

Research Paper

Analysis of Student Needs for Biology Teaching Aids and Replicas

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Article Info	ABSTRACT
Submitted: 10-10-2025 Accepted: 10-11-2025 Published: 10-12-2025	The human movement system is often considered difficult because it is abstract and requires a high level of visualization ability. This affects students' interest and understanding of anatomical structures and movement mechanisms. This study aims to analyze students' needs for biology teaching aids, specifically a human skeleton replica, as a learning medium at MAN 5 Batanghari. The research used a descriptive quantitative approach with 24 grade XI IPA students selected through purposive sampling. Data were collected through observation, interviews, and a Likert-scale questionnaire, then analyzed descriptively. The results showed that most students required concrete media, such as three-dimensional teaching aids, to visualize and understand the material. The use of teaching aids was found to increase students' interest, conceptual understanding, and active participation. However, limited tools and materials remain the main obstacles. In conclusion, developing an economical and anatomically accurate skeleton replica is essential to create more engaging and meaningful biology learning. Keywords: Teaching aids; Human movement system; Student needs; Biology learning.

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INTRODUCTION

Education is learning that not only focuses on factual knowledge, but also demands the internalization of concepts through students' learning experiences (Indah & Fadilah, 2024). In biology as a science that

explains the structure, function, and interaction of organisms with the environment, it requires a pedagogical approach that is able to bridge the understanding between theoretical abstraction and practicality in everyday life. According to Sari et al. (2024), experience-based approaches, such as interactive media and direct practice, can improve students' conceptual understanding of challenging biological material, including the human movement system. According to Apriana (2023), the use of illustrated booklets significantly improves students' ability to connect anatomical structures with their functions. The cause of this limitation is the low understanding and decreased interest in learning biology (Afsas *et al.*, 2025).

According to Ni'mah *et al.* (2022), learning interest is a psychological factor determining the success of students' learning processes. Research by Laode & Nurhayati (2022) shows that students' learning interest accounts for 78.53% of biology learning outcomes, while the remaining 21.47% is attributed to other factors not studied. This interest reflects students' emotional interest and involvement in learning activities without any external pressure. Based on observations conducted at MAN 5 Batang Hari, many students show low participation in biology learning, especially when studying the human movement system. They tend to show passive behavior, minimal initiative to ask questions, and more often rely on memorization strategies rather than efforts to understand in depth. According to Luluk (2023), low learning interest leads students to be passive, ask fewer questions, and prefer memorization strategies over concept exploration, ultimately harming academic achievement. This condition affects academic achievement, as most students have not met the Minimum Completion Criteria (KKM) set for the material.

To overcome these problems, strategic learning innovations are needed, including the use of teaching aids and human skeleton replicas. Learning media serves as a facilitator of abstract concepts, attracting students' attention and increasing engagement. According to Nurgiansah (2022), teaching aids are effective media that can bridge the gap between theoretical conceptualization and physical reality, because they allow students to make direct observations and understand learning objects. Furthermore, research by Afsas et al. (2025) confirms that the use of teaching aids not only facilitates difficult concepts to be easier to understand but also encourages active student involvement in the learning process.

A human skeleton replica is an example of a biology teaching aid that has the potential to support learning about the musculoskeletal system. Through the use of this replica, students can visually learn about bone structure and the relationships between body parts, which is in line with the findings of Stibies et al., (2023) that anatomical model-based media effectively increases students' interest and understanding of human body structure. However, based on interviews with biology teachers at MAN 5 Batang Hari, the availability of teaching aids such as human skeleton replicas is still hampered, both in terms of quantity and quality. Teachers tend to rely on textbooks, whiteboards, and static images, while human skeleton replicas are

not available. This makes it difficult for students to understand complex material such as the structure and function of the skeletal system, thus decreasing their interest and motivation to learn.

To overcome these obstacles, developing a human skeleton replica as a teaching aid in biology is a potential solution. Therefore, this article discusses the analysis of the needs of MAN 5 Batanghari students for biology teaching aids, specifically a specially developed human skeleton replica. The goal is to identify student needs, design a replica that suits their learning needs, and evaluate its effectiveness in improving understanding and motivation to learn. With the developed human skeleton replica, it is hoped that biology learning at MAN 5 Batanghari will be more interactive, engaging, and support the achievement of optimal learning outcomes for students..

METHOD

This study uses a quantitative descriptive analysis approach to analyze students' needs for biology teaching aids, specifically human skeleton replicas, at MAN 5 Batanghari. This approach is used to describe phenomena systematically and factually based on data obtained from student and teacher responses. The researcher was not involved in the teaching process, but only visited the school to collect data through classroom observations to identify learning obstacles, semi-structured interviews with biology teachers, and distribution of Likert-scale questionnaires to students to measure the level of needs, preferences, and difficulties in understanding the skeletal system material without teaching aids. In addition, an analysis of curriculum documents was conducted to ensure the suitability of the replicas with learning competencies. The research procedures included instrument preparation, data collection at the school, data analysis, and the development of human skeleton replicas using economical, anatomically accurate materials, based on the results of the needs analysis.

Participants

This research was conducted in class XI IPA and involved two biology teachers as informants.

Instruments

The research instruments were observation sheets, interview guidelines, and student needs questionnaires.

Sample

The research was conducted in class XI IPA with 24 students as subjects, selected using purposive sampling.

Data analysis

Quantitative data from the questionnaire were processed using descriptive statistics (percentages and averages), while qualitative data from interviews and observations were analyzed descriptively to support

the results. This descriptive analysis aims to systematically interpret the data and present the findings in an easily understood narrative form.

RESULT

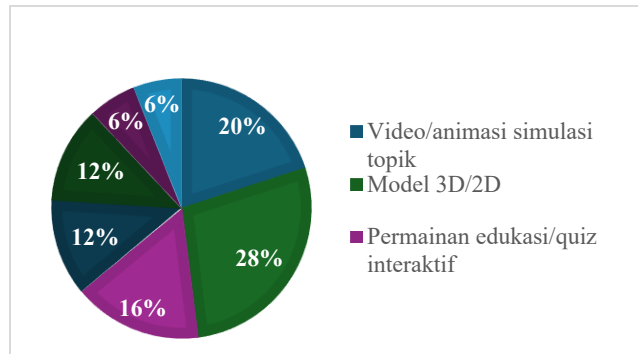


Figure 1. Media-type activities that help students

Figure 1 shows that most students felt that visual media such as anatomical images and learning videos were most helpful in understanding the human motor system.

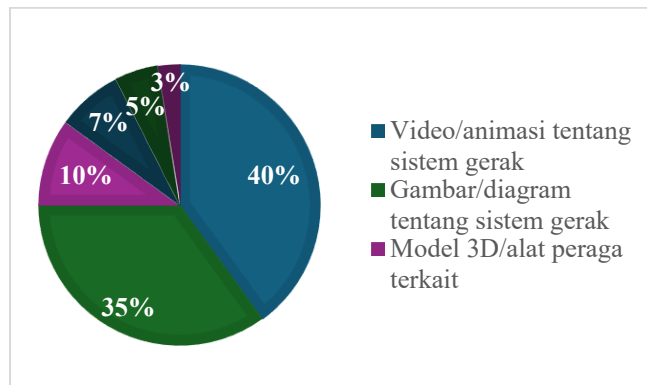


Figure 2. Media-type activities that help students

Figure 2 shows that three-dimensional teaching aids, such as replica human skeletons, are the most preferred media for students because they provide a realistic and engaging learning experience. Students find it easier to understand bone structure and joint function through direct observation.

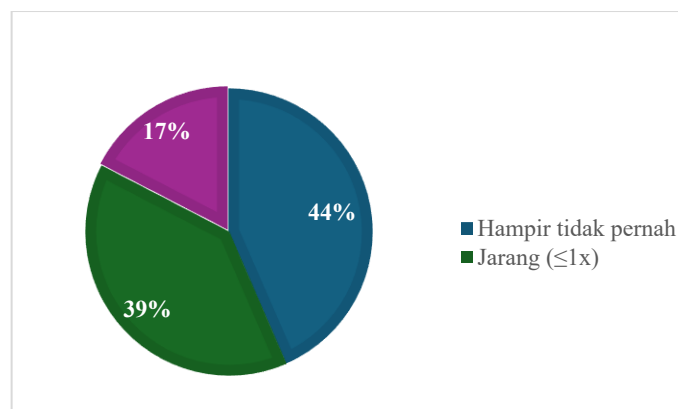


Figure 3. Frequency of media types that help students

Figure 3 shows that teachers still frequently use textbooks and PowerPoint, while teaching aids are rarely used.

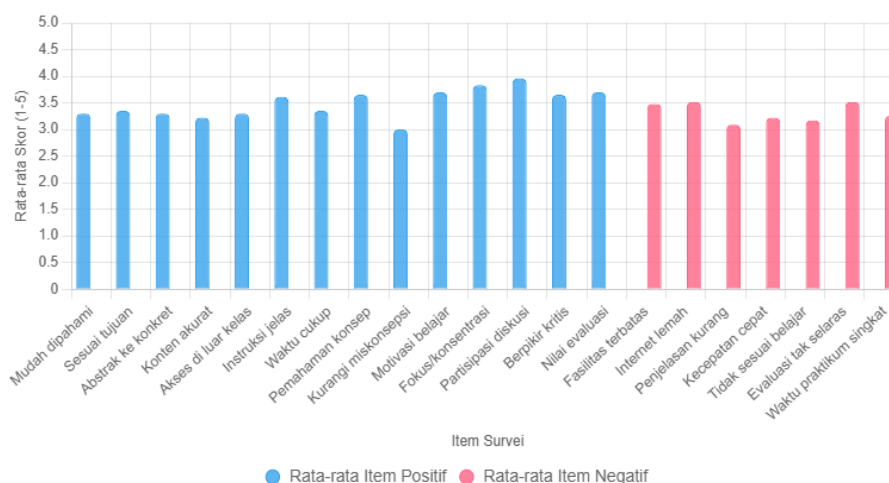


Figure 4. Average result of the benefits and barriers of the motion system media

Figure 4 shows that students consider teaching aids to be very useful for understanding the material, although there are still obstacles, such as limited tools and less durable materials.

DISCUSSION

Based on the results of a questionnaire analysis of students' needs for biology learning media on the topic of the musculoskeletal system, the majority of students found visual media, such as anatomical drawings, interactive videos, and three-dimensional props, very helpful in understanding the human musculoskeletal system. This suggests that students tend to have a visual learning style, making media that presents realistic representations easier to understand and remember. This finding aligns with research by Hayati (2020), which demonstrated that the use of torso props can improve student learning outcomes in the human musculoskeletal system. Visual media and props facilitate understanding of theoretical concepts and real-world phenomena that are difficult to grasp abstractly.

Furthermore, the use of three-dimensional props also provides a more enjoyable learning experience. Students can learn the structure and function of bones and joints by directly observing the relationships between human body parts. This aligns with research by Ramadansur et al. (2022) and Utami (2021), which demonstrated that the use of torso models in biology learning significantly improves student learning activities and understanding. These results also support research by Afsas et al. (2025), which demonstrated that visual aids play a crucial role in helping students overcome difficulties in understanding abstract biological material by providing contextual and engaging learning experiences.

The study also showed that the frequency of learning media use at MAN 5 Batanghari remains limited to materials such as textbooks, projectors, and PowerPoint slides. In contrast, the use of visual aids, such as human skeleton replicas, is suboptimal. This situation illustrates a gap between student needs and the

availability of learning media. This finding aligns with Ula et al. (2022), who found that low utilization of visual aids leads to a loss of student interest and motivation in learning about the musculoskeletal system. However, the use of visual aids in learning can positively affect motivation and learning outcomes, as stated by Daulay et al. (2019), who demonstrated significant improvements in student learning outcomes through the Guided Note-Taking method using torsos.

Based on the results of a Likert-scale questionnaire, most students strongly agreed that visual aids helped them understand material on the musculoskeletal system, increased their interest in learning, and strengthened their concept retention. Students also felt more enthusiastic and active when learning with visual aids than with traditional lecture methods. The application of the Problem-Based Learning model, with the aid of teaching aids, significantly increased students' interest in physics and their mastery of physics learning outcomes in MA students (Pujiyanti et al., 2021). In the context of biology, this aligns with the findings of Stibies et al. (2023), who confirmed that anatomical model-based media can enhance students' active participation and conceptual understanding of human body structure.

However, this study also revealed several obstacles to the use of teaching aids, including limited availability and quality of tools, limited learning time, and easily damaged materials. Most students reported that the available tools were unattractive and did not accurately reflect human anatomy. Limited tools are often a significant obstacle in science learning, necessitating the development of media from simple, economical yet educational materials (Pambudi et al., 2019). The use of teaching aids is effective in fostering students' interest in learning through more interactive activities, unlike the passive nature of conventional media (Sukandi et al., 2024).

In general, the use of teaching aids in biology lessons has been shown to help students better understand the material and motivate them to learn. Developing a human skeleton replica tailored to students' needs is a way to integrate theory and practice in biology learning. Constructivist theory emphasizes that knowledge is acquired through direct experience and active student involvement in the learning process. Therefore, the development of role-playing tools is not only a technological innovation but also a pedagogical strategy aimed at creating interactive, context-relevant, and meaningful biology learning for students.

CONCLUSION

Based on the needs analysis and discussion, it can be concluded that students at MAN 5 Batanghari have a high need for biology teaching aids, particularly human skeleton replicas, in their learning of the movement system. Most students indicated a preference for visual media and three-dimensional props because they help them understand the structure of bones and joints, and the mechanisms of human movement, in a concrete and engaging manner. The questionnaire results showed that the use of props not only improves conceptual understanding but also encourages student motivation and active participation in the learning process.

Furthermore, this study found that the availability of props in schools is still minimal, leading teachers to frequently use conventional media such as textbooks, projectors, and PowerPoint slides. This limitation hinders the achievement of optimal learning outcomes. Therefore, developing an economical, proportional, and student-tailored human skeleton replica is urgently needed to address the gap between theory and practice in biology learning. The use of these props aligns with the principles of constructivist learning, which emphasize hands-on learning experiences to meaningfully build students' conceptual understanding.

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