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Implementation of Smart Board Media to Improve Elementary School Mathematics Learning Outcomes

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Article

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Abstract

The purpose of this research is to improve the learning outcomes of mathematics multiplication and division materials using smart board media at SD Negeri Bawakaraeng 1 Makassar City. This type of research is Classroom Action Research (PTK) with 29 students in class IIIa research. The data collection techniques used are observation, tests and documentation. This research was carried out for two cycles. Each cycle consists of two meetings, namely the implementation of learning and the implementation of tests. Each cycle consists of four stages starting from planning, implementation, observation and reflection. The data analysis used was quantitative descriptive statistics. The results of this study show that the learning outcomes of students from cycle I to cycle II have increased. In cycle I, the average test result was 76.72 with good criteria, while the test results in cycle II showed an average of 88.34 with very good criteria. Therefore, the implementation of smart board media is effective in improving mathematics learning outcomes of elementary school students.

INTRODUCTION

Education is the main foundation in the formation of students' character and intelligence. In today's digital era, technological innovations have provided many opportunities to improve the quality of learning, especially in subjects that are considered difficult such as mathematics. According to mathematician Carl Friedrich Gauss, mathematics is the queen of science and also its servant. This means that in learning mathematics requires himself and servants, it is meant that mathematics always serves in other sciences (Suyitno, 2018). Math is often a challenge for many students at the elementary school level, which can negatively impact their motivation and learning outcomes.

Mathematics in elementary school studies the basics of arithmetic science to equip students at the next level of education. For this reason, educators are expected to

make an interesting and fun learning atmosphere with innovation through learning media. Learning media is one of the drivers of the successful process of teaching and learning activities and improving the quality of learning (Muslihatun, 2019). While other opinions say that media is a tool used by educators to communicate with students, media can be in the form of objects or behaviors, objects consisting of direct objects such as leaves, flowers, pencils and indirect objects such as whiteboards, tape recorders, films and others (Amreta, 2021).

Setiowati said that the incidents that often occur in schools show that mathematics learning tends to rarely use media or teaching aids that contain elements of creativity and innovation, educators often use makeshift media (Stuart, 2021). This certainly has an impact on students' disinterest in the learning process Based on the results of observations in class IIIA UPT SPF SDN Bawakaraeng 1, there are still students who do not understand multiplication. The low motivation to learn mathematics as evidenced by students who complain when learning mathematics, let alone learning multiplication, of course it affects students' learning outcomes. Mathematics does not only provide information in the form of theories, but aims to hone skills. Mathematics includes abstract learning, to understand abstract concepts requires media. In mathematics learning there are problems that are often encountered, namely students do not understand the material, teachers use conventional models and do not use media, this results in less mathematics learning results (Ningsih, 2022)

Interactive learning media, such as smart boards, offer a more engaging and effective approach. Smart boards allow teachers to deliver material in a more dynamic and visual way, so students can more easily understand complex math concepts. With interactive features, students can be directly involved in the learning process, which can increase their interest and participation in lessons. Additionally, the use of smart boards can help in presenting a variety of learning methods, such as educational games, simulations, and data visualization, which can support a variety of student learning styles. This is expected to reduce students' fear and anxiety about mathematics, as well as increase their confidence in solving mathematical problems. On the other hand, the implementation of technology in the classroom also needs to be supported by teacher training and adequate infrastructure. Therefore, it is important to design an implementation strategy that involves all parties, including teachers, students, and parents, so that the use of smart boards can have a significant positive impact on students' mathematics learning outcomes.

Research by (Amreta, 2021) with the title "Development of Scoreboard Media in Elementary Mathematics Subjects" states that the media of the scoreboard is seen

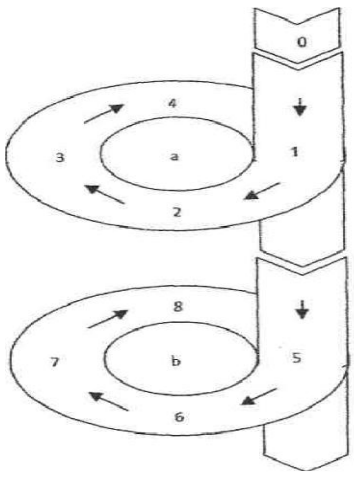
from its effectiveness and feasibility which is able to provide improved learning outcomes to students, can be used in the mathematics learning process. Further research by (Azizah, 2022) In the title "The Role of Multiplication Board Media on Mathematics Learning Outcomes of Multiplication Materials for Class V Elementary School" concludes that multiplication board media is able to provide an improvement in student learning outcomes in multiplication materials, students are also more active and stimulated to find the concepts of the material taught. Then this smart board can be used in learning. The results of the research have similarities with the research that will be carried out, namely the use of learning media to improve the mathematics results of elementary school students. The update that will be carried out by the researcher is the use of smart board media that is creatively made and will be implemented in grade III in elementary schools.

The urgency of this research is to improve the mathematics learning outcomes of students in class IIIA UPT SPF SDN Bawakaraeng 1, create a class that is not boring and increase the motivation of students to learn mathematics. Against this background, research and implementation of smart board media are expected to make a meaningful contribution to improving the quality of education, especially in mathematics lessons in primary schools.

METHOD

This study uses Classroom Action Research (PTK) which focuses on classroom situations. The research was conducted at UPT SPF SD Negeri Bawakaraeng 1 Makassar City per cycle which was carried out in a certain cycle. The subject of this study is grade IIIA students of SDN Bawakaraeng 1 consisting of 29 students. The data collection techniques used are tests and observations. There are two tests in this study, namely pre-test and post-test. Each consists of 10 questions with a weight of 0-10. Meanwhile, the observation technique is used to observe all student learning activities in the Mathematics learning process with smart board learning media.

Remarks



0 : Pre-action
1 : Planning
2 : Actions
3 : Observation
4 : Reflection
5 : Planning
6 : Actions

7 : Observation
8 : Reflection
a : Cycle 1
b : Cycle 2

Figure 1. The research design flowchart is adapted from the Kemmis & Mc. Taggart model (Wardani, 2005)

RESULTS AND DISCUSSION

1. Research Results

A. Pre-Actions

Before carrying out the classroom action research process by applying smart board media, the researcher conducted a pre-action to test the ability level of grade IIIA UPT SPF SDN Bawakaraeng 1 students to learn with conventional media on Thursday, September 5, 2024. In the implementation of the learning, the researcher observed and based on the observations, found:

a. Students pay less attention to learning
b. Students are less enthusiastic about taking math lessons because they do not understand multiplication material
c. Many students know multiplication only to the multiplication of two

Through the description of the initial data that has been obtained, each aspect shows a lack of learning success criteria, so there is a need for action to increase students' knowledge of mathematics subject multiplication material. The action taken is by applying smart board media in mathematics learning.

The initial data obtained by the researcher from the results of the pre-action test conducted before the learning process using smart board media is presented in the following table.

Table 1. Percentage of Pre-Action Learners' Knowledge Criteria

Value	Criteria	Number of Students	Percentage
86-100	Very good	2	6.90%
76-85	Good	3	10.34%
65-75	Pretty Good	24	82.76%
Quantity		29	100%

The results of the data in Table 1 show that all students in grade III participated in mathematics learning. Most of the students still experience problems in learning which can be seen from the dominant learning results are still quite good, students do not understand multiplication material. Subsequently, the first cycle of action will be carried out with the application of smart board media.

1. Description of Implementation of Cycle I Actions

The implementation of the first cycle of learning was carried out in 2 meetings. Each meeting consists of 2 hours of lessons, the implementation of the first cycle of learning is held on Wednesday, September 11, 2024 and Thursday, September 12, 2024 which consists of four stages, namely planning, implementation (action), observation results, and reflection. The four stages can be described as follows:

a. Cycle I Action Planning
    1) The researcher compiled the concept of mathematics learning using smart board media.
    2) The researcher compiles and prepares teaching materials (modules, assessments and learning media)
    3) Prepare *pre-test* questions to find out students' abilities before action is taken, and prepare *post test* questions to find out the results after action is taken.
    4) Prepare the facilities and infrastructure needed in the implementation of actions.

b. Implementation of Cycle I Actions

The implementation of the first cycle of actions was arranged in two meetings, for 1 week, namely on September 11, and 12, 2024 at the UPT SPF SDN Bawakaraeng 1 school, each meeting was held for 2x35 minutes. Each meeting consists of three stages, namely the initial activities, core activities, and final activities. The time allocation for the initial activity is ±10 minutes, the core activity is ±50 minutes, and the final activity is ±10 minutes. The action is carried out using smart board media.

Table 2. Percentage of Knowledge Criteria for Cycle I Students

Value	**Criteria**	**Number of Students**	**Percentage**
86-100	Very good	5	17.24%
76-85	Good	12	41.38%
65-75	Pretty Good	12	41.38%
Quantity		29	100%

The results of the implementation of the first cycle showed an increase in the understanding of grade III students. This can be seen from students who are on good criteria to increase. However, this still needs to be followed up to improve student learning outcomes.

c. Observations

Student activities in learning are known from field records conducted by researchers, it is known that in the first cycle the number of students who participated in the learning process was 29 students. During the learning process, students seem to pay less attention to the teacher's explanations and students are not too enthusiastic in participating in learning. There are still some students who rely on their classmates who are considered smart to answer the teacher's questions, but even so, the ability to multiply has increased compared to pre-action. In this first cycle, there are already several students who have increased their understanding of multiplication.

d. Reflection

At this stage, the researcher analyzed the data that had been collected from the results of observation and evaluation of multiplication learning in class IIIA UPT SPF SDN Bawakaraeng 1

a) There are still some students who have not reached the minimum completion score
b) Students still have difficulty in understanding the concept of multiplication
c) Students are less enthusiastic in following the learning process
d) Students still rely on their classmates who are considered smart to ask questions, answer questions.

Table 3. Success Criteria for Multiplication Material Ability in Pre-Action and Cycle I

Value	**Pre-Actions**		**Cycle I**		**Performance**
	Number of Students	**Presentation**	**Number of Students**	**Presentation**	
86 – 100	2	6.90%	5	17.24%	Excellent
76 – 85	3	10.34%	12	41.38%	Good
60 - 75	24	82.76%	12	41.38%	Enough

In the table above, it can be seen that the multiplication ability of class III UPT SPF SD Negeri Bawakaraeng 1 in the pre-action and action of the first cycle has increased. The learning carried out in cycle 1 is higher than the learning carried out in the pre-action, this is used as a first step and improvement to carry out learning in the next cycle. Thus, the implementation of smart board media can improve student learning outcomes, then cycle II action will be carried out.

2. Description of Cycle II Action Implementation

The implementation of cycle II learning was carried out in 2 meetings. Each meeting consists of 2 hours of lessons, the implementation of cycle II learning is held on Wednesday 18 September 2024 and Thursday 19 September 2024 which consists of four stages, namely planning, implementation (action), observation results, and reflection. The four stages can be described as follows:

a. Cycle II Action Planning

After the reflection of cycle 1 is carried out, then the researcher plans the learning to be carried out in cycle 2. Action planning is prepared based on the shortcomings in the actions of cycle 1 so that they can be corrected in cycle 2. The researcher agreed to repeat the use of media In cycle II, the researcher designed the implementation of the following actions:

The first stage of classroom action research is planning. Cycle II is an improvement action from cycle I, before entering cycle II, the researcher takes preparatory steps to carry out actions during mathematics learning activities. The preparations are as follows:

1) The researcher compiled a teaching module for cycle II.
2) The researcher compiled an observation sheet that was used to observe during the learning process.

b. Implementation of Cycle II Actions

The second cycle of action was carried out in two meetings. Namely on Wednesday, September 18, 2024 and Thursday, September 19, 2024. Strive to improve the understanding of multiplication with smart board media that is carried out in accordance with a predetermined plan.

Table 4. Percentage of Knowledge Criteria for Cycle II Students

Value	**Criteria**	**Number of Students**	**Percentage**
86-100	Very good	21	72.41%
76-85	Good	5	17.24%
65-75	Pretty Good	3	10.34%
Quantity		29	100%

c. Observations

The implementation of observation is carried out at the same time as the implementation of actions. At this stage, the researcher observes student activities during the learning process using observation sheets that have been made. Observations carried out in cycle II are the same as observations in cycle I. Observation is carried out by giving individual scores on students' attitudes and motivations during learning.

d. Reflection

The implementation of cycle II learning is an improvement of cycle I. Researchers and teachers applied smart board media to increase students' knowledge of multiplication materials. The implementation of cycle II in general found few obstacles, the obstacle was that there were 3 students who had not reached the KKM. These students have not reached KKM because they are still not very good at multiplication even though they use smart board media. Based on the results of the multiplication ability test of students in grade III at UPT SPF SDN Bawakaraeng 1 has increased.

The following are the learning outcomes of students starting from pre-action, cycle I to cycle II.

Table 5. Pre-Action Learning Outcomes, Cycle I and Cycle II

Value	Pre-Actions		Cycle I		Cycle II	
	Number of Students	Percentage	Number of Students	Percentage	Number of Students	Percentage
86 – 100	2	6.90%	5	17.24%	21	72.41%
76 – 86	3	10.34%	12	41.38%	5	17.24%
60 - 75	24	82.76%	12	41.38%	3	10.34%

Table 6. Comparison of Pre-Action, Cycle I and Cycle II

Test Results	Pre-Actions	Cycle I	Cycle II
Total Values	2000	2225	2562
Average	68.97	76.72	88.34
Criteria	**Pretty Good**	**Good**	**Very good**

Classroom Action Research is conducted in two cycles. Pre-action is carried out before the action to find out the initial ability of the student. Actions are carried out continuously until the desired result is achieved. The main goal of this study is to improve students' mathematics learning outcomes. Based on the results of the analysis that has been carried out, it can be concluded that there is an increase in mathematics learning outcomes of grade III students of UPT SPF SDN Bawakaraeng 1.

RESULT AND DISCUSSION

Result

The results of the study show that the use of smart board media in learning is effective in improving student learning outcomes. By paying attention to existing obstacles and continuing to reflect and improve, the quality of learning can be further improved. This is evidenced by the results of data analysis conducted by the researcher showing that the learning outcomes of students from cycle I to cycle II have increased. In the first cycle, the average test result was 76.72 with good criteria, while the test results in the second cycle averaged 88.34 with very good criteria. With chemistry, the implementation of smart board media is effective in improving the mathematics learning outcomes of elementary school students.The results of this study are similar to the research conducted by Firnanda and Faizah showing that the average score increased from Pretest 61.81 to Posttest 75.68, with an increase of 13.87 points. An N-gain of 0.37 indicates a moderate improvement category. The results of the paired t-test sample showed a significance value (2-tailed) of 0.000, which means that the increase is statistically significant (Firnanda & Faizah, 2024). The use of smart board media multiplication material succeeded in improving the learning outcomes of grade III students of SDN Klakahkasihah 01. This increase can be seen from the increase in the value of the prestralus, cycle I, and cycle II. This is supported by the results of the observation sheet at the time of the implementation of the action. Students are interested in the media presented so that they pay more attention and observe carefully. Students are also enthusiastic in working on multiplication problems given by researchers. The average pre-cycle score was 69.39, then the average score of the first cycle learning outcomes was 73.57 with a completion percentage of 71.42% and the average learning outcomes of the second cycle were 86.60 with a completion percentage of 100%. This shows that the second cycle succeeded in improving the learning outcomes of grade III students of SDN Klakahkasihan 01, Gembong District, Pati Regency with an increase percentage of 28.58% (Maula, 2024).

Research conducted by Gaudensiana Bopo et al show that the use of smart counting board media can significantly improve the numeracy ability of summing 1-20 in early grade students. The use of smart board media counting in mathematics learning with the sum of materials 1-20 was stated to have increased after using smart board media from pre-cycle to cycle 1 by 10.69% and obtained an average pre-cycle score of 54.48% to cycle 1 by an average of 65.17% or in the sufficient category. From cycle I to cycle II there was an average increase of 80%. Meanwhile, classically there was an increase from cycle I to cycle II, which was 100% from the determination of 75%. This indicates that the use of smart counting board media is very effective in improving numeracy skills in children aged 6-7 years. The TPOT model assisted by smart board media has been proven to improve learning outcomes in Mathematics multiplication and division materials because it is assumed that it facilitates students to exchange ideas with their friends to solve problems or problems with the help of Smart Board media so as to give rise to a confident attitude during the learning process (Firnanda, 2024). The strength of the relationship between learning motivation and student learning outcomes is very strong. By providing strong and high motivations in learning, it will have a positive and significant impact on the learning outcomes of elementary school students. So that the optimization of learning objectives in the form of student learning outcomes can be achieved (Mustanil, 2021).

Discussion

Research is carried out to improve the learning process in the classroom. The researcher tries to trace the problems experienced by students in mathematics subjects. This research was carried out through two cycles, each cycle consisted of four stages starting from planning, implementation, observation and reflection. This study uses smart board media as an alternative to overcome students' problems in learning mathematics multiplication materials. Thus, the main focus of this research is the implementation of smart board media to improve the learning outcomes of students in class IIIA UPT SPF SD Negeri Bawakaraeng 1.

CONCLUSION

Learning needs to create a fun atmosphere for students, one way that can be done is to apply interesting learning media. The use of smart board media in learning in elementary school can improve student learning outcomes in an interactive and fun way. With the right implementation, smart boards can be an effective tool in creating a better learning atmosphere and supporting students' academic achievement.

The use of smart board media significantly improves the learning outcomes of elementary school students in various subjects. This media has proven to be effective in increasing students' learning motivation, concept understanding, and problem-solving skills. Smart board media encourages students to more actively participate in the learning process. Interactive features on smart boards allow students to interact directly with the subject matter, making learning more engaging and meaningful. Visualizations presented through smart boards are able to simplify complex concepts, making them easier for students to understand. This is especially beneficial for subjects that are abstract in nature such as math and science. Smart board media provides flexibility in the delivery of materials. Teachers can adjust learning materials and methods according to the needs and learning styles of students.

Suggestions

Based on the results and conclusions of the research above, the researcher has several suggestions for using smart board media as follows:

1. Educators should use smart board media in learning mathematics multiplication materials
2. Smart board media is effectively used. So, the researcher recommends that it be used as an alternative learning media in schools to improve student learning outcomes

School principals are expected to provide direction and motivation to educators to improve the quality of learning by using learning media.

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