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The use of mathematical domino card media for PMRI-based mathematics learning: the impact on students' interest in learning

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ABSTRACT Interest in learning mathematics among elementary school students is often low, especially in topics such as multiplication and division. SD Negeri Gembira in Nangahale Village, Talibura District, Sikka Regency, faces similar issues. The aim of this study is to increase the interest in learning mathematics among Grade II A students by using mathematical domino cards through the Indonesian Realistic Mathematics Education (PMRI) approach. This study uses a qualitative descriptive method. The subjects of the study are Grade II A students and the class teacher at SD Negeri Gembira. Data collection techniques include observation, interviews, and a student interest in learning questionnaire. The results of the study show that the use of mathematical domino cards with the PMRI approach is effective in overcoming the low interest in learning mathematics. Students become more interested and motivated in learning multiplication and division materials. The use of learning aids such as domino cards combined with the PMRI approach has been proven to facilitate students' understanding of mathematical concepts. This approach also makes the learning process more enjoyable and interactive, thus addressing the low interest in learning mathematics among students, particularly in multiplication and division topics at SD Negeri Gembira. This approach can be applied more broadly to improve students' learning outcomes in mathematics.

1. INTRODUCTION

Mathematics is one of the subjects taught at all levels of education starting from elementary school (SD) and is used in everyday life to solve problems and meet practical demands (Permatasari, 2021; Purnama et al., 2021). Learning mathematics teaches students to participate actively and experience what is being learned and not just know it, but this is still considered the most challenging material by students in studying it (Betyka et al., 2019; Suratiningsih, & Subagya, 2021). Interactive and engaging learning media, such as domino cards, can overcome low interest in learning mathematics among students. When students are involved and find mathematics learning enjoyable, students tend to be more motivated to learn and actively participate in the learning process.

According to Rahmini & Ogylava (2024), mathematics is as foundational and important as logic, because mathematics is needed as a basic science or tool for studying other sciences, technology, and other fields of knowledge. Low interest in learning mathematics, especially in topics such as multiplication and division, is a challenge faced by many students, including those at SD Negeri Gembira in Nangahale Village, Talibura District, Sikka Regency. Faisal et al. (2023) suggests using mathematical domino cards as an effort to increase elementary school students' interest in learning. Despite numerous studies examining various learning media to address this issue. Although many studies have highlighted the use of various learning media in overcoming low interest in learning mathematics, there are several important gaps that have not been fully filled; 1) Specificity of Learning Media. Previous research often does not specifically examine the effectiveness of mathematical domino cards in contextualizing PMRI. Most studies tend to focus on other learning media or different approaches without exploring the full potential of dominoes in teaching mathematics in elementary school; 2) Education Level. Many studies focus on higher levels of education such as middle or high school, or on subjects other than mathematics. This creates a gap in research specifically targeting elementary school (SD) students and mathematics subjects; 3) PMRI Approach: Although PMRI has been known as an effective approach in teaching mathematics, research combining this approach with the use of domino cards is still limited. In fact, this combination has great potential to overcome students' low interest in learning and students' understanding of mathematics

This study aims to address the low interest in learning mathematics among grade 2 students at SD Negeri Gembira by using mathematical domino cards within the context of the Indonesian Realistic Mathematics Education (PMRI) approach. This research provides significant contributions in several aspects: a) Specific evaluation of learning media. This research specifically evaluates the use of mathe-

matical domino cards in PMRI-based mathematics learning, which has not been explored much in previous research; b) Implementation of PMRI in elementary schools, with a focus on the elementary school level. This research shows how the PMRI approach can be implemented effectively using domino cards, providing practical guidance for elementary school teachers; c) Overcoming low interest in learning, this research provides empirical data that shows how the use of mathematical domino cards can overcome students' low interest in learning in mathematics, which can be used as a reference by educators and other researchers.

Implications of this research include: a). Improving the quality of learning, the results of this research can help improve the quality of mathematics learning in elementary schools by providing empirical evidence about the effectiveness of using domino card media, b) Curriculum development, these findings can be the basis for curriculum developers to include innovative learning media in lesson plans, c). Guide for teachers, provides practical guidance for teachers in adopting and adapting mathematical domino card media in daily teaching, d). Motivation for further research encourages further research in this field to develop and evaluate other innovative learning media that can overcome low interest in learning mathematics and students' understanding of mathematics.

This paper will first delve into an exploration of the PMRI approach, followed by a description of the research methodology employed. It will then analyze the findings related to the use of mathematical domino cards and discuss the theoretical, empirical, and practical implications of the research. This research is expected to significantly contribute by providing empirical evidence on the effectiveness of using mathematical domino cards in PMRI-based mathematics education at the elementary school level.

2. METHOD

This research was conducted at SD Negeri Gembira, an elementary school located in Nangahale Village, Talibura District, Sikka Regency. The research was carried out in the 2023/2024 academic year, in semester II. The research method used is qualitative research with a qualitative descriptive type. To ensure the representativeness of participants in this research, purposive sampling technique was used. The class II A homeroom teacher was selected because the homeroom teacher had in-depth direct knowledge and experience regarding student learning activities and the implementation of learning media in class and class II A students consisting of 7 girls and 15 boys were selected to cover various backgrounds and levels of understanding. mathematics. This research uses observer-as-participant data collection techniques and procedures, where researchers act as participants in conducting research. Data collection techniques include Observation technique, using student activity observation sheets to record student involvement and interaction during learning using math domino cards with the PMRI approach. Questionnaire technique, using a student interest questionnaire to measure students' level of interest in learning mathematics before and after using domino media. Interview technique, using interview guidelines for teachers and students to obtain in-depth information about the experiences and perceptions of teachers in using learning media and students regarding the use of mathematics domino media and the PMRI approach. The data analysis technique used in this research is triangulation, which includes combining various data sources to increase the validity of the findings. Observation and interview questions were developed based on the theoretical framework of the research, namely PMRI contextual learning theory and learning media theory. Observation questions cover aspects such as student engagement, interaction during play, and understanding of mathematical concepts. Interview questions included teachers' perceptions about changes in students' interest in using media in the learning process as well as students' perceptions of the effectiveness of using domino mathematics media with the PMRI approach in learning mathematics. Researchers act as teachers who are directly involved in the learning process.

3. RESULT & DISCUSSION

This study aims to address the research problem regarding how the use of mathematical domino cards can overcome low student interest in learning mathematics in class II A at SD Gembira. The underlying research problem is the low interest in learning mathematics among students, often caused by the perception that mathematics is a difficult and boring subject. To address this issue, the PMRI (Indonesian Realistic Mathematics Education) approach utilizing domino cards as a media tool was introduced to make mathematics learning more engaging and interactive. The use of engaging learning media is expected to provide a solution to increase student engagement and motivation in learning mathematics. This research utilized several instruments to collect data, namely: a) Classroom Observation: conducted during the lessons using mathematical domino cards as a medium, b) Interviews: with the homeroom teacher of Grade II A and several students who served as respondents, c) Learning Interest Questionnaire: administered to all students of Grade II A to measure their interest in learning mathematics before and after using the mathematical domino cards as a medium.

3.1 Classroom Observation Results

On Monday, March 4, 2024, an observation was conducted on the mathematics learning process using domino cards in class II A at SD Gembira. Out of 22 students, 18 were present while 4 were absent due to illness. The learning process began with an introduction from the teacher, including the presentation of learning objectives, the introduction of mathematical domino cards, and an explanation of their use in the session. Before the lesson started, the classroom atmosphere felt ordinary, with students showing lack of enthusiasm towards mathematics, such as expressions that appeared sulky, flat, or unenthusiastic upon entering the mathematics class. They could be seen as lethargic or disinterested. Students were not actively participating in discussions or activities related to mathematics. They appeared passive, simply following instructions without much contribution. Students had difficulty concentrating or were easily distracted during mathematics lessons. They could be seen daydreaming or looking elsewhere. Students showed reluctance or indifference towards the taught material, asking unrelated questions or displaying clear ignorance. They did not engage much in conversation or interaction with the teacher or classmates when mathematical topics were discussed. They could appear closed-off or less commu-

FIGURE 1. Classroom Observation

nicative. Students exhibited slow or unproductive work patterns when given mathematical tasks. They seemed to complete tasks with less enthusiasm or avoided working on them.

However, after the introduction of domino cards, the classroom atmosphere changed to become more dynamic and interactive. Throughout the learning process, the classroom environment became livelier and more interactive. Students showed increased enthusiasm and engagement in learning activities, such as solving mathematical problems, performing calculations, and collaborating in groups. The use of mathematical domino cards in the PMRI approach made the classroom atmosphere more dynamic. Students demonstrated increased enthusiasm and engagement during the learning process. They actively participated in various activities using domino cards, such as solving mathematical problems, performing calculations, and collaborating in groups.

All students actively participated in the learning activities. Students appeared enthusiastic and energetic when using domino cards to solve multiplication and division problems. They were not just sitting quietly but actively moving, discussing, and participating in games. The use of domino cards helped students focus and concentrate more on understanding mathematical concepts. Students were more interested and less easily bored during the learning process, and they were motivated to complete the given tasks. The learning process involved intense interaction between the teacher and students, as well as among the students themselves. The teacher acted as a facilitator guiding students in solving the given problems.

After the learning session ended, the classroom atmosphere remained cheerful, with students showing greater interest in mathematics, feeling more confident in their mathematical abilities, and being more eager to learn further after using domino cards as a learning tool. They left the classroom with smiles on their faces and a sense of satisfaction with what they had learned that day. The teacher provides motivation and moral support, especially for students who are having difficulty understanding the material, in line with the PMRI approach that focuses on students. The teacher not only teaches but also guides and supports students in the learning process, fostering positive interaction between teacher and students. The teacher also observes and records the progress of each student. This helps the teacher to gauge the extent of each student's understanding of the material taught and to provide interventions if necessary.

The assessment indicators on the student interest observation sheet are (a) Feeling of joy; (b) Interest; (c) Engagement; and (d) Attention, which are described in the following statements: 1) Students feel happy when the teacher teaches using media; 2) Students feel delighted when the teacher introduces the media; 3) Students like the media used by the teacher; 4) Students are interested in the learning media used by the teacher; 5) Students are interested in solving mathematics problems; 6) Students answer questions given by the teacher; 7) Students ask the teacher when they cannot answer questions; 8) Students do not talk to themselves when the teacher teaches; 9) Students do not feel sleepy when the teacher teaches; 10) Students do not play alone when the teacher teaches Ilato et al. (2020).

The observation results indicate a clear cause-effect relationship between the use of mathematical domino cards and the change in students' learning interest. When introduced to engaging and interactive learning media, students showed positive responses such as increased enthusiasm, active participation, and better focus in learning mathematics. This indicates that the use of domino cards is effective in addressing low learning interest among Grade II A students at SD Gembira. Students feel that learning mathematics becomes more interesting and understandable, ultimately enhancing their motivation to learn. This is also consistent with the assessment observations conducted, where students feel happy and delighted when the teacher introduces and teaches using the learning media. Students are also interested in solving problems given by the teacher and do not play alone when the teacher is teaching. This shows a very positive response from students towards the use of learning media.

TABLE 1. Assessment Criteria for Student Learning Interest

Scor	Assessment Criteria
81 - 100	Very Good
61 - 80	Good
41 - 60	Fair
21 - 40	Poor
0 - 20	Very poor

In the entire range of scores, all students are categorized as "Very Good." This indicates that students feel happy and delighted when the teacher introduces and teaches using the learning media.

Overall, the use of mathematical domino cards with the PMRI approach successfully addressed low learning interest among Grade II A students at SD Gembira regarding mathematics. This finding supports the hypothesis that engaging learning media can positively influence students' behaviour and attitudes during the learning process. Discussions on variations in student responses also provide a deeper understanding of the outcomes of using these domino cards in the context of mathematics education in elementary schools.

3.2 Interview Results

The interviews were conducted at the school with the Class II A homeroom teacher and four students as representatives from Class II A. These four students were selected based on their responses to the questionnaire. The interview results with the respondents are as follows:

3.2.1 Interview Results with Class II A Homeroom Teacher

Based on the interview with the Class II A homeroom teacher, it is explained that the students in Class II A are very enthusiastic and interested in the use of learning media such as grains and number cards in the teaching and learning process. Below is the processed data from the interview with the Class II A homeroom teacher:

Researcher	:	"How do students react when using learning media?"
Teacher	:	"They become more enthusiastic and very eager to receive the lessons."
Researcher	:	"How does the teacher activate and involve students in using the media?"
Teacher	:	"Students are engaged in watching mathematics instructional videos and drawing flat and solid shapes."
Researcher	:	"How interested are the students before and after using the learning media?"
Teacher	:	"Before using instructional media, students' interest in receiving lessons was very low, whereas after using the media, students are more enthusiastic about receiving lessons."

The homeroom teacher observed that the use of instructional media significantly increased students' enthusiasm and engagement in the learning process. Before using instructional media, students showed a tendency towards passivity and lack of interest in mathematics. The teacher activated students through various strategies, including watching mathematics instructional videos and engaging in activities such as drawing planes and solid shapes. This helped students become more involved in learning and gain a better understanding of the mathematics concepts being taught.

The use of mathematical domino cards for instructional media also had a positive impact on student engagement in the learning process. The teacher mentioned that students were more actively involved in learning activities. They not only passively received lessons but also actively participated in activities involving the use of this media. Variation in student responses was also evident, where some students may require more guidance or support in overcoming difficulties in mathematics, while others showed rapid progress and satisfaction with their learning.

Overall, the use of instructional media such as mathematical domino cards has brought positive changes to the classroom dynamics, increased student enthusiasm, and transformed their attitudes towards learning mathematics. Students are not only more active in the learning process but also show a greater interest in understanding the mathematics concepts being taught. The teacher successfully activated students through diverse methods, including the use of technology and visual activities. The main findings from this interview highlight that the use of instructional media in mathematics significantly addressed the low interest in learning among Grade 2 students at Gembira Public El Elementary School towards mathematics.

3.2.2 Interview Results with Students

Interviews with students were conducted after the learning process was completed. There were 4 (four) students who participated as respondents. In the interviews, the respondents explained that there was a change in interest before and after the use of learning media in the learning process. Below is the processed data from the interviews with the students:

Researcher	:	"With the use of mathematical domino cards, do you find it easier to understand the material on multiplication and division of integers in the mathematics subject?"
Respondent 1	:	"Yes, it's easy."
Respondent 2	:	"Yes, it's easy because it's good."
Respondent 3	:	"Yes, it's easy because I really like the mathematical domino media."
Respondent 4	:	"Yes, it's easy because I can calculate quickly."

Interviews with four students who served as respondents after the learning process ended showed that the use of mathematical domino cards significantly influenced their understanding of multiplication and division of whole numbers. Respondent 1 found the material easier to grasp. Respondent 2 indicated that the material was more comprehensible due to the effective learning media. Respondent 3 felt that understanding the material was easier because they greatly enjoyed using mathematical domino cards. Respondent 4 stated that the mathematical domino cards helped them calculate quickly. The students' responses indicated that the use of mathematical domino cards not only enhanced their understanding but also made the learning process more enjoyable and engaging. All respondents agreed that this media made mathematical concepts easier to understand. Particularly, Student 3 highlighted that their fondness for this media increased their interest and engagement in learning.

Several key points connecting student behaviour and attitudes during learning with the use of learning media include: 1) Better Understanding, where all respondents stated that mathematics became easier to understand with the use of mathematical domino cards; 2) Higher Engagement, where students showed greater interest and involvement in the learning process due to the game element in the learning media; 3) Increased Motivation, where initially less enthusiastic students became more eager to learn mathematics, as seen from their positive responses to the learning media.

During the learning process, classroom dynamics became livelier and more interactive. Students were more active in asking questions, discussing, and participating in group activities. The use of mathematical domino cards created a more enjoyable and challenging classroom atmosphere, contributing to increased student interest. This change was evident not only in individuals but also in interactions among students and between students and the teacher. These activities not only enhanced individual understanding but also strengthened social relationships among students. This indicates that learning media helped create a more enjoyable and effective learning environment.

These findings suggest that interactive learning media, such as mathematical domino cards, can effectively enhance understanding and address low interest in challenging subjects like mathematics. Moreover, the more positive and interactive classroom dynamics enrich students' learning experiences and support better learning outcomes.

3.3 Learning Interest Questionnaire Results

The questionnaire results were obtained by distributing them to the Class II A students, and the questionnaire was filled out individually. In this study, two answer alternatives were used: "Very Happy" and "Very Unhappy." Out of the 18 respondents present, each answered "Very Happy" to every questionnaire statement. The questionnaire results indicate that each respondent expressed very positive interest in the use of mathematical domino card learning media, reflecting a 100% positive interest percentage towards learning mathematics with domino cards. This portrays a significant shift in students' learning interest after the implementation of this media. The questionnaire results show that all respondents expressed very positive interest in the use of learning media in the learning process, with a percentage reaching 100%.

Previously, students showed low interest in learning mathematics, perceiving the subject as difficult and boring. They tended to be passive in their learning, inactive in class discussions, and less inclined to participate in lessons. This led to a lack of enthusiasm in attending classes and passive engagement during the learning process. Concepts like multiplication and division were seen as challenging by many students, leading them to avoid delving deeper into the material. Students were not actively involved in the learning process, often listening passively and seldom asking questions or participating in class discussions.

After the implementation of mathematical domino card learning media with the PMRI approach, significant changes occurred in students' learning interest. All students showed a very positive interest in mathematics. Students felt happy and enthusiastic when using mathematical domino cards in learning. They stated that concepts such as multiplication and division became easier to understand due to the interactive and engaging approach of the media. Statements in the questionnaire indicated that all respondents felt very happy, reflecting a significant increase in learning interest.

With the use of domino cards, concepts such as multiplication and division of numbers became easier to understand. Students felt that mathematics material was no longer difficult and could be learned in a fun way. Respondents expressed those students found it easier to understand the material because the learning media used was engaging and interactive.

Students were more actively involved in the learning process. They participated in activities using mathematical domino cards, such as playing while learning and collaborating with their classmates to solve mathematical problems. This indicates an increase in student participation and engagement in learning. Students' attitudes towards mathematics changed to be more positive. Students no longer saw mathematics as a boring and difficult subject but rather as an interesting and enjoyable challenge to learn.

The use of mathematical domino card learning media with the PMRI approach has successfully significantly increased students' learning interest. Students showed high

FIGURE 2. The Use of Mathematical Domino Card Learning Media with the PMRI

interest in using mathematical domino card learning media. This indicates that the use of mathematical domino card learning media can be one of the effective strategies to overcome low student learning interest in mathematics. These findings indicate that the use of mathematical domino card learning media with the PMRI approach is effective in addressing low student interest in mathematics. By providing students with a fun and interactive learning experience, they are more motivated to actively participate in learning and develop their understanding of complex mathematical concepts.

3.4 Discussion

The data used in this study is qualitative data on students' learning interest in using mathematical domino card learning media in mathematics education, with the type of research being qualitative descriptive. Therefore, all data from observations, interviews, and the learning interest questionnaire of students will be analysed and discussed qualitatively. This study is like the research conducted by Herawati (2017) entitled "The Use of Fractional Domino Cards in Mathematics Learning Based on the STEM Approach." The similarity in this research lies in both studies emphasizing the use of the same learning media, namely domino cards, in the mathematics learning process. This indicates that both studies have a similar focus on integrating domino cards as a learning aid. However, the difference between this research and the previous one lies in the approach. This study uses the PMRI approach and mathematical domino cards as the learning media, while the previous study used the STEM approach. Additionally, this study also focuses on analyzing students' learning interest because of using the learning media, whereas the previous research focused more on understanding concepts and student motivation.

The novelty in this research lies in the use of mathematical domino card learning media with the PMRI approach to address low student learning interest in mathematics education. Here is a summary of the learning interest of Class II A students at Gembira Elementary School:

3.4.1 Classroom Observation Analysis

Overall, the observation results indicate a significant increase in the learning interest of Class II A students at Gembira Elementary School after using mathematical domino cards. Before using this media, the classroom atmosphere tended to be flat, with students showing little enthusiasm. This is a common condition in many mathematics classes, where the subject is often perceived as difficult and boring by students. However, after implementation, the classroom became livelier and more interactive, with students demonstrating higher enthusiasm for mathematics lessons.

The use of mathematical domino cards engaged students more actively in their learning. They were not just passive listeners but actively participated in activities such as problem-solving, calculations, and group work. These findings align with Marian & Yansyah (2021a) research stating that domino card games can be used as an alternative in mathematics learning in classrooms. This change suggests that innovation in teaching methods, particularly incorporating gaming elements, can stimulate higher interest and enthusiasm for learning, as also supported by Surentu et al. (2023) who found that students tend to prefer learning methods that integrate gaming elements because they are perceived as easier to digest and aid in material retention.

The domino card media helps students focus better and concentrate on understanding mathematical concepts. When using domino cards, students are more interested and less likely to feel bored during the learning process. This reduces boredom and enhances their active participation. Sitorus & Santoso (2022) discovered that game-based learning media attract students' interest and inspire them to continue learning, supporting these findings. Students are motivated to complete assigned tasks, indicating that engaging learning media can help students remain focused and interested in the material taught, thereby improving their understanding of mathematical concepts.

Before using the domino card learning media, students had a negative perception of mathematics. However, after implementation, students' attitudes became more positive, viewing mathematics as an interesting and enjoyable learning challenge. This observation supports Christanty & Cendana (2021) theory that learning involving active interaction can increase student engagement and motivation. Students not only listen to teacher explanations but also actively participate in various activities such as problem-solving, calculations, and group work. These activities encourage students to move more, discuss, and participate in games.

In the PMRI approach, the teacher acts as a facilitator guiding students in problem-solving and providing motivation and moral support. Positive interaction between teachers and students during the learning process is crucial. Teachers also observe and record the progress of each student, which helps in providing appropriate interventions when needed. The active role of the teacher as a facilitator is essential in ensuring that each student receives the support they need to succeed, supporting Rahmawati & Purnomo (2023) theory emphasizing the teacher's role as a facilitator in supporting students in seeking knowledge to develop the necessary skills to achieve desired learning goals.

Students showed a very positive response to the use of domino learning media. They felt happy, joyful, and interested during learning, as stated by Mahpudin (2021) that students' learning interest is influenced by their own interest. Students were more active in answering questions, asking the teacher when they encountered difficulties, and did not feel bored or sleepy during learning. This indicates that engaging learning media can make students more active and motivated in learning.

After the lesson, students showed a greater interest in mathematics and felt more confident in their abilities. Some students were even more enthusiastic about learning more about mathematics in the future. Puswiartika & Ratu (2024) stated that the expression of enthusiasm in facing subject matter is a strong indicator of elementary students' learning interest.

The use of mathematical domino card learning media with the PMRI approach has proven to have a significantly positive impact on students' learning interest. This media not only makes mathematics learning more enjoyable and engaging but also increases active involvement and cooperation among students. These observations support various literature stating that innovation in learning media can bring positive changes in students' interest and engagement (Dwanda et al,, 2023; Fauziyah et al., 2024; Magdalena et al., 2021; Melatai et al., 2023; Maghfiroh et al., 2024).

3.4.2 Analysis of Interview Data

Generally, the interview results with class teachers indicate that the use of instructional media positively impacts students' interest and participation. Before using instructional media, students often felt bored and unmotivated in learning mathematics. After implementing instructional media, students showed more enthusiastic and eager attitudes. This indicates that innovation in teaching methods, especially by incorporating game elements, can trigger higher interest and enthusiasm for learning.

These findings align with the research by Fadilah et al. (2022) which found that students are more actively engaged with instructional media compared to traditional teaching methods, which often make students passive. The use of media such as mathematical domino cards has a positive impact on students, increasing their motivation and learning outcomes (Adawiyah & Kowiyah, 2021; Mailili, 2018; Herawati, 2017; Puspitasari , 2022). Research conducted by Surentu et al. (2023) also shows that students tend to prefer learning methods that incorporate game elements because they are easier to understand and help with material retention.

Teachers use various instructional media such as videos and activities drawing planes and spatial shapes. These interactive learning media actively involve students, increasing their interest in learning. This is supported by the theory of Azzahra & Pramudiani (2022) which states that the characteristics of interactive instructional media involve students as active users, thereby enhancing their interest and motivation to learn. Research Adnyana& Suyanto (2013); Afriana & Prastowo (2022) and Pradani (2022) supports these findings, showing that the use of instructional media not only increases students' motivation but also their learning outcomes. Class teachers also reported that students become more active in asking questions and participating in class discussions, which was rare before.

Teachers face some challenges in using instructional media, including limited tools and materials, lack of creativity, and busyness in preparing administration. Despite this, teachers continue to routinely use instructional media, demonstrating their commitment to improving the quality of education despite existing limitations.

Interviews show that students' attitudes towards mathematics change significantly after the use of instructional media. Before the use of media, many students had negative perceptions of mathematics, considering it difficult and boring. However, after using the mathematical domino media, the response became more positive because they engaged in fun activities. This is like what Dhema & Jufriansah (2021) stated in their research, that students become

more eager to participate in mathematics learning activities, do not feel bored, and are no longer apathetic towards mathematics because they are engaged in fun activities. Students are more enthusiastic and eager to participate in every learning activity. This reflects the importance of enjoyable and relevant learning to change students' perceptions and attitudes towards difficult subjects.

These findings emphasize the importance of support and training for teachers to develop creativity in using various instructional media. With proper training, teachers can overcome existing limitations and continue to improve the quality of education through innovation in teaching methods. Rahmawati & Purnomo (2023) state that the role of teachers as facilitators is crucial in ensuring that each student gets the support they need to succeed.

The use of interactive instructional media such as mathematical domino cards has a significant positive impact on students' interest and participation in learning mathematics. These findings are supported by various studies showing that interactive learning media can increase students' interest, engagement, and activeness (Azzahra & Pramudiani, 2022; Puspitasari , 2022). Students' motivation increases when they are involved in enjoyable and interactive learning. The use of mathematical domino cards not only makes learning more interesting but also helps students understand mathematical concepts in an easier and more enjoyable way (Sitorus & Santoso, 2022). Interactive learning media also increases student participation in class. Students are more active in asking questions, discussing, and collaborating with classmates in solving mathematical problems ([Marian & Yansyah, 2021b). Research shows that the use of interactive instructional media can improve students' learning outcomes. Students are not only more motivated but also understand the lesson material better (Mahpudin, 2021).

The interview results and literature analysis show that the use of instructional media such as mathematical domino cards with the PMRI approach is effective in addressing the low interest in learning mathematics. This innovation in teaching methods can change students' negative perceptions of mathematics, increase active participation, and motivate students to be more involved in learning. This confirms that creative and interactive learning strategies can make a significant difference in students' learning, especially in subjects that are often considered difficult and boring.

Interview findings with four students reveal that the use of math domino learning media significantly enhances students' previously low interest in studying mathematics. Students expressed enjoyment and an improvement in their skills in understanding math concepts, such as the ability to calculate quickly.

The interview results with four students revealed that the use of mathematical domino instructional media has a very positive impact on students' learning interest. Before using this media, students' interest in learning mathematics was low, and students tended to view mathematics as a boring and difficult subject. However, after being introduced to mathematical domino cards, students' interest and engagement increased significantly. Responses such as "I am very happy with the mathematical domino media" and "I can count quickly" indicate that this media not only makes learning more engaging but also enhances students' understanding and skills in mathematics.

These findings align with the research byMarian & Yansyah (2021a), which suggests that domino card games can be an effective alternative in increasing students' interest in subjects that are perceived as difficult and boring, like mathematics. In other words, the use of domino cards not only addresses students' learning interest but also changes their view of mathematics to be more positive and enjoyable. Before the use of learning media such as domino cards, many students were apathetic towards mathematics due to calculation difficulties and boredom. The use of math dominoes also encourages active student involvement in the learning process. Fitri (2023) highlights that interactive learning media can increase student participation in class, which aligns with findings that students are more active in completing tasks and participating in discussions. By using interactive learning media like math dominoes, students not only become more active in the learning process but also more engaged in understanding and applying math concepts. This helps address students' negative perceptions of mathematics, which is often considered difficult and boring. Therefore, the use of interactive learning media can be an effective strategy to increase student participation in math learning and change their attitude to be more positive towards the subject.

One important finding is the increase in students' confidence in their math abilities after using domino media. This finding supports the theory of Fadiana & Rosalina (2020), which emphasizes that involvement in enjoyable activities can enhance students' motivation and confidence in their abilities. This means that when students are engaged in math learning through interactive media like domino cards, they not only increase their learning interest but also feel more confident in facing math challenges.

Interview results suggest that the use of math domino learning media can be widely applied in various classes and schools to address low learning interest and negative perceptions towards mathematics. Teachers need to implement and develop various innovative and interactive learning media to make learning more interesting and effective. Magdalena et al. (2021) states that by making learning material easier to understand using learning media, teachers can attract students' interest in learning new things. This is evidenced by the increased participation and involvement of students in math learning after using math domino media. Thus, the use of learning media that facilitates easier understanding of material can transform the learning dynamic to be more interactive and effective. Students become more actively involved in the learning process because they feel more capable and confident in tackling math challenges, as shown in interviews with students who responded positively to the use of math domino cards in their learning.

The study by Christanty & Cendana (2021) emphasizes that the use of interactive learning media promotes active learning, which is key to improving students' understanding of math concepts. When learning media are designed to involve students actively, such as through games or activities that engage them directly, students tend to better understand and retain math concepts. Direct interaction with the material and classmates makes students more engaged, enhancing their ability to solve math problems and understand theories in a more practical and enjoyable way. This highlights the importance of learning designs that are not only informative but also interactive, allowing students to learn in a more enjoyable and effective manner

Puspitasari (2022) show that engaging learning media like math dominoes can increase students' interest and motivation to learn, which is essential for achieving better learning outcomes. When students are involved in enjoyable and challenging learning, such as using math dominoes, they tend to be more enthusiastic about learning. This not only makes learning more interesting but also helps increase student engagement in understanding complex math concepts. Therefore, the use of creative and interactive learning media like math dominoes can contribute positively to improving students' academic performance in mathematics.

Increased confidence in students facing math also positively impacts their academic performance, according to Irman et al. (2022) teachers can leverage this increase to optimize students' learning experiences in class. When students feel more confident in their math abilities, they tend to have better academic performance. This increased confidence allows students to participate more actively in the learning process, be more daring in solving math tasks, and be more open to asking questions and discussing. Teachers can leverage this increased confidence by providing more opportunities for students to practice and apply math concepts in various learning activities, making the classroom learning experience more effective and enjoyable.

3.4.3 Analysis of Learning Interest Questionnaire

The questionnaire analysis results indicate that all students in Class II A show very positive interest in learning mathematics after using mathematical domino cards. This finding aligns with Prastika (2021) who also demonstrated increased interest in learning mathematics through appropriate instructional media. This heightened interest reflects increased intrinsic motivation among students, which is the internal drive to learn due to enjoyment or interest in the subject matter itself (Kurniasari et al., 2021)

Interest in learning mathematics is influenced by various factors, including the use of engaging instructional media such as mathematical domino cards (Aulia et al., 2021; Irkhami et al., 2021; Putri et al., 2019; Sirait & Apriyani, 2021). Effective instructional media not only enhances learning interest but also strengthens student engagement in the learning process (Afifudin et al., 2020). The theory of intrinsic motivation also supports that student interest and motivation in learning are more sustainable when driven from within themselves rather than external pressure (Ekayanti & Astawa, 2022).

One significant finding from the questionnaire is that students value freedom in mathematics learning without coercion. Students are more motivated when given the freedom to learn. This suggests that learning approaches that allow for exploration and active participation can enhance student motivation and interest in learning. This freedom can be realized through various teaching methods that encourage autonomy, such as project-based learning or the use of interactive media that allows students to learn in their own way.

The use of mathematical domino cards in mathematics education at SD Negeri Gembira has shown successful practices in enhancing students' learning interest. Questionnaire results indicate that students are not only more active in learning but also have a more positive perception of mathematics. Teachers can implement this approach by providing a learning environment that supports student exploration and active participation.

The use of mathematical domino cards in PMRI-based mathematics learning has successfully addressed students' interest in learning. This can be seen from several aspects: a) Increased learning activity where students are more active and involved in learning. Students not only listen to the teacher's explanations but also participate in activities that require critical thinking and collaboration; b) Increased interaction between students and between students and the teacher. Game-based activities like domino cards encourage students to cooperate and communicate better; c) Perception change, students change their views on mathematics from difficult and boring to more interesting and understandable. This indicates that the right instructional media can change negative perceptions of certain subjects.

Some challenges faced by researchers during the study include 1) Time constraints. Limited time to implement all planned learning activities can be a constraint. The solution adopted by the researchers is to carefully plan activities, prioritize the most important activities, and ensure efficient use of time during learning; 2) Resistance from some students. Some students initially felt reluctant or uncomfortable with the use of domino cards in learning. The solution adopted by the researchers is to provide better understanding of the benefits of the media, encourage active participation, and provide necessary support to students in need.

The main findings of this study indicate that the use of interactive learning media, such as mathematical domino cards, can address the low interest in mathematics learning among second-grade students at SD Gembira. Students became more enthusiastic, motivated, and engaged in mathematics learning. This implication is important as it shows that innovation in teaching methods can make subjects that are often considered difficult more interesting and enjoyable for students. The use of interactive learning media also increases student participation and involvement in learning activities. Students are more active in asking questions, discussing, and collaborating with their peers. This supports a better understanding of mathematical concepts and shows that teaching methods involving active interaction can improve the quality of learning.

The findings also indicate that students' attitudes toward mathematics became more positive after using interactive learning media. They no longer view mathematics as a difficult and boring subject, but as an interesting and enjoyable challenge. This is important for increasing motivation and long-term learning outcomes. These findings are significant because they provide empirical evidence that interactive learning media can significantly address low interest in mathematics learning. By showing that interactive learning media can change students' perceptions and attitudes towards difficult subjects, this study provides a basis for developing more effective teaching methods.

However, there are limitations in this study. It was conducted in a single class with a limited number of students, so the results may not be generalizable to a larger population. Future research should involve more classes and schools to ensure the validity and reliability of the findings. The interview and observation results are subjective and may be influenced by researcher bias. Nonetheless, data triangulation with questionnaires helps reduce this bias. Future research can use more objective methods, such as

learning outcome tests, to measure improvements in student understanding.

Future research can explore several areas: a) Use of Other Learning Media, exploring the effects of various other types of interactive learning media, such as digital games, instructional videos, or mobile applications; b) Long-Term Impact, examining the long-term impact of using interactive learning media on student learning outcomes and their attitudes towards specific subjects; c) Implementation in Various Contexts, applying this method in different educational contexts, including schools with different socio-economic backgrounds, to see if the findings are consistent across different conditions; d) Teacher Training Development, developing training programs to help teachers integrate interactive learning media into their curricula and address any challenges they may face.

4. CONCLUSION

This research aims to explore the use of mathematics domino cards in the context of PMRI-based mathematics education and its impact on students' learning interest in Class II A of Gembira Public Elementary School. Through classroom observations, interviews with teachers and students, and analysis of learning interest questionnaires, it was found that the use of interactive learning media such as mathematics domino cards significantly addresses low interest in mathematics learning. The main findings of this research indicate that the use of mathematics domino cards can create a livelier and more interactive classroom environment. Students are not only passive listeners but also actively engaged in problem-solving activities, calculations, and group work. This change shows that innovations in teaching methods, particularly those integrating gaming elements, can stimulate higher interest and enthusiasm for learning.

Furthermore, students showed a positive change in attitude towards mathematics. Previously, mathematics was often perceived as difficult and boring by many students. However, after using domino cards as a learning tool, they began to see mathematics as an interesting and enjoyable challenge. These findings support the theory that contextual learning involving active interaction can enhance student engagement and motivation. The broader implications of these findings for educational practice and policy suggest that integrating interactive and contextual learning media such as mathematics domino cards into the curriculum can enhance students' interest and learning outcomes. Educators and curriculum developers are advised to consider using similar learning tools to make learning more engaging and effective.

For future research, it is recommended to explore the long-term impacts of interactive learning media and their implementation in different educational environments. Longitudinal studies could provide deeper insights into the sustained effects of these learning media on students' interest and learning outcomes. Additionally, further research with larger and more diverse samples could yield more generalizable results.

In conclusion, this research successfully addresses the identified gaps in previous literature by demonstrating that interactive learning media such as mathematics domino cards can mitigate students' low interest in mathematics learning. These findings not only enrich knowledge in the field of education but also provide empirical evidence to inform better educational practices and policies.

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