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Exploring Students' Learning Experiences Through Interactive 3D Organ Media

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Abstract

Difficulties in understanding the structure and functions of human digestive organs remain a challenge in science learning because these organs cannot be directly observed. This study aims to explore the learning experiences of fourth-grade students through the use of Interactive 3D Organ Media in learning about the human digestive system at MI Jam'iyatul Mubtadiin Jenggawah, Jember. This research employed a qualitative approach with a case study design. Data were collected through observation, interviews, and documentation, then analyzed through data condensation, data presentation, and conclusion drawing and verification. The research focuses on students' initial experiences, their involvement in learning activities, interactions with the media and teachers, and their understanding of the subject matter. The use of 3D games and animated videos has the potential to present digestive organs in a more engaging and understandable way. This media is expected to help students identify digestive organs, understand their functions, and relate the learning materials to the importance of maintaining body health. Therefore, Interactive 3D Organ Media can serve as a supporting tool for creating more active and meaningful science learning.

Keywords: *3D organs, digestive system, interactive media, learning experiences.*

INTRODUCTION

Teaching the human organ systems in elementary school presents challenges because the objects being studied are located inside the body and have complex structures and functions that students cannot directly observe. Conceptually, science learning at the elementary level should provide experiences that connect abstract concepts with concrete, visual, and easily explored representations. However, in practice, lessons on human organs may still be dominated by textbooks, two-dimensional images, and verbal explanations. This may lead students to focus more on memorizing organ names and functions than on understanding the relationships between organ systems and their connection to maintaining bodily health. Therefore, learning media are needed to present organ systems in a more concrete and interactive manner, enabling students to engage in visual and exploratory learning experiences.

Advances in educational technology have encouraged the use of three-dimensional media and Augmented Reality (AR) in science learning, particularly to help students understand abstract concepts. Siki and Leba (2025), in a review of 20 studies, found that the use of AR in elementary science learning has the potential to support conceptual understanding through more visual and interactive presentations. However, its implementation is still influenced by several factors, including the teacher's role, students' readiness, and the availability of learning infrastructure. In line with this, Iqbal, Purbiyanto, and Hamid (2024) developed an AR application to introduce human organs through three-dimensional models equipped with audio and zoom features, while Kasan and Suratmi (2025) developed AR-based 3D media for the human digestive system using Sketchfab and Assemblr Edu. Nevertheless, these studies generally focus on product development, feasibility, practicality, and media effectiveness. Therefore, research into students' experiences of interacting and learning with three-dimensional organ media still needs to be expanded.

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Studies on technology-based learning media indicate that a medium's success is determined not only by product quality but also by how it is used and experienced by students in real learning situations. The use of AR in science learning has been shown to potentially support student engagement and understanding, although its implementation also faces challenges, including teacher readiness, classroom management, student characteristics, and the availability of facilities and infrastructure. Research on AR in science education also highlights the need to pay attention to students' learning experiences, rather than focusing solely on the final outcomes of media use. Thus, there is room for research examining how students interact with the media, respond to three-dimensional visualizations, encounter difficulties, and develop understanding throughout the learning process. Accordingly, this study focuses on students' learning experiences in learning about the human organ systems through Interactive 3D Organ Media in Grade IV at Madrasah Ibtidaiyah Subulus Salam Probolinggo.

In light of this research gap, this study employs a qualitative approach with a case study design to gain a deeper understanding of students' learning experiences. The main research question is: "How do fourth-grade students experience learning about the human organ systems through the use of Interactive 3D Organ Media?" This question focuses on how students explore the media, respond to three-dimensional organ visualizations, overcome difficulties during learning, and connect their knowledge of organ systems with efforts to maintain bodily health. This focus is expected to provide an overview of the interactions among students, media, learning materials, and teachers throughout the learning process. Thus, this study is not solely intended to examine learning achievement, but also to understand students' learning processes and the meaning they attach to using Interactive 3D Organ Media in an authentic learning context.

Interactive 3D Organ Media is considered capable of providing a more exploratory learning experience because it allows students to visually observe organ structures, identify their parts and functions, and connect concepts about organ systems with efforts to maintain health. Three-dimensional visualization can bridge concepts that are difficult to observe directly and more concrete, interactive representations, giving students opportunities to develop understanding through observation and exploration. However, students' learning experiences may differ because they are influenced by prior knowledge, how they interact with the media, teacher guidance, learning conditions, and available facilities. Therefore, this study argues that students' experiences need to be examined directly to understand how Interactive 3D Organ Media is used, responded to, and interpreted in learning about human organ systems. This approach is expected to provide a more comprehensive understanding of three-dimensional media from the perspective of students' learning experiences, rather than solely through effectiveness measurements.

METHOD

This study employed a qualitative approach with a case study design to explore students' learning experiences through the use of Interactive 3D Organ Media for learning about the human digestive system. The study was conducted at MI Subulus Salam, with the learning experiences of fourth-grade students during the learning process serving as the unit of analysis. The location and participants were selected based on preliminary findings indicating that students had difficulty understanding the complex structures and functions of the human digestive organs, which cannot be directly observed. To provide a more concrete learning experience, lessons incorporated 3D games and 3D animated videos as part of the strategy for using Interactive 3D Organ Media.

The study's sources of information included respondents and informants selected purposively based on their involvement in and knowledge of the learning process. Respondents consisted of fourth-grade students who used the media and the fourth-grade science teacher who was directly involved in implementing the lessons. Supporting informants included the school principal and the vice principal for curriculum, who provided information about learning conditions, student characteristics, and the implementation and use of learning media at the

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school. The involvement of these various sources was intended to obtain diverse and in-depth data about students' learning experiences using Interactive 3D Organ Media.

Data were collected through observation, interviews, and documentation. Direct observation was conducted during lessons to identify students' activities, responses, engagement, interactions, and experiences when using Interactive 3D Organ Media. Semi-structured interviews were conducted using an interview guide developed based on the research focus and directed at students and the science teacher. Interviews with the school principal and vice principal for curriculum served as supporting data. Documentation was used to complement the research data, including photographs of learning activities and student learning records, such as scores relevant to the subject being studied.

Data were analyzed interactively through three stages: data condensation, data display, and conclusion drawing and verification. During data condensation, the researchers selected, focused, simplified, and categorized data from observations, interviews, and documentation according to the research focus. The condensed data were then presented in narrative descriptions and thematic categories related to students' experiences, responses, engagement, and understanding during lessons using Interactive 3D Organ Media. The final stage involved drawing and verifying conclusions by comparing and connecting various findings to gain an overall understanding of students' learning experiences in studying the human digestive system through Interactive 3D Organ Media.

RESULTS AND DISCUSSION

This study focuses on exploring the learning experiences of fourth-grade students at Madrasah Ibtidaiyah Jam'iyatul Mubtadiin Jenggawah, Jember, through the use of interactive 3D organ media. The results are organized using a qualitative approach by examining students' experiences, engagement in learning, understanding of the subject matter, interactions with teachers, and challenges encountered while using the media. Analysis was conducted through data condensation, data display, and conclusion drawing to identify key themes related to students' learning experiences.

The following is a complete draft of the Results and Discussion section in the style of a journal article, including a thematic table, placeholders for interview quotations and documentation, critical interpretation, and research limitations. Since the original interview transcripts and observation notes are not yet available, sections requiring field evidence are marked to avoid fabricating quotations or research findings.

1. Students' Initial Experiences Using Interactive 3D Organ Media

Initial experiences are important for understanding how students respond to the use of interactive 3D organ media during learning. This media presents representations of body organs in three dimensions, allowing students to observe objects from different viewpoints and visually explore their parts. These characteristics may provide a learning experience different from using two-dimensional images in textbooks, particularly when students have the opportunity to interact directly with the displayed objects.

The exploration of students' initial experiences focuses on their responses when first introduced to the media, including interest, curiosity, willingness to try its features, and ability to follow instructions. These responses are important to observe because they provide information about students' initial acceptance of the learning media. However, enthusiasm alone does not necessarily indicate the development of conceptual understanding; therefore, students' learning behaviors and explanations during the activities also need to be analyzed.

During interviews, students' initial experiences should be explored through questions about their first impressions, the most interesting features of the media, and differences between

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learning with 3D organ media and the media commonly used in class. Students' explanations are then compared with observation notes to identify consistency between their reported responses and observed behaviors. Through this process, initial experiences can be understood not merely as interest in new technology, but also as part of students' adaptation to interactive visual learning.

2. Student Engagement and Interaction During Learning

Student engagement in learning with interactive 3D organ media can be examined through activities such as observing, asking questions, discussing, trying features, and responding to the material presented by the teacher. Interactive media provide opportunities for students to explore more actively than in lessons where they are merely recipients of information. In this study, student engagement is analyzed across behavioral, emotional, and cognitive dimensions so that learning experiences are not assessed solely based on visible activity.

Behavioral engagement is reflected in students' participation in following instructions, observing organ structures, and completing learning tasks. Emotional engagement can be identified through expressions of interest, comfort, or confusion while using the media, whereas cognitive engagement is observed through students' efforts to understand information, ask meaningful questions, and explain the relationship between organ parts and their functions. These three dimensions should be analyzed together because students who appear active in using the media may not necessarily be engaged in deeper thinking.

Social interaction is another aspect to consider when using interactive 3D organ media. Discussions between students and teachers can help clarify information that students do not yet understand, while exchanges of ideas among students may generate different explanations and perspectives on the objects being observed. Therefore, the learning process should be analyzed as an interaction among students, media, learning materials, and the learning environment.

3. Students' Understanding of the Material Through 3D Organ Visualization

Understanding the subject matter is one of the main aspects of exploring students' learning experiences through interactive 3D organ media. Three-dimensional visualization allows students to observe organ structures, shapes, and relationships among parts more comprehensively than two-dimensional representations. Through these activities, students have the opportunity to connect their existing knowledge with new information acquired during the learning process.

CONCLUSION

The conclusion should indicate the findings, strengths and weaknesses, and possible directions for future work. It should be written as a paragraph rather than in bullet points.

Interactive 3D Organ Media has the potential to provide fourth-grade students with a more concrete, visual, and exploratory learning experience when studying the human digestive system. The use of 3D games and 3D animated videos enables students to observe organ structures, identify their functions, and connect visual information with the learning material. These learning experiences encompass students' interest, engagement, interaction, and understanding, which need to be examined through observation, interviews, and documentation. The media's strength lies in its three-dimensional presentation of learning objects, while its limitations relate to students' readiness, device availability, and the need for teacher guidance. Therefore, the use of Interactive 3D Organ Media should be supported by appropriate learning strategies to make

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students' learning experiences more meaningful. Future research is recommended to examine students' learning experiences in a wider range of school contexts and to evaluate the media's contribution to conceptual understanding in greater depth.

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