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THE USE OF THE CONCRETE-PICTORIAL-ABSTRACT (CPA) APPROACH TO ASSIST SECOND-GRADE STUDENTS IN UNDERSTANDING ADDITION AND SUBTRACTION AT SDN 1 BANYU URIP

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ABSTRACTS

Elementary mathematics learning often faces the phenomenon of "memorizing without understanding" due to the material being presented too abstractly, even though class II students are still at the concrete operational stage. This research aims to describe the process of implementing the Concrete-Pictorial-Abstract (CPA) approach and identify obstacles to its implementation in addition and subtraction material in class II at SDN 1 Banyu Urip. The research used a qualitative case study approach, with four students as subjects selected through purposive sampling representing high, medium and low abilities, supported by data from the homeroom teacher and school principal. Data was collected through participant observation, interviews and documentation, analyzed using the Miles and Huberman model, and tested for validity through triangulation. The research results show that CPA is carried out systematically through concrete, pictorial and abstract stages; The high group crossed all stages ideally, the medium group had doubts at the pictorial stage but reached the abstract stage well, while the low group experienced cognitive asynchrony and got stuck at the abstract stage due to limited number symbol literacy. Obstacles include disparities in student abilities, overcrowded classes (38 students), and limited classroom space, which the school responds to through Deep Learning Training. Research concludes that CPA is effective in helping students understand mathematical concepts in stages, but its success needs to be supported by increasing teacher competence and improving classroom facilities.

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INTRODUCTION

Mathematics education at the elementary school level is a crucial foundation for students' future cognitive development. At this stage, students are not only required to be able

to answer questions, but what is more important is to understand the logic behind the calculation operations. Especially in the initial phase such as in class II, understanding addition and subtraction operations is the main entry point before they learn more complex mathematical concepts.

However, the reality on the ground shows that there is a quite worrying phenomenon. Students often memorize the final result without really understanding the process or meaning of the numbers they operate on. This condition of "memorizing without understanding" becomes a time bomb for students' learning development. When they are given questions in a slightly different form or story questions, they often experience confusion because they lose grip on the basic concepts.

This problem is most likely rooted in the way the material was presented was too abstract from the start. Elementary school age children, according to cognitive development theory, are still at the concrete operational stage. Forcing them to immediately grapple with number symbols without any bridge from real objects often makes mathematics feel like a difficult lesson.

Therefore, a learning approach is needed that is able to bridge between concrete objects and abstract mathematical symbols. The Concrete-Pictorial-Abstract (CPA) approach is present as a solution that offers systematic learning stages. Through the Concrete stage (using real objects), students are invited to physically manipulate objects. Then follows the Pictorial (image) stage to visualize the object, until finally entering the Abstract (number symbol) stage. The formulation of this research problem are:

1. How is the Concrete-Pictorial-Abstract (CPA) approach implemented in mathematics instruction—specifically regarding addition and subtraction operations—for second-grade students at SDN 1 Banyu Urip?
2. What challenges do teachers and students encounter when implementing the Concrete-Pictorial-Abstract (CPA) approach in mathematics instruction for second-grade students at SDN 1 Banyu Urip?

RESEARCH METHODS

The research design employed in this study is a case study—a methodology used to gain an in-depth understanding of a specific phenomenon, event, or issue within a real-life context. The subjects of this research are second-grade students at SDN 1 Banyu Urip. These children, aged 7–8 years, are at the "concrete operational" stage of cognitive development. Primary data sources in this study consist of information obtained directly from the research subjects at the research site, without the use of intermediaries. This original data is collected firsthand by the researcher during classroom instruction in the second grade at SDN 1 Banyu Urip. The primary subjects—the second-grade students—provide data through their actions, verbal responses, and behaviors as they interact with concrete objects, as well as during their transition toward abstract thinking in mathematics. In addition to the students, the second-grade teacher serves as a primary data source and a key informant, providing in-depth insights into the students' learning characteristics and validating the effectiveness of the interventions implemented. Given that the researcher also acts as the instructor, the instructional events themselves—along with the reflective notes recorded by the researcher

while in the field—constitute a crucial component of the primary data. All data obtained from these primary sources serve as the fundamental basis for describing the process of how students understand mathematical concepts, in a comprehensive and in-depth manner. The data collection process in this study is conducted systematically using three interconnected techniques: interviews, observation, and documentation. These three techniques were selected to obtain a complete picture of the implementation of the Concrete-Pictorial-Abstract (CPA) approach in the second-grade class at SDN 1 Banyu Urip. Data analysis is carried out through several stages: 1) Data Reduction, 2) Data Presentation, and 3) Drawing Conclusions.

RESEARCH FINDINGS AND DISCUSSION

1. The process of implementing the Concrete-Pictorial-Abstract (CPA) approach in mathematics learning material for addition and subtraction arithmetic operations for Class II students at SDN 1 Banyu Urip

   Based on the presentation of research data, the implementation of the Concrete-Pictorial-Abstract (CPA) approach in mathematics learning material for addition and subtraction arithmetic operations in class II at SDN 1 Banyu Urip has been carried out through three continuous instructional stages. This learning flow is deliberately designed to follow the rhythm of cognitive development of elementary school age students (7–8 years) who according to cognitive development theory are still in the concrete operational phase. The use of the CPA approach has been proven to be able to change the mathematics learning paradigm which was previously considered rigid and too abstract into a knowledge construction process that is interactive and meaningful for students.

   The first stage implemented is the concrete stage. At this stage, researchers facilitate students to interact and manipulate physical objects directly using simple media that are close to their environment, such as ice cream sticks, shirt buttons, straws, and marbles. The act of manipulating real objects gives students the opportunity to build sensory and motor experience before they are exposed to number symbols. When students physically count the combination or subtraction of ice cream sticks, the basic logic regarding the concept of "increasing" or "remaining" is formed naturally through their motor activities. (Yasa et al., 2023)

   The second stage is the picture or pictorial stage. This stage functions as a cognitive bridge that connects students' initial knowledge from the concrete phase to the world of mathematics which is full of abstract notations. After students understand the concept of addition or subtraction using ice cream sticks, the researcher guides students to transform this physical activity into a semi-concrete representation in the form of an image of a circle of buttons or a cross on a stick. The use of these images stimulates students' visual memory so that they can still imagine the quantity of objects even though the physical object is no longer in their hands. (Yasa et al., 2023)

   The final stage carried out is the abstract stage. In this phase, mathematical concepts that have been understood through physical manipulation and visual representation begin to be modeled symbolically using number symbols (numbers) as well as standard arithmetic operation symbols such as the plus sign (+), minus sign (-), and equals (=). The circle drawings that students have made at the pictorial stage are then transformed into

numerical notation that represents the number of groups of objects. Through this final stage, students are trained to think by operating mathematical symbols independently without losing control of the basic concepts. This stage is in line with the views of Millah et al. (2025) that mastery of abstract symbols is the culmination of the construction process of students' understanding of mathematical concepts which is built in stages from the concrete stage.

The application of these three stages in the second-grade class at SDN 1 Banyu Urip demonstrates that the process of learning mathematics should not be viewed as a series of disconnected fragments. Each stage within the CPA (Concrete-Pictorial-Abstract) framework is shown to be interconnected, building a foundation for the subsequent stage. These research results support previous relevant findings by Millah et al. (2025), which affirm that the CPA approach is highly effective in helping students organize mathematical ideas incrementally. Consequently, the conceptual understanding formed in the students' minds becomes significantly more robust, as it is rooted in tangible, real-world experiences. (Millah et al., 2025)

2. Challenges faced by teachers and students in implementing the Concrete-Pictorial-Abstract (CPA) approach in mathematics instruction for the second grade at SDN 1 Banyu Urip

Based on observations and in-depth interviews conducted with the second-grade homeroom teacher and the school principal, the implementation of the Concrete-Pictorial-Abstract (CPA) approach at SDN 1 Banyu Urip is not without its objective, real-world challenges. Broadly speaking, these challenges can be categorized into two primary dimensions: technical-pedagogical obstacles encountered by teachers in the classroom, and structural-managerial issues faced by the school administration in its capacity as a provider of learning facilities.

The first challenge, arising at the classroom level, is closely linked to the heterogeneity of students' foundational abilities and their uneven levels of literacy readiness. The second-grade homeroom teacher noted a striking disparity in intelligence (IQ) levels among students within the same class. The CPA approach—which requires a gradual transition toward the symbolic (abstract) stage—is often hindered because some students in the lower-ability group (such as the case of Subject S4) have yet to achieve fluency in reading and writing, and have not yet fully mastered the alphabet. This limitation in verbal literacy has a direct impact on the fluency of their mathematical literacy. Students demonstrate the ability to manipulate concrete objects and produce drawings or scribbles accurately; however, they struggle—or become completely stuck—when tasked with translating these visualizations into abstract numerical symbols (written digits). This situation underscores that the success of the CPA (Concrete-Pictorial-Abstract) approach is heavily contingent upon the students' foundational literacy readiness. This aligns with the perspective of Safari and Nurhida (2024), who argue that mastering basic mathematical concepts is inseparable from a learner's proficiency in symbolic and linguistic literacy.

A second challenge arises from the objective reality of "overcrowded classrooms"—classes with an excessively large number of students. According to data

confirmed by the school principal, SDN 1 Banyu Urip has a total enrollment of 236 students, with the highest concentration found in the lower grades. Both Grade I and Grade II contain 40 students per classroom. From the perspective of classroom management, having 40 children in a lower-grade class places an immense instructional burden on a single teacher. The teacher must divide their attention between guiding students who struggle with reading or arithmetic and managing other students who are highly active and difficult to contain. This crowded environment renders the provision of ideal, individualized guidance for lower-achieving students inefficient in terms of instructional time. These findings are consistent with Wahyuningsih (2019), who notes that the student-to-class ratio significantly impacts learning effectiveness; the larger the number of students in a single class, the greater the burden on the teacher to provide individual attention to each child. This reinforces Wahyuningsih's (2019) view that the ratio of students to available classroom space is a structural factor that directly influences the effectiveness of learning within a school.

This structural constraint is further complicated by a shortage of new classrooms. The school principal explained that, ironically, the "A" accreditation status of SDN 1 Banyu Urip hinders the school from receiving government stimulus—specifically for the construction of additional classrooms—because the school is perceived as being self-sufficient and well-equipped. Consequently, the plan to reorganize student groups into smaller classes cannot be realized in the near future. This situation reinforces the perspective of Wahyuningsih (2019), who argues that the ratio of students to available classroom space is a structural factor that directly influences the effectiveness of learning within a school.

In response to these complex challenges, the school management has adopted strategic, solution-oriented measures to ensure that learning outcomes remain optimal. The principal has prioritized enhancing teacher quality by requiring participation in "Deep Planning" (Deep Learning) training for both lower- and upper-grade teachers. Through this instructional training, teachers are equipped with advanced classroom management competencies, strategies for developing adaptive teaching materials, and interactive pedagogical tactics specifically designed for large, overcrowded classes. This approach aligns with the recommendation by Wahyuningsih (2019) that the negative impacts of a high student-to-classroom ratio can be mitigated by strengthening teachers' pedagogical and managerial competencies in classroom administration.

These proactive efforts by the school underscore that the successful implementation of the CPA (Concrete-Pictorial-Abstract) approach—which facilitates children's cognitive transitions—does not rely solely on the readiness of individual teachers; rather, it also requires supportive regulations and a strong institutional commitment from the school's management. Through the training provided on "Deep Planning" (in-depth instructional design), teachers are expected to be able to create mathematics lesson plans that are engaging, measurable, and well-targeted. This will enable the school to realize its vision of providing optimal learning for all students—in an inclusive manner—even amidst limitations in physical classroom space.

CONCLUSION

The conclusions can be drawn: 1) The implementation of the CPA approach was carried out in a sequential and systematic manner. 2) The challenges encountered during the implementation of the CPA approach stem from two main factors. Regarding students and teachers, the primary obstacles include a significant disparity in IQ levels and uneven literacy (reading and writing) skills among students in the lower grades. Regarding facilities, structural constraints—specifically "overcrowded classrooms" (with up to 40 students per class) and a shortage of additional classroom space—have limited the teachers' ability to provide effective individual guidance. As a solution, the school has facilitated teacher participation in "Deep Planning" training to enhance their competence in managing large, crowded classes.

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