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# THE USE OF MATH COUNTING BOARDS IN IMPROVING EARLY COUNTING SKILLS IN CHILDREN AGED 5-6 YEARS

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Keywords:		ABSTRACTS
Counting Mathematics, Counting	Board,	Currently, there are still many children who have difficulty learning to count. So, learning media that is interesting and not monotonous is needed in order to develop student interest and improve students' ability to calculate. This research aims to describe 1) Implementation of the use of a mathematical calculation board. 2) obstacles and challenges in using mathematical calculation boards. 3) Teacher perceptions of the effectiveness of the mathematics calculation board. This research uses a qualitative descriptive research method with a case study approach. This research was carried out at Siwi Peni Grobogan Kindergarten with subjects including Siwi Peni Kindergarten students aged 5-6 years with a total of 15 students and teachers participating, namely the Siwi Peni Kindergarten. The data collection techniques used were interviews, observation and documentation. The data analysis used is the Miles and Huberman theory, namely data collection, data reduction, and drawing conclusions. Based on the research results, it can be stated that: 1) The use of counting board media is carried out through three stages, namely the planning stage, implementation stage and evaluation stage. 2) Obstacles and obstacles in using counting board media, namely the teacher's lack of knowledge regarding learning media, lack of facilities and infrastructure, and students not knowing how to write numbers, which hinders learning activities. 3) Based on the teacher's perception of the effectiveness of using counting board media, it can be said to be effective, because it is able to increase student involvement in class and improve students' numeracy skills.

#### A. INTRODUCTION

Education plays an important role in development in Indonesia, thus education needs to be developed from various sciences to improve the quality of the nation's intelligence. Human resource development is also influenced by education in improving skills and abilities that are considered important to support human efforts in living life, especially education in early childhood. As stated in Government Regulation Number 57 of 2021 concerning the national education system, education is a deliberate and planned effort to create a learning environment so that students actively develop their potential to have religious spiritual strength, personality, self-control, noble character, intelligence, and skills needed by the state, society, and individual students

Early Childhood Education (PAUD) is a stimulus and stimulation program that is implemented for children from birth to six years of age (Golden Age) in order to support physical and spiritual development and prepare them to enter education after (Shofia & Dadan, 2021). One of the early childhood education services is in the form of kindergarten. At this stage, the introduction of basic math concepts, such as counting has an important role in forming the foundation of numerical skills that will be useful later in life. Good numeracy skills not only support future academic achievement but also influence children's ability to solve everyday problems and think logically.

The curriculum plays an important role in optimizing the learning objectives to be achieved in each subject, mathematics is one of them. Math is taught as one of the subjects in elementary school. In terms of teaching students to reason, math is very important. Mathema which means knowledge and mathanein which means thinking or learning, are the roots of mathematics (Muhlisrarini and Hamzah 2014 in Aspreliha et al., 2022) . Students must be taught mathematics since kindergarten to build the ability to think analytically, logically, systematically, innovatively, critically, creatively and be able to collaborate well. In Indonesia, there are many problems faced in the world of education, one of the fundamental problems is the low numeracy skills of students at Siwi Peni Kindergarten, which is located at Jl. Glugu 27A, Purwodadi, Purwodadi Subdistrict, Grobogan District, Central Java. At this stage, the introduction of basic math concepts, such as counting, plays an important role in forming the foundation of numerical skills that will be useful later in life. Good numeracy skills not only support future academic achievement but also influence a child's ability to solve everyday problems and think logically.

Early childhood intelligence is shaped by the family, community, and educational environment. To achieve the characteristics of growth and development, especially mathematical logic intelligence, it is necessary to provide various forms of stimulation according to its stages (Fitriani, 2023). A fun, contextual, imaginative, and realistic approach to teaching mathematics in schools that emphasizes process and children's understanding and problem solving is needed to achieve this. Pavlov's learning theory states that when implementing the mathematics learning process, teachers should use media to effectively communicate abstract mathematical concepts, stimulate students with questions ranging in difficulty from easy to difficult, and reward students who have mastered the material.

Teaching mathematics to children of early age should be adapted to their developmental stage (Hikmah et al., 2024). However, this is often met with the demands of parents who want educators to teach students to read, write and count (calistung). This can be seen from learning that does not use methods and media to meet the needs of a child, especially in early math activities. The use of learning media will greatly facilitate the teacher in providing material and facilitate students in receiving learning. Therefore, as educators need tools educational games as educational media in interesting school learning. This is reinforced by the opinion of Nurlidiah et al., (2022) children can learn and experience real things while playing with educational media, so that learning becomes fun for them. To ensure that the learning and media used are aligned, the teacher must prepare the learning well. Of course, the media should be as interesting as possible to make children feel like they are playing an exciting game. This will keep children engaged and prevent them from getting bored while learning math

According to Mudlofir & Rusydiyah (Hamidah et al., 2023) the definition of media is a message intermediary from the sender to the recipient in printed or nonprinted format that allows the recipient to be motivated to learn in order to achieve satisfactory learning outcomes. In order for children to develop at school and for the information they get from teachers to be assimilated effectively, in-depth learning media education is very important in the teaching and learning process (Supriyah, 2019). From the description described, it can be concluded that media is a means of channeling messages and information that functions as a learning aid that is useful in helping students understand the material and information that the teacher provides in order to achieve learning objectives as well as possible. The use of learning media allows students to respond according to their desires and abilities, increase student attention and focus, increase student motivation to learn, and create more direct interaction with the environment.

In Siwi Peni Kindergarten, teachers do not use interesting and innovative media when teaching so that students feel bored and not excited, teachers also tend to direct students to take notes and give assignments directly during the learning process. In addition, students are not directly involved in the classroom because learning is still teacher-centered as a result, students have difficulty understanding the material provided by the teacher in teaching. This situation makes many students assume that math learning is difficult to master. This is what ultimately makes students' numeracy skills low. Based on the findings at Siwi Peni Kindergarten, some of the causes of students' low numeracy skills are when the teacher presents the subject matter there are many students who daydream and do not focus on paying attention to the teacher, there are many students who forget the material that has been learned before, the cause of this is the low desire of students to repeat lessons at home and students do not take notes when the teacher explains the subject matter at school, some students have a tendency to look at the work of their classmates when solving the exercise problems given by the teacher, and they also take longer than the time given to solve the problem.

Related to the identification of the problems found, the author limits the research problem to the low counting ability of students. Therefore, the right solution is needed in improving math counting skills, especially addition and subtraction materials. Numeracy is the most important math learning that kindergarten students must have. According to Khuzaima & Sundi, (2024) counting ability is a basic skill related to addition and subtraction. The ability to count plays an important role in daily life activities, therefore the ability to count is a basic skill that is very necessary for the development of students in the future. The indicators of numeracy skills used are being able to solve problems, having high accuracy and knowing the basics of learning.

Numeracy skills should have been mastered by students in low grades, especially students at the kindergarten level because if students already have good numeracy skills, it will indirectly make it easier for students to understand math concepts at the next grade level.

In the context of early childhood education, various learning methods and tools have been developed to facilitate the teaching and learning process. One of the learning media that can support the development of counting skills is the math counting board. The counting board, as a visual and interactive tool, offers students an active role in the implementation of learning.

Math counting boards generally consist of various elements such as numbers, math symbols, and other visual elements designed to make learning more fun and easy for children to understand. By using a counting board, teachers can provide hands-on and interactive examples of how math concepts such as addition, subtraction and number sequencing can be applied. This is expected to help children understand the math material more deeply and motivate them to learn.

When using learning media to a material, of course, you must pay attention to the selection of learning media that is appropriate and suitable for use, especially for kindergarten students whose cognitive learning abilities are still at a basic stage. One of the media suitable for kindergarten students is the math counting board media. Through this media can improve students' thinking skills because it is a media that can be seen and felt by students, especially for addition and subtraction material where students are expected not only to receive lessons but also to be able to do themselves in learning to count. Based on the description above, changes are needed in the use of learning media in the classroom. Thus, to improve the math counting skills of Siwi Peni Purwodadi Kindergarten students on addition and subtraction materials can be done by applying math counting board media as a solution.

Previous research has also investigated the improvement of counting skills, including the results of research from Ningrum, (2021) entitled "Optimizing Activeness and Counting Ability with Concrete Media for 1st grade students of SDN Kaliwerang in 2020/2021". This research can be concluded that students' liveliness and counting skills can be improved by using concrete media. What distinguishes this research is that it lies in the research objectives, objects, time, place and type of media used and studied. In addition, research from Chamimah, (2019) entitled "Improving the Counting Ability of Students Using the Problem Solving Learning Model of Number Competency in Class V Elementary School". Based on the research findings, it can be said that the problem solving learning approach helps improve the numeracy skills of grade V elementary school students. The difference from this research lies in the material studied, the object of research and the time of research.

Given the importance of early numeracy skills and the potential role of counting boards in supporting math teaching, this study aims to explore the use of math counting boards in improving students' numeracy skills at Siwi Peni Kindergarten. By conducting this study, it is hoped to gain in-depth insight into the effectiveness of the counting board as a learning tool, as well as provide recommendations for better math learning practices in early childhood education settings. The objectives in this study are to 1) Describe the Implementation of the Use of Math Counting Boards. 2) Explore the Constraints and Challenges in Using the Math Counting Board. 3) Analyze Teacher Perceptions of the Effectiveness of the Math Counting Board.

### **B. METHOD**

The type of research used is descriptive qualitative where in this approach the researcher emphasizes more on an in-depth explanation of a problem rather than looking at the problem for generalization research (Al-Kansa et al., 2023) . Researchers will describe how the use of math counting boards in improving early counting skills in students at Siwi Peni Kindergarten. The researcher used a case study approach in which thoroughly examined procedures, activities, and one or more individuals. This research was conducted at Siwi Peni Kindergarten which is located at Jl. Glugu 27A, Purwodadi, Purwodadi Sub-district, Grobogan District, Central Java, Indonesia. The object of this research is the students of Siwi Peni Kindergarten. The research subjects involved included Siwi Peni Kindergarten students aged 5-6 years with a total of 15 students and participating teachers, namely Siwi Peni Kindergarten homeroom teachers, and also the principal of Siwi Peni Kindergarten.

The data collection techniques used are interviews, observation, and documentation. In this study, data validity can be ensured by paying attention to several aspects, namely ensuring that the data collected reflects the actual phenomenon and can be replicated by other researchers in the same situation by using consistent methods in data collection, detailed notes, and accurate transcriptions. The data analysis used is the Miles and Huberman theory, namely data collection, data reduction, and conclusion drawing (Sugiyono, 2021).

## C. RESULT AND DISCUSSION

### Implementation of the Use of Counting Board Media in Mathematics Learning

In the implementation of using math counting boards based on the results of the analysis conducted at Siwi Peni Kindergarten through three stages, namely:

1. Planning stage

Planning involves organizing the actions that will be taken to achieve goals, especially in the curriculum and learning process. Learning planning can be seen as the process of making lesson plans, using learning media, making learning strategies, and implementing assessments within a certain period of time in order to achieve predetermined goals (Suriani, 2016).

Based on the data obtained, teachers at Siwi Peni Kindergarten in planning the counting board learning media through media reflection learning that has occurred in the use of previous learning media and is coordinated again between class teachers before proceeding to implementation. Teachers also adjust to student conditions and student abilities. With the hope that the media used can be a source of motivation for students to follow and apply learning. As according to Insyiroh et al., (2019) that gaining knowledge about media planning techniques by obtaining new information in kindergarten can be created by considering previous educational media. According to Wulandari et al., (2023) the effectiveness of the learning process, message delivery, and the content of learning materials will all be greatly enhanced by the use of learning media. By simplifying communication and information, educational media can accelerate and improve learning procedures and outcomes.

2. Implementation stage

Bintoro Tjokroadmudjoyo defines implementation as a series of steps, especially starting with policies to achieve a goal and then obtaining policies from a project and program (Adisasmita, 2011).

Based on the analysis of the data obtained, the implementation stage carried out by teachers at Siwi Peni Kindergarten is: 1) Learning activities begin with greetings, prayers, and singing. 2) The teacher invites students to remember numbers or introduce numbers both in pronunciation and writing. 3) The teacher explains the learning stages using the counting board clearly. 4) The teacher asks one by one to follow the learning with the counting board and the teacher provides assistance to students by following the merging process which begins with students taking as many sticks as the initial number then stored in box 1 then students take sticks according to the second number and stored in box 2. After that, students are asked to take and combine sticks in boxes one and two and store them in the result box. After that, students are given the opportunity to count the number of sticks in the result box and the result box as the result of numerical addition. 5) Next, the teacher presents the conclusion so that students always remember the material that has been learned. 6) The teacher closes the learning activity by singing and then praying.

Because the arithmetic board media on arithmetic operation content is proven to be effective so that it can be utilized in the educational process. In addition, students have also practically utilized the counting board media as a real media in learning the arithmetic process (Irfandi et al., 2023).

3. Evaluation stage

The process of assessing the feasibility of learning is called learning evaluation, which is carried out through measurement or assessment activities related to learning and learning (Idrus, 2019).

Based on the data obtained, the evaluation carried out at Siwi Peni Kindergarten is to assess teacher learning during the activity. To achieve this, teachers ask students questions regarding their activities that day. This is a habit of daily action to repeat what has been done at that time and naturally. In addition, reporting, namely parents or guardians of students receive reporting in the form of child development data for one semester.

According to Idrus (2019) that in order to place students in learning situations that are more in line with their ability levels, evaluation seeks to ascertain the level of student achievement in specific areas of the learning process as well as understand students about the extent to which it can help their ability deficiencies. Research by Djabba & Ilmi (2022) also conveys the importance of continuous evaluation and feedback to the learning process. Teachers can identify learning barriers and make efficient remedial plans by using evaluations conducted at the end of each lesson which ultimately improves student learning outcomes.

#### Constraints and Challenges in Using Counting Board Media in Math Learning

In the field of education, challenges or constraints often arise related to learning models, approaches, learning materials, and student assessment. Therefore, it can be said that an obstacle is a problem or situation that arises that hinders the achievement of the desired goal and requires a special solution that is in accordance with the challenges faced (Soewarno et al., 2016). In applying the counting board to improve

early counting skills for Siwi Peni Kindergarten students, various obstacles were found including:

1. Lack of teacher knowledge about learning media

Based on the results of the data that has been obtained, teachers at Siwi Peni Kindergarten are classified as old, this causes a lack of teacher knowledge related to learning media that is more effective and not monotonous. Teachers at Siwi Peni Kindergarten learn learning media through the internet google and youtube so that they are less mastered how to practice the media.

The teacher's job is to facilitate learning by changing the classroom environment. To address this issue, teachers should emphasize that they are understanding, patient, responsive, authoritative and help students achieve their learning goals. Teachers must improve and assist student learning so that the learning process can run smoothly and information is conveyed quickly. (Siregar et al., 2024). The use of various forms of media as a learning tool is one way the development of information technology has begun to change the educational process (Nursyam, 2019). So it takes more effort to become an educator or teacher in the digital era than a few decades ago.

2. Lack of facilities and infrastructure

In using learning media at Siwi Peni Kindergarten, the obstacle that occurs is the lack of facilities and infrastructure, so that teachers have difficulty in practicing learning media that are effective and not monotonous. In applying the counting board media, the teacher prepares the media independently and improvised. The unavailability of facilities and infrastructure in this school certainly hampers effective teaching and learning activities, making it difficult to achieve the desired results.

As stated in a study conducted by Angkat et al., (2024) that school facilities have an impact on students' ability to focus during class, it is important for stakeholders in the global education system to consider this issue. According to Pratiwi & Dewi (2024) the first step in the field of education is the provision of adequate and equitable facilities in all residential areas of Indonesia to fulfill learning as the times shift.

3. Students do not know how to write numbers

Based on the results of the analysis of the obstacles in using the counting board media at Siwi Peni Kindergarten, there are still some students who do not know how to write numbers. Students are able to mention numbers correctly, but when writing or reading numbers students still have difficulty. This certainly hampers learning with the counting board media, so the teacher must try harder in assisting these students. This obstacle is caused by students who do not like or have low interest in learning mathematics.

As according to Nasution & Tambunan (2022) the lack of enthusiasm or encouragement among students to learn results in students having difficulty in making numerical symbols that can be read and accurate. Also conveyed by Indah et al., (2014) that students already have the ability to recite, but that does not mean they have mastered or understood the principles of counting. The majority of students can count, but are still unable to arrange number symbols correctly. A teacher needs to master how to translate abstract mathematical ideas into concrete ideas that are easy to understand or from concrete to abstract levels.

### Teachers' Perceptions of the Effectiveness of Using Counting Board Media in Learning Mathematics

In responding to stimuli, teacher perception is an active process that involves not only the stimulus but also the individual with his or her experiences, related motivations, and attitudes. The process of teacher perception is dynamic and involves not only the stimulus but also the individual with his experience, related motivation, and attitude as a reaction to the stimulus (Tarigan et al., 2024).

Based on the results of data analysis related to teacher perceptions of the effectiveness of using the counting board media in mathematics learning at Siwi Peni Kindergarten, it was found that teachers consider learning to use math counting board media is quite easy to use if at the beginning it is explained how to use it. Furthermore, students play an active role in learning using the math counting board media and all cognitive intelligences work actively.

According to the teacher, teaching the children how to use the math counting board will improve their early counting skills and make them excited to learn counting in an entertaining and imaginative way. The students are between five and six years old. Students cannot just sit around enjoying learning, so when they utilize the counting board media to learn, they are very happy and actively participate. This is supported by the students' very good reactions, which are always excited and do not feel bored.

Thus, learning mathematics using the counting board media is effective because it can increase student involvement in learning activities and increase students' cognitive intelligence related to initial counting ability.

As research conducted by Safitri & Rachmiati (2023) that one of the interesting and very successful methods for teaching whole number addition is the learning resource of the addition counting board. According to research by Baharuddin & Abidin (2021) the use of student-centered learning practices can improve learning outcomes and engagement. According to this study, the use of more interactive and participatory teaching strategies helps students learn more thoroughly. In addition, student engagement in small groups can improve understanding and academic performance. Furthermore, Musmulyana et al., (2024) also conveyed that the use of counting media can help students become more proficient in counting addition and subtraction.

### **D.CONCLUSION**

Based on the research objectives and research results that have been presented, it can be concluded that the implementation of the use of counting board media in learning mathematics at Siwi Peni Kindergarten is carried out through three stages, namely: The first stage, the planning stage is carried out by evaluating the previous media and assessing the ability of students, then determining the media used. The second stage, the implementation stage begins with singing, praying, then applying learning using the counting board, then closing with conclusions and prayers. The third stage is the evaluation stage which is carried out when learning takes place and reporting to parents and guardians regarding student development at the end of each semester.

The obstacles and barriers that occur in Siwi Peni Kindergarten in using the counting board media in learning math are: 1) Lack of teacher knowledge related to

learning media. Teachers learn learning media through the internet so that the application is not optimal. 2) Lack of facilities and infrastructure. The learning facilities used are only makeshift, so that learning is not maximized. 3) Students do not know how to write numbers. In Siwi Peni Kindergarten, there are still students who can mention numbers but cannot write the numbers, so the teacher must provide more intense explanations to students.

The teacher's perception of the effectiveness of using the counting board media in Siwi Peni Kindergarten is that it can increase student involvement in learning so that students are active and can increase students' cognitive intelligence. Thus, the counting board media in learning math is said to be effective.

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