basic education curriculum is not just a goal but an essential need. The PISA study shows that students in Indonesia still face significant challenges in achieving proficiency in mathematics. Therefore, further research is needed so that Indonesia can benefit from mastering mathematical literacy (Murdaningsih & Murtiyasa, 2016).

This ability, known as mathematical literacy, includes the ability to perform calculations and interpret and apply mathematical concepts in various contexts of daily life (Lindawati, 2018). Mathematical literacy involves mathematical reasoning that utilizes concepts, procedures, facts, and tools to describe, explain, and predict phenomena (OECD, 2019). Therefore, improving students' mathematical literacy is a top priority in mathematics education. Mathematics is increasingly essential in communication, problem-solving, and information processing, especially amid advances in science and technology (Ojose, 2011). The skill of applying mathematical knowledge taught in the classroom to real-world situations is a significant need for today's students.

In addition, mathematical literacy enables students to generate, apply, and understand mathematical concepts in various situations. This literacy is essential to mathematical reasoning and applying mathematical ideas, methods, facts, and tools to study and predict real-world events. Students with good mathematical literacy are better prepared to become contributing members of society because they can think systematically, understand the relevance of mathematics in everyday life, and find applications in various fields (Pamungkas & Franita, 2019).

Indonesia participated in a comprehensive international study, TIMSS, to measure students' understanding of mathematical literacy (Amaliya & Fathurohman, 2022). This study provides a comprehensive picture of student competencies, the results of which are often directly related to a country's level of political or educational engagement (Purwanto, 2008). Analysis of students' mathematical abilities can forecast various aspects of a country's social and economic development. Due to its relevance to professional activities and daily life, mathematical literacy is becoming an important skill for individuals (Salvia et al., 2022).

In formal education, teaching mathematics in primary schools has undergone significant changes with the implementation of Curriculum 2013, where learning is thematic and integrative. Although math can be an easy subject for some students to understand, its negative reputation among students needs to be changed. One way is to use engaging and fun learning media. In addition, innovative methods, models, strategies, and media are required to make learning mathematics a positive and enjoyable experience (Apriani et al., 2021).

Teachers, as the main facilitators of learning, play an important role in inspiring students to love math. With various effective teaching strategies, teachers can help students develop essential skills and make math learning more interesting and relevant to their lives.

Based on the above description, mathematical literacy is an essential ability for students, especially at the basic education level, to face the challenges of daily life and the demands of the times. However, as reflected in the PISA and TIMSS studies, Indonesian students' low mathematical literacy results indicate an urgent need to explore effective learning strategies.

Teachers play a key role in building mathematical literacy by applying methods, media, and approaches relevant to students' characteristics. Therefore, this study focuses on "teachers' strategies in building mathematical literacy skills in grade II primary school students" to contribute to developing better and relevant educational practices.

2. Literature Review

There have been many studies on teacher strategies in improving the mathematical literacy skills of grade II elementary school students, although there are differences in focus and approach. One of the relevant studies entitled "Analysis of Students' Mathematical Literacy Skills with the Presence of the Gerobak Singgah Program". This study aims to evaluate students' mathematical literacy skills using essay questions based on the value of money in a real-world context. The results showed that of the four students involved, their ability to answer questions based on real-life scenarios was in the moderate category (Patunah, 2022).

Patunah's study used an approach that focused on exploring students' abilities in authentic contexts. It emphasized the application of mathematics in everyday life without strict attachment to a particular learning theory. This approach is more oriented toward utilizing real situations to assess students' mathematical literacy, which is one of the important contributions of the previous study.

As a differentiator, this study uses the behavioristic approach as the theoretical foundation. This approach emphasizes learning on the mastery of knowledge delivered in a structured and systematic manner. The learning process is seen as an activity that requires students to reproduce the knowledge learned through various evaluations, such as reports, quizzes, and tests. The material delivery is focused on specific, isolated skills, with the teaching sequence starting from small parts towards the whole. The learning process strictly follows the curriculum and relies heavily on textbooks as the primary source.

With this approach, this study makes a new contribution to exploring how behavioristic-based learning strategies can help improve the mathematical literacy of grade II primary school students. In contrast to previous research focusing on authentic contexts, this study offers a perspective focusing on a more systematic and purposeful learning structure. This is expected to broaden the understanding of practical approaches to improving students' mathematical literacy. In this context, emphasis is placed on students' ability to retell the book's content.

3. Research Methods

This research applies a qualitative approach because it seeks to build an understanding of reality and its meaning. This approach focuses on social context and human interaction, allowing researchers to explore the dynamics of processes and events in more detail. Therefore, qualitative research emphasizes processes, events, and authentic aspects (Somantri, 2005). According to Suryono, research with qualitative methods seeks to reveal, explain, and describe the excellence or quality of social consequences that cannot be measured and explained quantitatively (Fiantika, 2022). This makes qualitative methods the right approach to understanding complex phenomena that cannot be reduced to numbers or statistical data (Rachmad et al., 2024). The foundation of qualitative research is using descriptive language to describe and analyze relevant data collected from real-world sources (Sulastri & Masriqon, 2021; Yuliani, 2018). In this study, 32 students and the class teacher from grade II participated as research subjects. This participation enabled the researcher to gain diverse and comprehensive perspectives on the research context. Data were

collected through various techniques, namely observation, interviews, and documentation, thus providing data triangulation that strengthens the validity and accuracy of the research results (Nurfajriani, 2024). Structured interviews were used for this investigation. The purpose of these interviews was to gain a better understanding of how teachers improve the mathematical literacy skills of grade II students. Data processing, data presentation, and conclusion drawing are included in this study's data analysis approach. Table 2 illustrates the research instrument grid for Grade II students, while Table 1 shows the interview instrument for the classroom teacher.

Table.1. Class II Teacher Interview Instrument

No.	Question
1.	How is student participation in the Teaching and Learning Activities process in class II?
2.	How is student participation in the learning process, especially in mathematics?
3.	How are students compliant with school assignments, especially math assignments?
4.	Regarding lesson planning, what strategies do you use to build students' mathematical literacy skills in class II?
5.	In implementing learning, what strategies do you use to build skills in mathematical literacy in grade II students?
6.	What strategies do you use to build students' literacy skills in the learning evaluation process?
7.	How do students respond when you teach in class?
8.	What is the mathematical literacy ability of primary school students in grade II using the strategies implemented by the teacher?
9.	Is the strategy effective? How much impact does it have on helping students learn well?

Table.2. Interview Instrument for Class II Students

No.	Question
1.	What real-world context or problem does the problem relate to?
2.	What information do you know from the question?
3.	Explain how you solved the problem?
4.	How do you know that your result is correct?
5.	Are you excited about participating in the learning process, especially in math?
6.	Are you diligent in doing school assignments given by the teacher, especially math assignments?
7.	What is your impression of the learning process in class II?

4. Result and Discussion

4.1. Result

The research site was SDN RBU 21, a public elementary school in North Jakarta City. Grade two educators served as the subjects of this study. Based on the research findings, grade II students at SDN RBU 21 showed a high level of engagement in class; this was evident from the looks on their faces throughout the math lesson. Many students said that, barring illness or other pressing issues, they had never missed a school day.

It was clear that the second graders were very engaged in the learning process. Starting from the icebreaker given by the second-grade teacher to the final exam, the students seemed engaged and excited throughout the learning process. Student participation was lively and enthusiastic throughout the learning process. They were very excited and engaged in learning in class. The extent to which students completed their work was commendable. They followed the teacher's directions in class II, whether it was an assignment or not. Based on conversations with many students, they are also quite thorough in completing all the teacher's homework.

To achieve learning goals, one must have a strategy, which is a plan that contains a series of planned activities. Teachers in grade two often use the following methods to help their students become more math-literate:

1. Lesson Planning

The first step in the learning process is planning, which every good teacher does. The instructor took the time and effort to organize his lesson in advance, drawing up a lesson plan and selecting the media for that day.

2. Learning Implementation

An important part of any learning process is implementing the teacher's carefully crafted plan for classroom activities with students. After reviewing the research, one-way teachers can help second graders become more proficient readers is to have them participate in icebreakers or sing a class song at the beginning of each lesson. This encourages everyone to get up and move around, so they are encouraged to be actively involved in the learning process. Educators also utilize digital learning tools such as projectors and computers to show students online resources such as educational films and images. Usually, students are permitted to leave early if they do well on the written and oral assessments given by their instructors towards the end of the learning process; conversely, if they perform poorly, they must attend remedial classes.


Description of Data on the Results of Mathematical Literacy Ability of Grade II Primary School Students in Solving Fraction Problems Subjects S.1, S.2, and S.3

4.1.1. Formulating the Situation


Subject S.1 should record his findings from the problem and use them to develop a mathematical formulation of the situation in the indicator. In addition, subject S.1 noted the question's wording but continued to answer it on the answer sheet without recording the information he already knew. The following questions related to the fraction mathematics problem are shown in [Figure 1](#).

SOAL MATEMATIKA

1. Perhatikan kue cokelat yang telah dipotong berikut!



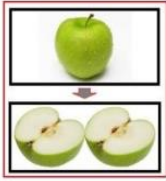
Andi sangat menyukai kue cokelat.
 Kue cokelat dibuat oleh Ibu Andi sendiri.
 Pada suatu sore, teman Andi yaitu Alif dan Reza sedang berkunjung ke rumah Andi.
 Ibu Andi membuat kue cokelat kesukaannya untuk Andi dan kedua temannya.
 Potongan – potongan kue cokelat tersebut digambarkan sebagai berikut



Jika Andi mendapatkan $\frac{1}{3}$ bagian dari kue yang telah dipotong. Gambarkan kue bagian Andi...

2. Maya bekerja di sebuah toko kue yang terkenal di kota Jakarta, Maya dengan semangat membuat berbagai jenis kue untuk dijual toko tersebut. Ada banyak jenis kue yang dijual di toko tersebut. Pada saat jam makan siang, Maya memakan roti dari toko kuenya. Maya ingin berbagi rotinya kepada teman yang lainnya. Agar mendapatkan kue $\frac{1}{2}$ bagian, Bagaimana cara maya membagi kue tersebut?

3. Perhatikan gambar dibawah ini!



Di sebuah kebun yang subur, tinggal seorang petani bernama Dino. Dia sangat menjaga kebunnya yang penuh dengan pohon apel. Suatu hari Dino memetik satu buah apel. Dino akan membagi apel tersebut kepada Jun. Berapa bagian yang di dapatkan oleh Jun? Jelaskan alasanmu!

Figure.1. Fraction Mathematics Problem

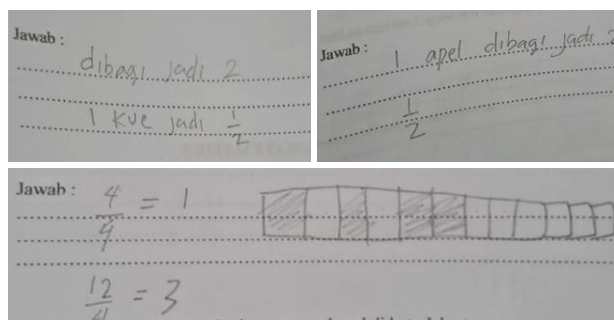


Figure.2. Subject S.1's Answer to the Fraction Problem

Based on [Figure 2](#), however, after being asked in the interview, the subject 1 can provide answers and successfully convert them into mathematical form. This can be seen from the results of the interview with subject 1:

- Researcher : What is the real-life problem in the problem?
 Subject 1 : Question number 1 is about Andi's share of the cake; question number 2, Maya wants to share the cake with her friend; and question number 3 is how much share Jun gets.
- Researcher : What do you know about the problem?
 Subject 1 : In problem number 1, Andi likes chocolate cake and is told to draw the cake Andi gets; in problem number 2, Maya wants to share her cake with her friend; and in problem number 3, Dino picks one apple and wants to divide the apple into two parts.

Subject S.2 was able to note the details given in the question. For example, he counted the squares in the first question, described the second question to understand it better, then calculated.

Because question number 3 had a picture, he immediately knew the answer. The following answer made by subject S.2 is shown in Figure 3.

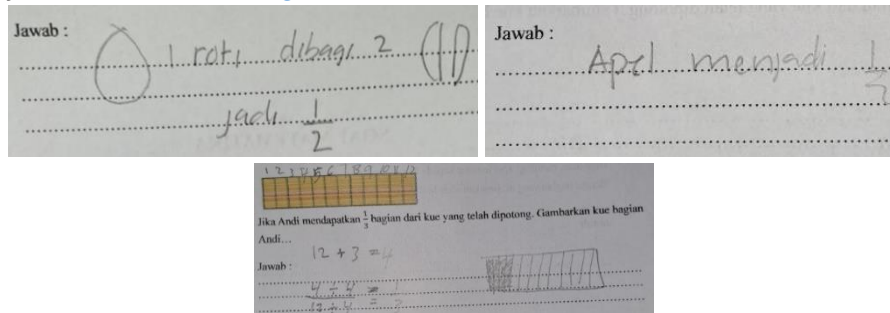


Figure.3. Subject S.2's Answer to the Fraction Problem

- Researcher : What is the real-life problem in the problem?
 Subject 2 : Number 1, I first counted how many boxes there were and then divided 12 by 3 for Andi 1 and her friend 2. Number 2, I drew the bread and then divided it into two equal (magnitude) and got the answer. Number 3, if the apple is divided by 2, it becomes $\frac{1}{2}$. If $\frac{1}{2} + \frac{1}{2}$ becomes 1.
- Researcher : What do you know about the problem?
 Subject 2 : For problem number 1, Andi liked the chocolate cake and was told to draw the cake Andi got; for problem number 2, Maya wanted to give the cake to her friend; and for problem number 3, Dino had one apple and wanted to divide the apple into two.

In the indicator of formulating the situation mathematically, subject S.3's answer did not describe the process and immediately gave an answer of $\frac{1}{3}$, which was converted into mathematical form. In addition, subject S.3 does not include what is asked in problem number 1 and immediately works on the problem. The following answer made by subject S.3 is shown in Figure 4.

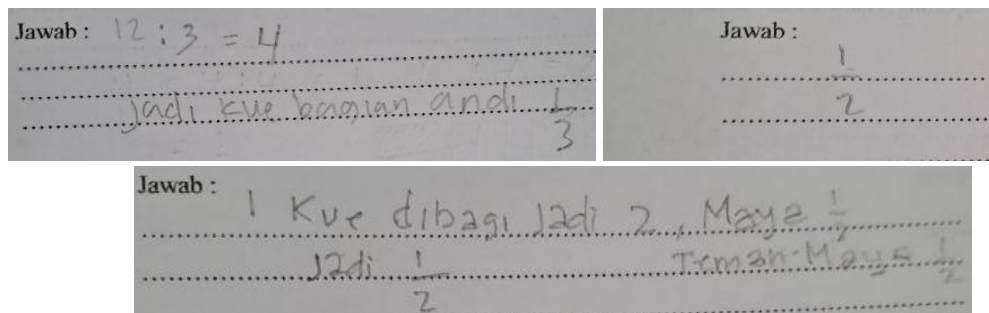


Figure.4. Subject S.3's Answer to the Fraction Problem

- Researcher : What is the real-life problem in the problem?
 Subject 3 : Number 1 Andi, who likes chocolate cake
 Researcher : And number 2 and 3?
 Subject 3 : Number 2 (then pauses), then number 3 apple.
 Researcher : What do you know about the problem?
 Subject 3 : If question number 1, Andi likes chocolate cake, number 2, Maya wants to share bread, and number 3, dino apples.

4.1.2. Using Mathematical Concepts, Facts, Procedures and Reasoning

On the indicator of the use of mathematical concepts, facts, procedures, and reasons, based on the answers that have been given, S.1 can utilize the information available to solve the problem. Subject S.1 can develop and apply strategies seen in the answers given.

Researcher : How did you solve the question?

Subject 1 : Problem 1 is that there are 12 chocolate cakes, which are divided into 3 for Andi and her friend. There are 2, and number 2 Maya's cake is cut directly into 2. Number 3 is the same as number 2.

Subject S.2 was able to design a strategy to find a mathematical solution and use the available information to solve the problem.

Researcher : How did you solve the question?

Subject 2 : Number 1 first count the contacts and then divide by 3

Researcher : After that?

Subject 2 : Then calculate 12 squares divided by 3, the result is four, and then reduce the number again (simplified)

Researcher : What about numbers 2 and 3?

Subject 2 : Number 2 is if divided by 2, the result is $1/2$; if number 3 is also the same.

In the indicator of the use of mathematical concepts, facts, procedures, and reasons, based on the answers that have been done, subject S.3 uses a logical method that he considers quick and easy. Subject S.3 immediately wrote the answer without detailing the steps in fraction problem number 1.

Researcher : How did you solve the question?

Subject 3 : The number 1 answer is $1/3$

Researcher : Where did you get that $1/3$ answer?

Subject 3 : (silence)

Researcher : How about number 2?

Subject 3 : It is divided into two equal parts, so one person gets half or $1/2$.

Researcher : What about number 3?

Subject 3 : Number 3 is $1/2$ the same as number 2

Thus, based on the answer sheet and interview results, subject S.3 applied different strategies to reach a mathematical solution. Subject S.3 used a direct approach and his logic to solve the problem.

4.1.3. Interpreting, Applying, and Evaluating Math Results

On the indicators of interpreting, applying, and evaluating mathematical results, based on the answers that have been done, subject S.1 can connect mathematical results with everyday situations, such as how to describe Andi's piece of cake, how Maya divides the cake to her friend, and how Dino shares an apple with Jun.

Researcher : How do you conclude from the results you obtained?

Subject 1 : Problem number 1 is divided, 12 divided by 3, and then reduced again (simplified). Number 2 is divided into two cakes, so you get $1/2$ one person. If number 3 is also the same as number 2, the apple is just cut into 2.

In this indicator, Subject S.2 was able to translate mathematical results into the context of everyday life, such as dividing one food into two equal parts.

Researcher : How do you conclude from the results you obtained?

Subject 2 : Number 1 results in $1/3$

- Researcher : Why $1/3$?
Subject 2 : It will be divided
Researcher : What about numbers 2 and 3?
Subject 2 : Numbers 2 and 3 have the same answer: $1/2$
Researcher : Why $1/2$?
Subject 2 : Number 2 is bread divided by 2 to make $1/2$, and number 3 is the same.

In this indicator, based on the answers obtained from subject S.3, he has successfully connected the mathematical results with everyday life situations.

- Researcher : How do you conclude from the results you obtained?
Subject 1 : Problem number 1 is $1/3$, number 2 is $1/2$, number 3 is also $1/2$.

4.2. Discussion

Data for this study were obtained from three primary sources. First, the mathematical literacy test results of grade II students of SDN RBU 21 included questions related to the concept of fractions. Secondly, interviews with these students will be conducted to explore their understanding of questions related to fractions in various contexts. This study aims to examine how educators develop students' mathematical literacy through the use of fraction-based mathematics assessment questions. Indicators of mathematical literacy include (1) the ability to formulate situations mathematically, (2) the application of mathematical concepts, facts, methods, and reasoning to solve problems, and (3) interpretation and evaluation of the results of the solutions obtained.

Students' actions, such as reinterpreting mathematical results in real-world contexts, evaluating the reasonableness of mathematical solutions to real-world problems, and explaining mathematical conclusions, reflect their mathematical literacy achievement (OECD, 2013). However, this does not apply in the context of the problems found. Based on the analysis of student's answers and the results of interviews with all subjects, S.3 could not answer and work on the issue appropriately, so it did not meet the indicators of mathematical literacy. In contrast, the indications of mathematical literacy competence were successfully met by S.1 and S.2.

The results of this study include several subchapters that discuss aspects of students' attendance, their participation in the classroom learning process, compliance in completing tasks given by the teacher, and the strategies teachers use to improve students' mathematical literacy. In Phase II, the research highlights the methods applied in designing, implementing, and evaluating educational efforts, focusing on the strategies used by SDN RBU 21's grade II teachers to help their students improve mathematical literacy.

First is the planning strategy, which is the first step in teaching activities. Before starting the teaching process, teachers develop a plan to ensure that every activity supports meaningful learning. This planning is important for preparing for the future and setting purposeful learning goals (Talibo, 2018). Based on the research findings in the second grade of SDN RBU 21, at the planning stage, teachers arrange various learning resources, such as Learning Implementation Plans (RPP), that are carefully designed and tailored to each student's unique characteristics. Teachers also prepare media and other tools to support the learning process in the classroom.

In teaching the material, the first step the teacher takes after welcoming students and starting the lesson with prayer is to break the ice in the classroom through group activities. This is important to create a more conducive learning atmosphere. Ice-breaking with simple actions can help return the classroom environment to a better condition (Fanani, 2010). Ice-breaking activities

aim to get students more involved in learning, both inside and outside the classroom. In addition, teachers also utilize relevant learning media to help students understand the material presented.

Finally, assessment is often student-centered, aiming to monitor their progress in achieving learning objectives and identifying resources supporting their learning process (Hamalik, 2011). Based on the research results in the second grade of SDN RBU 21, teachers adapt their pedagogical approach to the unique needs of each student to help improve their reading and writing skills. One of the strategies implemented is case study-based learning, where teachers use real-life examples to help students understand complex concepts. For example, the teacher may tell a narrative relevant to the lesson topic, which is then used as a basis for the students' discussion, analysis, and evaluation. In addition, the group discussion approach is also often used by teachers. This method encourages interaction between students and helps them understand different points of view, thus teaching the importance of respecting other people's ideas (Putri, 2024). These various teaching strategies are designed to arouse students' interest in learning and help them develop their potential and strengths in the classroom.

5. Conclusion

This research demonstrates that effective teaching preparation, varied learning materials, and engaging warm-up activities, such as icebreakers, can significantly enhance students' interest, involvement, and mathematical literacy, particularly in solving fraction problems. Positive responses from grade II students of SDN RBU 21, who exhibited enthusiasm, active participation, and strong problem-solving skills, highlight the success of this approach. The study emphasizes the importance of designing lessons that develop mathematical literacy, utilizing innovative methods and materials, and fostering a fun, motivating learning environment. These findings serve as a model for future research on improving mathematical literacy and problem-solving abilities in early-grade students.

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