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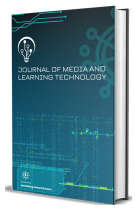

Use of Concrete Media to Improve the Understanding of Fraction Concepts of Grade III Students of SD Negeri Sirimomungkur

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ABSTRACT

Mastering the concept of fractions presents a significant challenge for many third-grade students, often resulting in low conceptual understanding and difficulty in problem-solving. This study aimed to investigate the effectiveness of using concrete learning media to improve the comprehension of fraction concepts among students in Grade III at UPTD SPF SD Negeri Sirimomungkur. The research utilized a Classroom Action Research (CAR) design, structured into two cycles, with all third-grade students serving as participants. Data was collected through observation of teaching and learning activities and concept comprehension tests, including a pre-test and post-tests for each cycle. The findings indicate that the application of concrete media such as physical objects, shapes, and manipulatives significantly enhanced students' engagement and learning outcomes. The use of tangible resources made the abstract concept of fractions more accessible and relatable. There was a notable progression in student mastery. This approach successfully increased the percentage of students who achieved the Minimum Mastery Criteria (KKM) from the initial condition through Cycle I and Cycle II. This research concludes that concrete media is highly effective and recommended for teaching abstract mathematical concepts like fractions at the elementary level.

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Introduction

Education plays a fundamental role in developing quality human resources with character (Rahman et al., 2022). In the context of basic education, efforts to improve the quality of learning are a priority to ensure that each student acquires adequate knowledge and skills. Teachers and principals play a key role in ensuring the quality of this learning process, particularly in improving performance and effectiveness within the school environment (Hamka, 2023). Mathematics is one of the essential subjects taught from elementary school (SD) because it serves to develop logical, analytical, and

systematic thinking skills. However, students' motivation and interest in learning this subject often pose challenges, which ultimately impact their learning outcomes (Ricardo & Meilani, 2017).

Specifically, one topic considered difficult and often a barrier for third-grade students is the concept of fractions. An inadequate understanding of basic fraction concepts can hinder students' ability to solve more complex math problems at the next level. Therefore, innovative learning strategies are needed to optimally improve students' mathematics learning outcomes (Rahmah & Lubis, 2024). The gap between curriculum targets and student learning outcomes is often caused by conventional teaching methods, where teachers predominantly use lectures without involving concrete activities or aids. This approach makes students passive and makes abstract concepts difficult to visualize, making efforts to improve learning outcomes through active learning models crucial (Lubis, 2019).

This phenomenon of difficulty understanding fraction concepts was also identified among third-grade students at the UPTD SPF (School of Mathematics Education) of Sirimomungkur Public Elementary School. Preliminary data showed that the majority of students struggled to concretize basic fraction concepts, such as determining parts of a whole, which resulted in low achievement of the Minimum Completion Criteria (KKM). To address this issue, the development and implementation of innovative learning media are essential. Learning innovations, including the use of educational games or gamification, can improve the quality and atmosphere of learning, making it more engaging and oriented towards improving visual literacy and conceptual mastery (Elisyah et al., 2024).

In this study, the proposed solution is the use of concrete media. Concrete media was chosen because it can bridge students' abstract thinking to concrete understanding (Lubis et al., 2022). By manipulating physical objects such as paper, fruit, or blocks, students can see and experience firsthand how the fractions 1/2 or 1/4 are formed, thus solidifying the concept. This study used a Classroom Action Research (CAR) design. The CAR method was chosen because it is highly effective in solving practical problems that arise during the learning process, particularly in the third grade of the UPTD SPF of Sirimomungkur State Elementary School, by involving repeated cycles of action and reflection (Sugiyono, 2018).

The implementation of CAR allows researchers and teachers to collaborate in identifying problems, designing actions, implementing them, and evaluating their effectiveness directly in the classroom. This aligns with the principles of action research, which emphasize continuous improvement of learning practices (Arikunto, 2002). Based on the background of the problem and the proposed solutions, this study aims to empirically test and analyze the effectiveness of using concrete media in improving the

understanding of fraction concepts and analytical thinking skills of third-grade students at the UPTD SPF of Sirimomungkur Public Elementary School (Lubis et al., 2021). Therefore, it is hoped that the results of this study can make a significant contribution to improving the quality of mathematics learning at the elementary school level.

Methods

This study employed a Classroom Action Research (CAR) design, a practical and reflective approach focused on solving immediate teaching and learning problems within a specific educational environment. The research was conducted directly in the natural setting of UPTD SPF SD Negeri Sirimomungkur, specifically focusing on the third-grade classroom. This methodology was chosen as it allows for systematic intervention, observation, and refinement of teaching practices to improve identified conceptual difficulties among the students. The participants in this research included all students enrolled in the third grade at the school during the designated academic year. The class was selected based on initial diagnostic assessments that revealed a widespread low level of comprehension regarding fundamental fraction concepts. The researcher worked closely as a collaborator and facilitator, while the classroom teacher served as the main implementer of the instructional actions, ensuring the feasibility and authenticity of the intervention.

The CAR process was structured into two primary cycles, with each cycle systematically following four distinct phases: Planning, Action, Observation, and Reflection. This iterative structure is essential for CAR, as the shortcomings identified in one cycle become the basis for improvements and refined strategies implemented in the subsequent cycle, ensuring continuous quality enhancement in instruction. The Planning phase was conducted meticulously prior to the commencement of each cycle. This involved developing detailed lesson plans that fully integrated the use of concrete media for teaching fractions. Essential resources, such as divided physical objects, customized paper manipulatives, and visual aids, were prepared. Crucially, the instruments for data collection, including observation sheets and post-tests, were finalized during this stage to ensure alignment with the learning objectives.

The Action and Observation phases were executed concurrently. During the Action phase, the teacher implemented the lessons, actively encouraging students to manipulate the concrete objects to visualize and understand fraction concepts such as one-half and one-quarter. Simultaneously, the Observation phase involved the researcher and observers systematically recording data on student engagement, participation rates, interaction with the media, and the overall classroom environment using structured observation protocols.

Following the completion of the action and observation components for a cycle, the Reflection phase commenced. This stage involved a collaborative analysis of all

collected data between the researcher and the teacher. The team assessed the success rate, identified which teaching activities were most effective, and pinpointed remaining conceptual barriers or implementation difficulties. This analysis then generated specific recommendations for the refinement of the instructional strategy for the next cycle.

Data collection utilized multiple techniques to ensure the reliability and validity of the findings. Cognitive tests were administered before and after each cycle to quantify the improvement in conceptual understanding and learning outcomes. Furthermore, observation sheets provided qualitative and quantitative insights into the affective and psychomotor domains, measuring student motivation and active involvement. Documentation, including field notes and photographs, recorded the overall instructional process.

The collected quantitative data from the cognitive tests were analyzed using descriptive statistical methods. The primary focus of the analysis was the calculation of the percentage of students who successfully achieved the predetermined Minimum Mastery Criteria (KKM). The effectiveness of the concrete media intervention was conclusively determined by comparing the KKM attainment percentages across the pre-test, Cycle I, and Cycle II results.

Result

The improvement observed in Cycle II not only validated the importance of concrete media but also highlighted the teacher's adaptive role in refining instructional strategies. The integration of real-life objects such as fruits and snacks provided students with relatable experiences, bridging their prior knowledge with new mathematical concepts. This contextualization reduced cognitive load and allowed students to perceive fractions not merely as abstract symbols, but as meaningful representations of everyday quantities. Moreover, the classroom atmosphere during Cycle II demonstrated a significant transformation compared to earlier sessions. Students showed greater enthusiasm, collaborated actively with peers, and displayed confidence in answering questions both verbally and in written exercises. The use of varied media encouraged exploratory learning, where students were motivated to test their understanding by dividing objects and representing the divisions in fractional form. Such participatory engagement is consistent with the constructivist learning approach.

The reflective phase following Cycle II provided further evidence of student growth. Anecdotal records from teacher observations noted that even students who initially struggled with abstract notation became more proficient in linking concrete experiences with mathematical symbols. This gradual internalization of knowledge represents a critical achievement of the intervention, where external aids eventually supported independent abstract reasoning. In addition, peer collaboration became a noteworthy aspect of the learning process. During group activities, students explained fractions to

one another using the concrete objects at hand. This peer-to-peer explanation not only reinforced understanding for the explainer but also facilitated comprehension for the listener. Such cooperative learning outcomes align with Vygotsky's concept of the Zone of Proximal Development (ZPD), wherein social interaction plays a pivotal role in advancing cognitive abilities.

From the assessment perspective, the progression from 30% mastery in the pre-test to 90% in Cycle II illustrates a substantial learning gain. This quantitative evidence corroborates the qualitative findings, thereby strengthening the reliability of the research conclusion. It underscores the notion that concrete media, when systematically integrated into lessons, can significantly enhance mathematical comprehension among elementary students.

Furthermore, the success of this research provides a practical implication for classroom teachers. It emphasizes that pedagogical strategies should not be static but dynamic, responsive to students' needs and reflective of their learning contexts. Teachers are encouraged to consistently evaluate their methods and incorporate teaching aids that resonate with the cognitive levels of their students. The findings also carry implications for curriculum development. By embedding concrete media use in mathematics instruction, curriculum designers can create structured learning pathways that facilitate gradual transitions from concrete to semi-concrete and finally to abstract representations. This scaffolding approach ensures that students build a strong conceptual foundation before advancing to higher levels of abstraction.

It is also worth noting that the intervention fostered positive attitudes toward mathematics. Students, who previously expressed anxiety and reluctance when dealing with fractions, began to perceive the subject as enjoyable and approachable. This attitudinal shift is essential, as a positive mindset toward mathematics is often linked to sustained academic achievement in the long term. Nevertheless, the study acknowledges certain limitations. For instance, the research was confined to a single class of Grade III students at UPTD SPF SD Negeri Sirimomungkur, which may limit the generalizability of the findings. Future research involving larger samples across different schools would provide a broader perspective and confirm the robustness of these results.

In conclusion, the Classroom Action Research demonstrated that the use of concrete media significantly enhanced the comprehension of fraction concepts among Grade III students. The iterative process of planning, acting, observing, and reflecting enabled the refinement of teaching strategies, leading to marked improvements in student learning outcomes. The research not only achieved its immediate goals but also contributed valuable insights into the broader field of mathematics education.

Discussion

The substantial improvement from 30% to 90% is a powerful finding, providing conclusive empirical evidence that the concrete media intervention successfully addressed the conceptual difficulties faced by the third-grade students. The shift highlights the critical role of sensory engagement in early mathematics education (Fatimah & Maryani, 2018). The success is attributed to the ability of concrete media to serve as a visual and tactile bridge between the tangible world and the abstract mathematical concept of parts of a whole (Ningsih et al., 2023). When students could physically divide an orange or fold a piece of paper, the meaning of the numerator and denominator became instantly recognizable and intuitive, reducing the cognitive load associated with abstract symbols.

Furthermore, the introduction of engaging, hands-on learning methods, which share characteristics with educational games or gamification, inherently boosts student motivation (Elisyah et al., 2024). This positive shift in affective domains, where students feel less intimidated and more curious, is vital, as motivation and interest are strong predictors of successful learning outcomes (Ricardo & Meilani, 2017). The implementation of the media also fostered analytical thinking skills, a necessary component for true mastery, beyond simple procedural knowledge (Lubis etal., 2021). By physically comparing 1/2 and 2/4 using different objects, students were prompted to analyze relationships and derive their own conclusions about equivalent fractions, developing deeper conceptual understanding.

The reflective nature of the CAR design played a non-negotiable role in achieving the 90% success rate (Sugiyono, 2018). The immediate feedback loop allowed the teacher to quickly identify the gaps from Cycle I—for example, the need for more structured guidance—and implement targeted improvements in Cycle II, ensuring the instructional practice evolved optimally to meet student needs. This finding aligns with broader educational literature emphasizing the importance of diverse and interactive learning resources in a modern classroom (Siregar, 2024). Whether through interactive digital tools or simple concrete manipulatives, the key is moving away from passive instruction toward active, multimodal engagement (Manshur & Ramdlani, 2019).

The role of the teacher, supported by the principal's leadership in encouraging innovative teaching (Hamka, 2023), was instrumental. The teacher’s willingness to adapt and refine the lesson delivery based on classroom observation data is a testament to professional development focused on evidence-based practice. In essence, the research demonstrates that when faced with abstract learning challenges in primary schools, educators must prioritize methods that convert concepts into concrete, relatable experiences. This finding not only resolves the low fraction mastery issue at UPTD SPF

SD Negeri Sirimomungkur but also provides a replicable model for teaching other abstract mathematical topics.

The success of the concrete media approach underscores the global requirement for educators to cultivate 21st-century skills, which prioritize creativity, critical thinking, and problem-solving through hands-on activities, rather than rote learning (Mardhiyah et al., 2021).

Ultimately, this study confirms that a well-designed, iterative intervention using readily available concrete media is an effective, practical, and highly successful strategy for elevating third-grade students' conceptual understanding of fractions in the local context of UPTD SPF SD Negeri Sirimomungkur. The successful incorporation of tangible tools, while traditional, does not negate the importance of preparing students for modern educational environments. Studies on interactive multimedia, augmented reality (AR) storybooks, and e-bookstories highlight the trend toward integrating visual and technology-assisted tools to enhance learning outcomes and reduce anxiety in subjects like mathematics (Lubis & Dasopang, 2020; Lubis, 2023; Lubis et al., 2022). The foundational visual and manipulative skills developed through concrete media serve as essential precursors for effectively utilizing these advanced digital and visual learning resources in the future (Gogahu & Prasetyo, 2020).

Beyond cognitive gains, the hands-on nature of the lesson positively influenced student disposition and behavior. Active, focused tasks utilizing manipulatives naturally minimize off-task behaviors, leading to a more disciplined and focused classroom environment. Previous research supports that engaging, structured media can enhance character traits such as discipline, which is vital for academic success and healthy school integration (Lubis & Wangid, 2019). This positive behavioral reinforcement, often observed during highly interactive instruction, complements the improved academic performance, contributing to a holistic educational benefit.

The choice of concrete media is particularly appropriate for Grade III students, who are typically transitioning from preoperational to concrete operational stages of cognitive development. At this age, abstract concepts like fractions are best assimilated through sensory and physical interaction, which is a key pedagogical principle. Providing relatable, physical models for abstract concepts directly supports their developmental needs, ensuring that complex ideas are internalized properly, much like how parents internalize foundational values in early childhood through concrete examples and interaction (Dasopang et al., 2022).

The data starkly contrasts the effectiveness of the concrete method against the initial abstract approach, where only 30% of students met the KKM. This low pre-test score strongly reiterates the established challenge in elementary education: abstract instruction in complex mathematics tends to confuse, rather than clarify, concepts

(Lubis, 2019). The intervention confirms that simply presenting rules or symbols without a physical foundation is inefficient for mastery at this level, reinforcing the necessity of pedagogical innovation over traditional, passive methods.

Given the compelling evidence of effectiveness, this research advocates for a wider integration of concrete media into the Grade III mathematics curriculum at the institutional level, and possibly beyond. The success achieved suggests the need for teacher training programs that focus on effective manipulative integration, aligning with modern pedagogical frameworks like the Kurikulum Merdeka which emphasize context-based and student-centered learning (Pebtiyanti et al., 2023). Future research should explore the longitudinal effects and transferability of these concrete-derived skills to solving abstract fraction problems without the aid of manipulatives.

Conclusion

This Classroom Action Research successfully demonstrated the efficacy of utilizing concrete media as an intervention to significantly improve the conceptual comprehension of fractions among Grade III students at UPTD SPF SD Negeri Sirimomungkur. The study successfully raised student mastery dramatically from a baseline of 30% in the pre-test to a conclusive 90% following Cycle II. This remarkable improvement confirms that abstract mathematics concepts are most effectively mastered when presented through visual and tactile manipulative materials (Fatimah & Maryani, 2018; Lubis, 2019). The success is largely attributed to the pedagogical appropriateness of concrete media, which served as a critical bridging tool for students transitioning to concrete operational thought, positively impacting their motivation (Ricardo & Meilani, 2017) and reducing anxiety (Lubis et al., 2022). Furthermore, the iterative nature of the CAR design, involving rigorous reflection and refinement between cycles (Arikunto, 2002; Sugiyono, 2018), was instrumental in optimally targeting instructional strategies, thereby ensuring the ultimate success of the intervention.

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