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THE EFFECT OF SIMPLE TEACHING AIDS ON THE UNDERSTANDING OF THE CONCEPT OF THE HUMAN CIRCULATORY SYSTEM

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Abstract: The study was motivated by students' difficulties in understanding the abstract and unobservable circulatory process, which may be addressed through concrete learning media. A descriptive quantitative method with a one-group pretest–posttest design was employed. The participants were 30 fifth-grade students of SDN 106 Bengkulu City in the odd semester of the 2025/2026 academic year, selected through purposive sampling. Data were collected using a 20-item multiple-choice test and student activity observation sheets, while the teaching aids were constructed from plastic bottles, Styrofoam, small hoses, and colored liquids to simulate blood flow. The data were analyzed by comparing pretest and posttest scores and conducting a paired-sample t-test. The results showed an average score increase of 12.16 points, with a significance value of 0.000 (<0.05), indicating a significant improvement in learning outcomes. The use of simple teaching aids also increased students' motivation, active engagement, and cooperation during learning. Therefore, simple teaching aids are effective contextual learning media for transforming abstract science concepts into more concrete and understandable representations.

Keywords: Simple Props, Concept Comprehension, Circulatory System, Elementary School

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INTRODUCTION

Science education at the elementary level plays a pivotal role in fostering students' scientific literacy, including critical thinking, observational skills, and the ability to apply scientific knowledge in real-life contexts (Huda, et al., 2020a; Huda et al., 2026; Hardini et al., 2026). Despite its importance, evidence from international large-scale assessments, such as TIMSS 2019 and PISA 2018, consistently indicates that Indonesian students' performance in science remains below the global average. This gap highlights the need for more effective, context-sensitive instructional approaches, particularly in terms of how abstract scientific concepts are represented and taught in classroom settings (Mullis et al., 2020).

One of the science topics that remains challenging for elementary students is the human circulatory system. The inherent abstractness of this topic due to the invisibility of internal physiological processes often results in superficial learning, where students rely on memorization rather than developing a coherent conceptual understanding (Nurulsari et al., 2020; Usman et al., 2025; Huda, et al., 2020b). Previous studies have shown that students encounter difficulties in explaining blood circulation mechanisms, understanding the distribution of oxygen and nutrients, and relating these processes to human health when instruction is not supported by appropriate learning media (Aytekin & Topçu, 2025).

To address this issue, the use of simple teaching aids has been widely suggested as a practical and pedagogically grounded solution, particularly in resource-limited educational contexts. These teaching aids, typically constructed from low-cost and easily accessible materials, enable the visualization of abstract processes through concrete representations (Munifah et al., 2019; Lestari et al., 2021; Saregar et al., 2025). Grounded in constructivist learning theory, such hands-on and manipulable media are believed to support active knowledge construction and enhance students' engagement in the learning process. Empirical evidence suggests that the use of concrete instructional media can improve both conceptual understanding and learning motivation among elementary students (Ramadhani & Mellisa, 2025; Habsy & Christian, 2023).

However, despite the growing body of research on instructional media, several gaps remain. First, many studies focus primarily on the effectiveness of advanced technologies, such as digital simulations or augmented reality, which may not be feasible in under-resourced schools. Second, limited research has systematically examined how simple teaching aids influence conceptual understanding specifically in the context of the circulatory system at the elementary level. Third, there is a lack of empirical evidence addressing the mediating factors such as instructional design, teacher facilitation, and assessment strategies that determine the

success of such interventions. These gaps indicate the need for a more focused and contextually relevant investigation (Huda et al., 2019; Yasin et al., 2020; Putra et al., 2024).

Therefore, this study aims to examine the effect of simple teaching aids on elementary students' conceptual understanding of the human circulatory system and to identify the factors that mediate their effectiveness. By addressing these issues, this study is expected to contribute both theoretically by strengthening the empirical basis of constructivist learning in science education and practically by providing feasible instructional recommendations for teachers, particularly in settings with limited resources.

METHOD

This study uses a descriptive quantitative method with a one-group pretest–posttest design which aims to determine the influence of the use of simple teaching media on the understanding of the concept of the human circulatory system (M Makhrus Ali and others, 2022). The research was carried out at SDN 106 Bengkulu City in the odd semester of the 2025/2026 school year, with 30 research subjects of class V who were selected purposively, namely based on suitability with research needs. The research procedure is carried out through three stages, namely preparation, implementation, and data analysis. The preparation stage includes the preparation of learning tools, the manufacture of simple props in the form of circulatory models using Styrofoam, plastic bottles, small tubes, and colored liquids, as well as the preparation of research instruments. At the implementation stage, students first do the pre-test to find out their initial understanding.

Furthermore, the researcher carried out learning by utilizing simple teaching aids, where students observed blood flow simulations and participated in discussions. Student activities during learning are assessed through observation sheets that include indicators of activeness, cooperation, and involvement in activities (Huda et al., 2019; Yasin et al., 2020; Putra et al., 2024). After learning, students work on a post-test to measure the improvement in understanding of concepts. The research instrument consisted of a multiple-choice test of 20 questions arranged based on a learning achievement grid and an observation sheet of student activities. The research data was analyzed by calculating the average, percentage, and difference in pretest and posttest scores to see an improvement in learning outcomes, and reinforced with a paired sample t-test to determine the significance of improving student understanding.

FINDING AND DISCUSSION

The results of descriptive statistical analysis show an overview of the biology learning outcomes of grade V students of SD Negeri 106 Bengkulu City after being given an initial test, more details can be shown in **Table 1**.

Table 1. The following presents the results of descriptive statistical analysis based on the results of students' pretest and posttest.

Table 1. Descriptive statistical results of the initial and final test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test	42.67	30	11.351	2.072
	Post Test	54.38	30	12.069	2.203

Based on **Table 1**. There was an increase in the average score from the pretest by 42.67 to 54.83 in the posttest. This shows an increase in students' understanding of concepts after the implementation of learning using simple teaching aids. The average score that increased by around 12.16 points indicates that the learning media used has a positive effect on student learning outcomes.

To ensure that the increase is statistically significant, a paired sample t-test is performed. The results of the analysis are presented in **Table 2**.

Table 2. Paired sample t-test results

Test Pair	Average Difference	Standard Deviation	Standard Error of the Mean	T	df	Sig. (2-Tailed)
Pre-test Post-test	-12,167	11,039	2,016	-6,037	29	0,000

The t-test results showed a Sig. (2-tailed) value = $0.000 < 0.05$, which means that there is a significant difference between the pretest and posttest values. Thus, it can be concluded that the use of simple teaching aids has a significant influence on improving the understanding of the concept of the human circulatory system in elementary school students.

The findings of this study indicate that the use of simple teaching aids significantly improves students' conceptual understanding of the human circulatory system. This is evidenced by the increase in the mean score from 42.67 in the pretest to 54.83 in the posttest, with a mean difference of 12.16 points. Furthermore, the paired sample t-test result ($p = 0.000 < 0.05$) confirms that the improvement is statistically significant.

This improvement can be attributed to the role of concrete learning media in facilitating the understanding of abstract concepts. The human circulatory system involves internal processes that are not directly observable, making it difficult for elementary students to fully comprehend the material through verbal explanation alone. The use of simple teaching aids enables students to visualize and simulate blood circulation processes, thereby transforming abstract concepts into more concrete and meaningful learning experiences.

From a theoretical perspective, these findings are consistent with constructivist learning theory, which emphasizes that knowledge is actively constructed through direct experience and interaction with learning materials (Piaget, 1970). In addition, the Cognitive Theory of Multimedia Learning suggests that students learn more effectively when information is presented through both visual and verbal representations (Mayer, 2009). In this study, the integration of visual models and teacher explanations enhanced students' ability to process and retain information.

These findings are supported by previous studies indicating that the use of concrete and activity-based learning media can significantly improve students' conceptual understanding and engagement in science learning (Cahyani & Rahmawati, 2021; Kurniawati & Susanto, 2023). During the learning process, students were more active, showed greater enthusiasm, and were able to explain the circulatory system in their own words, indicating meaningful learning rather than rote memorization. **Figure 1** illustrates how students interacted with simple teaching aids to simulate the human circulatory system during the learning process.



Figure 1. Using media of the human circulatory system

Furthermore, the use of simple teaching aids promotes collaborative learning and communication skills through group-based activities. This aligns with contemporary educational perspectives that emphasize the importance of interaction and active participation

in the learning process (Slavin, 2018). Students not only acquired knowledge but also developed the ability to work collaboratively and communicate their ideas effectively.

From a practical standpoint, simple teaching aids offer significant advantages, particularly in schools with limited resources. They are cost-effective, easy to construct, and adaptable to various learning contexts. However, their effectiveness depends on how well they are integrated into the instructional design and facilitated by the teacher to achieve the intended learning objectives.

In conclusion, the use of simple teaching aids represents an effective and practical instructional strategy for enhancing students' conceptual understanding, particularly for abstract scientific topics such as the human circulatory system.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that the use of simple teaching aids has a significant effect on increasing the understanding of the concept of the human circulatory system in elementary school students. This media is able to transform abstract concepts into concrete learning experiences through visualization of blood flow using simple materials such as plastic bottles, styrofoam, small tubes, and colored liquids. The increase in the average score of learning outcomes and the results of statistical tests confirms the effectiveness of teaching aids in deepening student understanding. In addition to improving cognitive skills, this media also encourages active participation, motivation, and cooperation between students in the learning process. The hands-on experience in using the props helps students relate theory to real phenomena, making learning more meaningful and enjoyable. Thus, simple teaching aids not only function as a means of visual aid, but also as an effective learning strategy to improve the quality of science learning in elementary schools, especially in the material of the human circulatory system.

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