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Need Analysis of Using Button Seed Boards Based on Performance Assessment as Mathematics Learning Media for Elementary Schools in Kudus District

Afsantin, Syarifah, Sumaji & Mohammad Kanzunnudin[1*]

[1*]Universitas Muria Kudus, Kudus, Central Java 59327, INDONESIA

*Corresponding author email: moh.kanzunnudin@umk.ac.id

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Abstract: This research investigates the significance of utilizing button board media in mathematics education, particularly for teaching addition of whole numbers. The study adopts a qualitative approach and involves first-grade students from two different elementary schools within a sub-district of Kudus City, with 25 students from SD 2 Demaan and 23 students from SD 2 Mlatinorowito, along with their two homeroom teachers. Data were collected through non-test methods, specifically interviews. The findings indicate that button board media, when used as a mathematics learning tool, is essential for enhancing students' understanding of place value and facilitating the addition of integers. The use of this media was shown to significantly improve learning outcomes, as students were better able to engage with the material and perform addition tasks more effectively. The study concludes that performance assessment-based button board media is crucial in increasing student engagement, preventing boredom, and improving comprehension of mathematical concepts.

Keywords: Needs analysis, performance assessment, button seed board, mathematics learning

1. Introduction

Mathematics is a discipline deeply rooted in reasoning, critical thinking, and creativity. Among the many topics in mathematics, understanding fractions is crucial (Tarigan, 2021). Mathematics stands out as an extraordinary field of study because it blends logic with practical experience (Worowirastri et al., 2018). As a universal science that evolves alongside technological advancements, mathematics plays a pivotal role in enhancing human intellect across various domains (Susanti, 2020).

According to Slavin and Lake (2008), it is essential for every individual to be "number aware," as numbers are an integral part of daily life. Therefore, introducing basic mathematical concepts to first-grade students is vital as it lays the foundation for formal education. This is supported by Thorndike (1922), who argued that students' numerical abilities can be optimized when taught from the first grade. Typically, these abilities are nurtured through counting, often ranging from 1 to 20 or even up to 100, depending on the students' capabilities, which can vary widely (O'Donnell et al., 2024).

Vebrian and Putra (2019) emphasized the importance of teaching addition and subtraction to first-grade students by relating these operations to real-life contexts. By linking mathematical concepts to students' environments, their understanding becomes more intuitive. Moreover, frequent practice with arithmetic operations helps students differentiate and internalize these concepts (Baroody et al., 2019). As noted by Harmanto (2017), addition is a fundamental arithmetic operation in which two numbers are combined to form a new sum.

In the learning process, the use of media is essential to foster student enthusiasm, engagement, and creativity. Media can inspire curiosity and imagination, making the learning experience more dynamic. Consequently, teachers must integrate media into their instruction to sustain the learning process (Febriyandani & Kowiyah, 2021). Garlach and Ely (1971) defined media as tools, materials, or environments that facilitate students' acquisition of knowledge, comprehension of situations, and development of skills. An (2023) further described learning media as techniques, tools, models, and methods that enhance the effectiveness of learning. Through media, communication and interaction between teachers and students are enriched, thereby improving the teaching and learning process.

*Corresponding author: moh.kanzunnudin@umk.ac.id

One such tool is the button seed board, which has proven effective in mathematics instruction (Rahayu & Yatri, 2021). This media is designed to be visually appealing, capturing students' interest and ensuring that the learning process proceeds smoothly (Khoirunisa et al., 2022). The button seed board not only aids in conveying instructional content but also plays a significant role in developing students' critical thinking skills and enhancing the overall quality of education. By using this media, teachers can deliver clear and understandable explanations, facilitating students' comprehension of the material (Fitriani et al., 2021).

Conducting a media needs analysis is crucial before developing and implementing any learning tools. This analysis ensures that the selected media are relevant, effective, and aligned with the learning objectives. The button seeds board media, in particular, has been analyzed for its potential to convey messages and information effectively during the learning process (Fitriani et al., 2021). This research focuses on evaluating the necessity of using button seed boards as a learning medium for teaching the addition of integers to first-grade students. The study aims to determine whether this media is needed in mathematics instruction and to assess students' understanding after utilizing the button seed board.

2. Methodology

This research began by selecting the research sites, SD 2 Demaan and SD 2 Mlatinorowito, and focused on analyzing the need for button seed boards as a medium for teaching the addition of whole numbers to first-grade students. The research process commenced with observations, followed by the development of interview frameworks and instruments for both students and teachers. These instruments were then validated by an expert to ensure their reliability and effectiveness. Upon validation, the instruments were utilized to collect data in the field.

The study was conducted in May 2022, aiming to assess the necessity of button seed board media in first-grade mathematics instruction, specifically for teaching the addition of whole numbers. A descriptive research design with a qualitative approach was employed (Moleong, 2018). This descriptive research seeks to provide a detailed depiction and understanding of the phenomena under investigation (Sidiq et al., 2019). The research subjects included 48 first-grade students and 2 homeroom teachers from SD 2 Demaan and SD 2 Mlatinorowito, selected to represent the broader population of first-grade students in Kudus City district.

The primary data collection instrument was an interview guide, used to explore the impact of media on the learning process and outcomes. Data analysis was conducted in three stages: preparation, implementation, and final analysis (Sugiyono & Lestari, 2021). This structured approach ensured a comprehensive understanding of the effectiveness and need for button seed board media in elementary mathematics education. Indicators of learning media needs for students and teachers shows in Table 1.

Table 1: Indicators of learning media needs for students and teachers

Indicator	Needs indicator
Learning process	• The mathematics learning process carried out by the teacher • Suitability of the material presented in class
Instructional media	• Mathematics learning media that has been used before • Learning media that is suitable for the characteristics of class I elementary school
Material presented	• Linking teaching material to everyday life • Utilization of objects in the surrounding environment in learning activities
Student learning outcomes	• Providing question forms as learning evaluation • The level of difficulty in working on the form of evaluation questions given

3. Results and Discussion

The need for learning media is to find topics and media that are relevant and appropriate in the learning process. The need for learning media is also one of the supporting factors in a learning process because in the process of using this media it must be very functional and also useful because by using this media you must be able to achieve the goals in the learning process. Analysis of learning media needs must also pay attention to several things (Paulina et al., 2021). The things that must be paid attention to are: Suitability of targets or characteristics of learning media, learning media that is interesting, easy for students to understand and use. The use of button seed board media in mathematics learning has a positive impact on student learning outcomes which can be seen from the results of the learning carried out. The results for all 48 class I students shows in Table 2.

Table 2: Mathematics learning results for addition material

Level achievement	Category/qualification	Total student
90-100	Very effective	4
80-89	Effective	23
65-79	Effective enough	18
55-64	Less effective	3
0 – 54	Ineffective	-

Analysis of the need for using button seed boards as a mathematics learning medium for the addition of integers material for class I. Elementary schools have different qualifications, but the qualifications obtained are dominantly effective. Fig. 1, is a presentation of the data based on percentage.

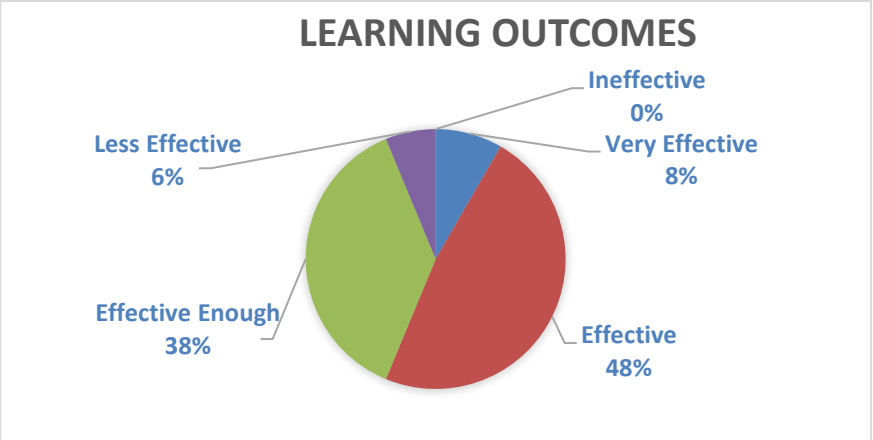

Fig. 1: Learning results after using button seed board media

From the total number of students, the data qualifications show that 8% are very effective, 48% are effective, 38% are quite effective, 6% are less effective and 0% are not effective. From the results of the study, it shows that significant changes occurred after using the button seed board media in mathematics learning about adding integers. The results of interviews with students and homeroom teachers of class I regarding the need to use button seed board media in learning mathematics regarding addition of integers are as shows in Table 3.

Table 3: Interview results for learning media needs for students

Needs indicator	Student answers
• The mathematics learning process carried out by the teacher.	• The teacher's mathematics learning is quite interesting and fun.
• Suitability of the material presented in class.	• Sometimes the teacher tells about other things such as stories of the prophet and so on.
• Mathematics learning media that has been used before.	• Previously the class teacher had never used learning media.
• Learning media that is suitable for the characteristics of class I elementary school.	• Suitable learning media are media that can be used for play and are interesting.
• Linking teaching material to everyday life.	• Teachers often relate teaching material to everyday life.
• Utilization of objects in the surrounding environment in learning activities.	• The teacher once used a straw to explain mathematics material.
• Providing question forms as learning evaluation.	• The form of evaluation questions that are usually given is in writing.
• The level of difficulty in working on the form of evaluation questions given.	• The questions given are sometimes confusing and difficult to understand.

From the results of student interviews, it was found that the use of button seed board media is very necessary in mathematics learning to support learning and attract students' interest in following the learning process. Changes after the use of media can be seen from the learning outcomes that have been carried out by students getting predominantly effective qualifications.

The use of button seed board media can influence students' understanding in the learning process, increase students' concentration, and prevent students from getting bored during the learning process because it suits the character of grade I elementary school students. Based on teacher interviews in Table 4, the use of media in mathematics learning is important because it can influence the level of activity in students and prevent students from getting bored during learning and improve learning outcomes (Fadli et al., 2017). Student learning results show that of the 48 students who were quite effective in getting qualifications, 38% were less effective. By using this button seed board media, students are able to understand the questions well, but there are still students who lack focus in the lesson due to lack of focus/distraction.

Judging from the answers given by students after using the button seed board, students were able to determine and group numbers according to place value when adding them, but the lack of accuracy in counting button seeds made students write inaccurate answers. Students who are less careful are taught slowly and carefully so that they understand better. A learning process occurs with changes in student behavior through the button board in mathematics lessons. This is in line with what Lestari (2018) explains that learning is a process for an individual to gain experience or knowledge, consciously or not, with the final result being learning outcomes. The learning outcomes are changes that occur in a person. The forms of learning outcomes are changes in behavior, increased knowledge, and changes that occur in a person (Paulina et al., 2021).

Table 4: Interview results for learning media needs for teachers

Needs indicator	Student answers
• The mathematics learning process carried out by the teacher.	• The mathematics learning carried out by the teacher is not optimal.
• Suitability of the material presented in class.	• The teacher has delivered additional material apart from the main material.
• Mathematics learning media that has been used before.	• Never, because I haven't found learning media that suits the student's character.
• Learning media that is suitable for the characteristics of class I elementary school.	• Suitable learning media is media that suits the character of first grade students who still like to play.
• Linking teaching material to everyday life.	• Teachers often relate teaching material to everyday life.
• Utilization of objects in the surrounding environment in learning activities.	• The teacher once used a straw to explain mathematics material.
• Providing question forms as learning evaluation.	• According to the teacher, the most effective thing is written questions so that students are trained and able to write fluently.
• The level of difficulty in working on the form of evaluation questions given	• The questions prepared by the teacher are a little difficult for the teacher to prepare.

4. Conclusion

The conclusion drawn from the analysis of the need for using button seed boards, based on performance assessments as a mathematics learning medium for first-grade students in Kudus City sub-district, indicates that the integration of media in learning is crucial. It enhances both teachers' and students' understanding of educational media and significantly boosts student engagement. The use of button seed board media increases student interest and participation, making students more active in the learning process and improving their mathematics outcomes, particularly in the addition of whole numbers. This conclusion is supported by an analysis of the learning outcomes of 48 students: 38% of the students showed a moderately effective response, 48% were effective, and 8% were highly effective. However, 6% of the students were less effective in their use of the button seed board media, primarily due to difficulties in maintaining focus during lessons. Overall, the button seed board media proves to be a valuable tool in enhancing mathematical learning for first-grade students.

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