



Improving Students' Numeracy Skills Using the CPA (Concrete, Pictorial, Abstract) Approach in Number Material for 2nd Grade at MIN 1 Batam

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Abstract:

This study aims to improve the numeracy skills of 2nd-grade students at MIN 1 Batam through the CPA (Concrete, Pictorial, Abstract) approach in number material. The CPA approach is a method that emphasizes three stages of learning: concrete, pictorial, and abstract. In the concrete stage, students use real objects to understand number concepts. In the pictorial stage, students draw or use visual representations of numbers, while in the abstract stage, students apply the concepts they have understood using mathematical symbols. This research employs a classroom action research method conducted in two cycles. Data were collected through observation, tests, and interviews to assess the improvement in students' numeracy skills. The results show a significant increase in students' numeracy abilities, as reflected in test scores and positive responses to the implemented learning method. The CPA approach has proven effective in helping students grasp number concepts in an easier and more engaging manner. Therefore, this approach can be applied in early-grade mathematics learning to enhance learning quality and student achievement.

Keywords: numeracy skills, CPA approach, numbers, classroom action research.

INTRODUCTION

Mathematics education in Indonesia, especially at the elementary level, plays a crucial role in developing students' fundamental logical and critical thinking skills. One of the essential skills that students must acquire is numeracy, which includes the ability to recognize, understand, and manipulate numbers in everyday life. Numeracy skills serve as a foundation for more complex mathematical skills at higher education levels. However, in practice, many students struggle to understand basic mathematical concepts, particularly in number material, which is fundamental in 2nd-grade mathematics learning.

Based on observations at MIN 1 Batam, many students still face difficulties in understanding number material, particularly in sequencing, addition, and subtraction. This indicates a gap between curriculum expectations and student achievement in the field. Therefore, an approach is needed to address this issue and enhance students'

understanding and numeracy skills. One applicable approach is the CPA (Concrete, Pictorial, Abstract) approach, which can help students comprehend number concepts in a more structured and enjoyable manner.

The CPA approach is a learning model consisting of three stages: concrete, pictorial, and abstract. In the concrete stage, students use real objects to grasp the concept being taught. In the pictorial stage, students draw or use images to represent the concept, while in the abstract stage, students use mathematical symbols to solve problems. This approach is highly suitable for early-grade mathematics learning as it helps students build a stronger understanding of the concepts taught through various representations. A study by Hidayat (2021) found that the CPA approach can enhance students' numeracy skills, particularly in number material.

The objective of this study is to improve the numeracy skills of 2nd-grade students at MIN 1 Batam by implementing the CPA approach in number material. By using this approach, students are expected to understand number concepts more easily and improve their ability to solve mathematical problems. Additionally, this research aims to determine whether the CPA approach can reduce the learning gap in number concepts among students. Moreover, the study seeks to explore whether the implementation of the CPA approach can increase students' motivation and interest in mathematics.

The primary issue addressed in this research is the low numeracy skills of students in number material, as reflected in assessment results and observations during the learning process. This is further supported by exam and test data, which indicate that many students have not yet achieved basic competency in understanding numbers. One contributing factor is the lack of variation in teaching methods, which fail to capture students' attention, making them struggle and lose interest in mathematics.

To overcome this issue, the CPA approach can serve as an effective alternative. According to research by Iskandar and Suryana (2020), the CPA approach helps students better understand mathematical concepts through concrete and visual stages. This approach not only facilitates concept comprehension but also enhances students' motivation to learn. Therefore, this study will apply the CPA approach to improve the numeracy skills of 2nd-grade students at MIN 1 Batam, particularly in number material.

This research employs a classroom action research (CAR) method conducted in two cycles. Each cycle consists of planning, implementation, observation, and reflection. Data collection is carried out through direct observations, numeracy skill tests, and interviews with teachers and students. The findings of this study are expected to contribute to the development of more effective mathematics teaching methods, particularly in early-grade classrooms, and serve as a reference for teachers to implement a more engaging approach that enhances students' numeracy skills.

METHODS

This study adopts a Classroom Action Research (CAR) method consisting of two cycles. Each cycle comprises four stages: planning, implementation, observation, and reflection. In the planning stage, the researcher designs a lesson plan incorporating the CPA approach, aligning it with the curriculum and students' needs. During the implementation stage, the CPA approach is applied in teaching and learning activities, engaging students in the three learning stages: concrete, pictorial, and abstract. The concrete stage utilizes real objects such as number cards and similar items to help students grasp basic number concepts. The pictorial stage involves drawings or visualizations, while in the abstract stage, students use mathematical symbols such as numbers and operations to solve problems. Observations are conducted in each cycle to assess students' responses and progress.

The research data consists of two primary categories: quantitative and qualitative data. Quantitative data are obtained through numeracy skill tests conducted before and after implementing the CPA approach in number material. These tests are designed to measure students' improvement in understanding number concepts, such as sequencing,

addition, and subtraction. Qualitative data are collected through direct observations, interviews with teachers and students, and field notes recording interactions and students' responses during the learning process. Interviews with teachers aim to gain insights into the effectiveness of the CPA approach in enhancing students' numeracy skills.

Quantitative data analysis is performed by comparing test scores before and after implementing the CPA approach. These data are analyzed using descriptive statistics to examine the mean scores, as well as t-test analysis to determine whether there is a significant difference between pre-test and post-test scores. Qualitative analysis is conducted by reviewing observation and interview results. Observation notes are analyzed to identify interaction patterns during the learning process and students' responses to CPA stages. Interviews with teachers and students are analyzed to gain insights into the impact of the CPA approach on students' motivation, interest, and understanding of number material.

As a follow-up step, data analysis results will be used for reflection and improvement in the next cycle. If necessary, adjustments to methods and materials will be made to enhance learning effectiveness. This study aims to determine whether the CPA approach can improve the numeracy skills of 2nd-grade students at MIN 1 Batam and address existing gaps in number concept comprehension..

RESULTS

In this study, data obtained through numeracy tests and observations were used to assess the effectiveness of the CPA approach in improving the numeracy skills of second-grade students at MIN 1 Batam. Quantitative data collected from numeracy tests showed a significant improvement in students' ability to understand numerical concepts after the implementation of the CPA approach. These test results were obtained from two measurements: before and after the implementation of the CPA approach. Additionally, qualitative data from observations and interviews provided insights into students' and teachers' responses to the applied method.

Table 1: Average Student Numeracy Test Scores

Cycle	Average Score Before Intervention	Average Score After Intervention	Improvement (%)
Cycle 1	55	75	36.36%
Cycle 2	58	82	41.38%

From the table above, it can be seen that there was a significant increase in students' numeracy test scores after implementing the CPA approach. In the first cycle, the students' average score increased by 36.36% after the application of the CPA approach, while in the second cycle, the improvement reached 41.38%. This increase indicates that the CPA approach has a positive impact on students' numeracy skills, particularly in number-related material.

Table 2: Percentage of Students Meeting the Minimum Competency Criteria (KKM)

Cycle	Percentage of Students Meeting KKM (%)	Percentage of Students Not Meeting KKM (%)
Cycle 1	70	30
Cycle 2	90	10

In the first cycle, 70% of students successfully met the Minimum Competency Criteria (KKM), while 30% had not yet achieved the required level. However, after implementing the CPA approach in the second cycle, the percentage of students meeting KKM increased to 90%, with only 10% remaining below the standard. This indicates a

significant improvement in students' numeracy skills following a more optimized application of the CPA approach in the second cycle..

Data Verification

Data verification was conducted by comparing the numeracy test results obtained from two sources: the initial test (before the implementation of the CPA approach) and the final test (after the implementation of the CPA approach). The data were then analyzed using a t-test to determine whether the difference between the initial and final test scores was statistically significant. Based on the calculations, the obtained t-value was greater than the critical t-value at a 0.05 significance level, indicating that the difference in scores between the initial and final tests was significant. This supports the hypothesis that the CPA approach can improve students' numeracy skills.

Additionally, qualitative data obtained from observations and interviews with teachers and students also supported these findings. In interviews, teachers stated that students became more active and enthusiastic in learning after using the CPA approach, as this method involved more concrete and visual activities that were easier for students to understand. Students also expressed that they found it easier to grasp numerical concepts when using real objects and images in learning. This aligns with theories suggesting that learning using multiple representations can help students better understand abstract concepts.

Observations also revealed positive changes in students' attitudes and engagement during learning. In the concrete stage, students found it easier to recognize and understand numerical concepts through real objects, such as number cards and other materials. In the pictorial stage, students were able to draw or use images to represent number problems, helping them connect mathematical concepts to more tangible visuals. Finally, in the abstract stage, students were able to solve mathematical problems using symbols and numbers, indicating that they had mastered the taught concepts.

Furthermore, teachers reported that implementing the CPA approach also increased students' motivation in learning mathematics. Before the CPA approach, most students struggled and showed little interest in mathematics. However, after using a more concrete and visual approach, students became more enthusiastic and engaged in learning. Teachers noted that students found it easier to understand numerical material and gained more confidence in solving mathematical problems.

CONCLUSION

This study demonstrates that the implementation of the CPA (Concrete, Pictorial, Abstract) approach in mathematics learning for second-grade students at MIN 1 Batam has successfully improved students' numeracy skills, particularly in number-related material. A key finding of this study is the significant increase in students' numeracy test scores after applying the CPA approach. Additionally, observations and interviews with students and teachers indicate that students became more active and motivated in learning mathematics. This suggests that the CPA approach not only enhances mathematical concept comprehension but also positively impacts student engagement and motivation in learning. The academic impact of this study is the improved numeracy skills of students, which undoubtedly contributes to achieving the learning objectives of elementary-level mathematics education. By enhancing students' numeracy skills, they are expected to master fundamental mathematical concepts that will serve as a foundation for more complex mathematical learning at higher educational levels. Furthermore, the CPA approach can be utilized as an effective learning model in various elementary schools to improve the quality of mathematics education, particularly in lower-grade classrooms. The social contribution of this study is providing an alternative solution to the challenges faced by many teachers in teaching mathematics, especially in enhancing students' understanding

of basic concepts. Implementing the CPA approach can help address gaps in mathematical comprehension among students, thereby improving the overall quality of elementary mathematics education. Additionally, this approach can provide students with a more enjoyable and meaningful learning experience, ultimately increasing their interest and motivation in mathematics. Overall, this study makes a significant contribution both academically and socially. The implementation of the CPA approach can be integrated into elementary mathematics learning as an effective method for overcoming learning difficulties, improving numeracy skills, and enhancing the quality of education in schools. These findings are expected to serve as a reference for teachers and educators in developing more innovative and engaging approaches to teaching mathematics.

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