

Research Article

Developing Interactive Biology Learning Media for Merdeka Curriculum To Enhance Knowledge Transfer In Junior High School

Romy Faisal Mustofa, R. Reza El Akbar*, Linda Herawati

Universitas Siliwangi, Jl. Siliwangi No. 24 Kahuripan, Tasikmalaya, Indonesia

*Corresponding Author: reza@unsil.ac.id | Phone: +62 811 212 202

ABSTRACT

In order to enhance the interest and motivation of Junior High School students, The goal of this study is to create interactive biology learning materials aligned with the Merdeka Curriculum. The learning media will be tested on Junior High School students using the MDLC (Multimedia Development Life Cycle) approach. During the testing phase, data will be collected through observation techniques and questionnaires. The research sample will be purposively selected from Junior High School students in the Tasikmalaya areas. Data analysis will involve descriptive and inferential statistics to examine significant differences assessing student's academic performance before and after implementing interactive learning tools. The objectives of this research are to develop interactive biology learning media based on the Kurikulum Merdeka that aligns with the characteristics of Junior High School students, enhance the interest and motivation of these students through the user of interactive biology learning media based on the Kurikulum Merdeka, assess the effectiveness of the media in improving students interest and motivation, and identify challenges along with their solutions in developing interactive biology learning media.

Keywords: Interactive Learning Media; Biology; Merdeka Curriculum Junior High School; MDLC

1. INTRODUCTION

The Merdeka Curriculum is the latest educational innovation introduced by the Ministry of Education and Culture of the Republic of Indonesia. It is designed to foster students' creativity and independent capabilities by providing deeper freedom and developing their learning interests. The Merdeka Curriculum requires learning to go beyond information transfer, emphasizing the need to stimulate students' learning interests through different and innovative learning approaches (Pertiwi et al., 2022).

In the digital era, the necessity for employing interactive learning resources is identified as a viable strategy to boost student's engagement and enthusiasm (Eva & Cholil, 2021). Biology education holds significance in the Merdeka Curriculum. However, many students face difficulties in understanding biological concepts and lack interest in learning biology (Azizah & Alberida, 2021). In this context, interactive biology learning media based on the Merdeka Curriculum are expected to enhance the effectiveness of biology education in junior high schools. It aims to develop students' abilities to comprehend biological concepts in a more enjoyable and interactive manner.

Earlier investigations have highlighted the positive impact of interactive learning materials can enhance students' interest and motivation. The utilization of interactive educational tools has the potential to enhance both motivation and academic achievements in the subject of biology (Nadzifah, Widodo, et al., 2022). The utilization of animation-based interactive learning media can enhance the interest and learning outcomes of students in the human nervous system topic (Hafzah et al., 2020). Therefore, this study aims to develop interactive biology learning media based on the Merdeka Curriculum to enhance the interest and motivation of junior high school students.

Learning media encompasses all tools or facilities used to aid the teaching and learning process, while interactive learning is a form of education that involves students actively and interactively in the learning process (Manurung, 2020). The Merdeka Curriculum, characterized by its flexibility, empowers schools to tailor content and teaching methods based on the student needs. Student interest and motivation are crucial factors in the learning process. Internal factors include cognitive abilities, interests, and attitudes toward learning, while external factors encompass the learning environment, teaching methods, and support from teachers and parents (Marisa, 2019). The research has four objectives, including:

- The creation of interactive instructional resources for biology aligned with the Merdeka Curriculum.
- Enhancing the interest and motivation of junior high school students through the use of interactive biology learning media based on the Merdeka Curriculum.
- Assessing the efficacy of incorporating interactive biology learning media based on the Merdeka Curriculum.
- Identifying challenges and solutions the creation of interactive learning materials rooted in the Merdeka Curriculum for junior high school students.

Interactive learning media has emerged as a solution to address the challenge of students' lack of enthusiasm for learning (Mirayani et al., 2022). However, the limited development of learning media based on the Merdeka Curriculum has hindered students from experiencing optimal learning (Mufti & Hastuti, 2023). Many biology teachers still face difficulties in implementing the Merdeka Curriculum, especially concerning assessment instruments (Festiyed et al., 2022)."

2. METHOD

The research methodology employed in this study is as follows:

1. Literature Review

This phase is conducted to gather information and knowledge related to the research topic.

2. Problem Identification

This phase involves identifying the problems to be investigated by analyzing the results of literature reviews and previous studies.

3. Determination of Research Objectives

This phase aims to establish the research objectives in line with the identified problems.

4. Determination of Research Sample

This phase is carried out to select the research sample based on predefined criteria.

5. Development of Learning Media

This phase involves developing interactive learning media based on the Merdeka Curriculum using the MDLC method.

6. Validation of Learning Media

This phase includes validating the interactive learning media developed by engaging experts in the fields of education and biology.

7. Testing of Learning Media

This stage is specifically designed to evaluate the efficacy of the newly developed interactive learning materials involving junior high school students as research subjects.

8. Data Analysis

This phase entails analyzing the collected data using appropriate statistical techniques based on the data type.

9. Interpretation of Research Results

This phase is conducted to interpret the research findings derived from the data analysis.

3. RESULTS AND DISCUSSION

Results and discussion encompass the outcomes of the conducted stages as follows.

1. Literature Review

In this literature review, detailed insights into the concepts of interactive learning, recent advancements in instructional media, and issues relevant to the Merdeka Curriculum are provided. A profound understanding of the literature assists in crafting a robust theoretical foundation. The literature serves as a strong theoretical basis for designing learning media that aligns with the needs of junior high school students.

2. Problem Identification

Problem identification involves analyzing the challenges and obstacles faced in biology education at the junior high school level. Problems are identified as the basis for formulating research objectives and designing relevant interactive learning media.

3. Determination of Research Objectives

The research objectives are clearly defined, involving the creation of interactive educational tools grounder in the Merdeka Curriculum, enhancing the interest and motivation of junior high school students, evaluating the effectiveness of learning media, and identifying potential constraints and solutions.

4. Determination of Research Sample

The sample selection is carried out through purposive sampling, focusing on junior high school students in Kota Tasikmalaya and Kabupaten Tasikmalaya. This selection considers specific characteristics relevant to the research context.

5. Development of Learning Media

The development of the 'Organisasi Kehidupan' biology learning media is executed using the Multimedia Development Life Cycle (MDLC) method, involving the following steps.

a) Concept

This stage results in the formulation of concepts for the created application, namely:

Table 1. Learning Media Concept

Title	Interactive Learning Media Application of Life Organization for 7 th Grade Junior High School Students
Audience	7 th Grade Junior High School Students
Duration	Unlimited
Image	Format *.png and *.jpg
Content	Learning objectives, materials, quiz

The purpose of developing this learning media is as an interactive learning tool for the topic of life organization. The benefits derived from the development of this application include addressing students' boredom during classroom learning activities, aiming to instill enthusiasm and motivation in students.

This learning media is intended for use by learners, especially 7th-grade students in junior high school, and teachers as facilitators. When using this learning media, students need guidance from the teacher as a guide and a source of information if they feel confused or curious.

b) Design

Designing the life organization learning media for 7th grade students includes the following stages.

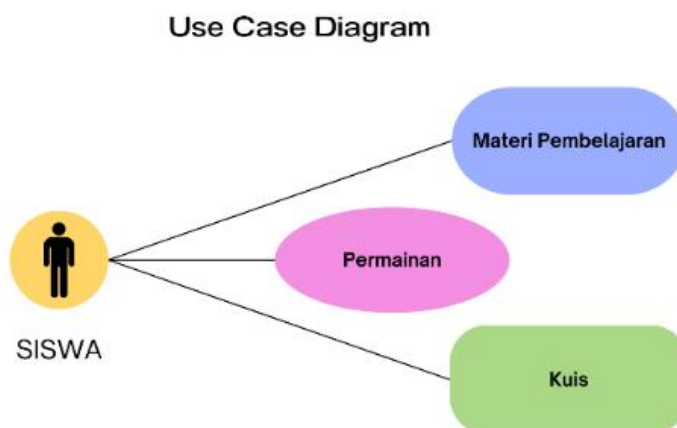


Figure 1. Use Case Diagram

The interaction is depicted in the user case diagram or dialogue between the system and the actor, involving the exchange of messages and actions performed by the system. The actor here is a 7th-grade junior high school student.

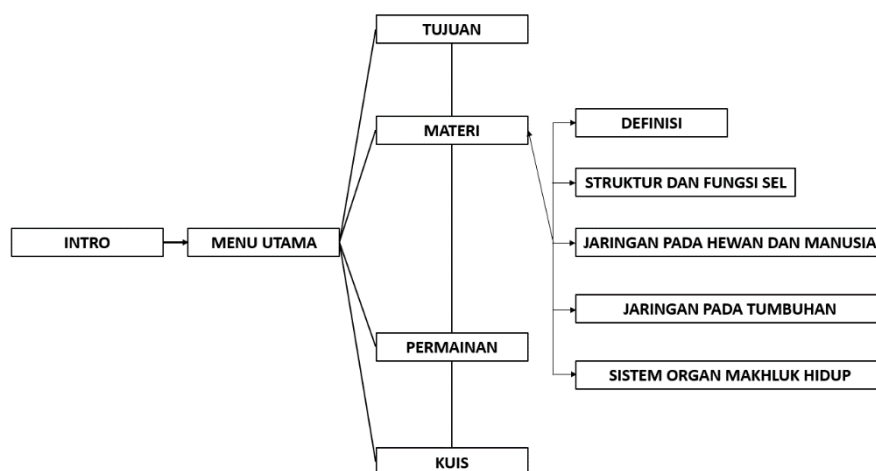


Figure 2. Navigation Structure

The application begins with the intro/loading phase. Once the intro is completed, it will enter the Menu. In the Menu, there are four sub-menus: Learning Objectives, Materials, Games, and Quiz. There are several materials in the application corresponding to their respective sub-chapters, such as Definitions, Structure and Function of Cells (covering cell membrane, protoplasm, and nucleus), Animal and Human Tissue (including Epithelial Tissue, Connective Tissue, Muscle Tissue, Nervous Tissue), Plant Tissue (covering Epidermal Tissue, Parenchyma Tissue, Conductive Tissue, Supporting Tissue), and the Organ System of Living Organisms (covering Organs, Organ Systems, and Organisms).

c) Material Collecting

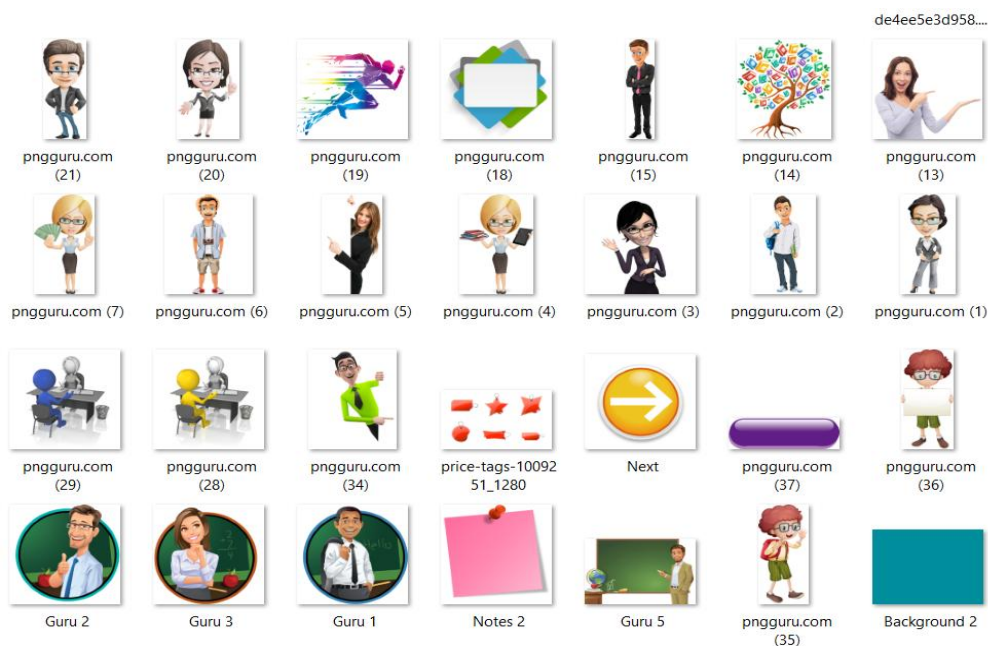


Figure 3. Material Collecting

In this stage, all necessary materials are being gathered. The following materials have been collected in accordance with the design stage. Primary information sources will be obtained from various scholarly references, textbooks, and learning materials relevant to the topics of biology and the Merdeka curriculum. Additionally, high-quality images, illustrations, and photos will be utilized to visualize the biology concepts to be taught.

d) Assembly

The creation process of the interactive learning media is carried out by combining existing materials. The application is developed using Macromedia Flash 8.

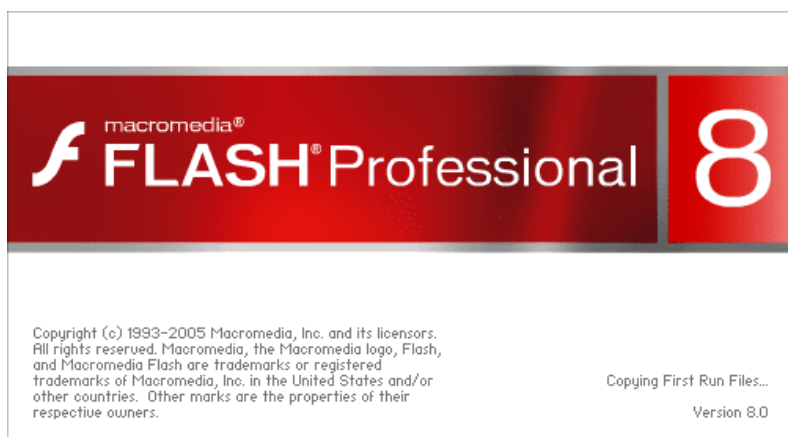


Figure 4. Macromedia Flash 8

The application creation is performed step by step for each scene, as in the introductory/loading scene below.

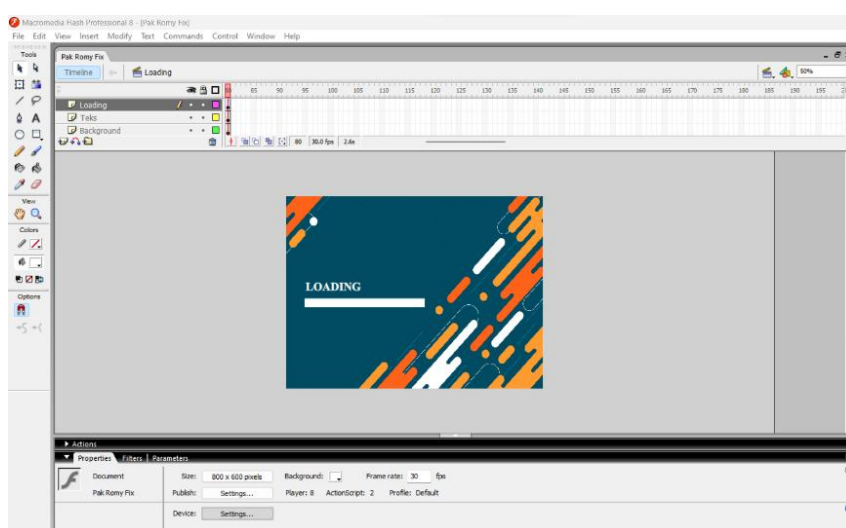


Figure 5. Intro / Loading Scene

After the introductory/loading scene has been designed for a certain duration of the process and appearance, it will proceed to the next scene, namely the Menu containing sub-menus.

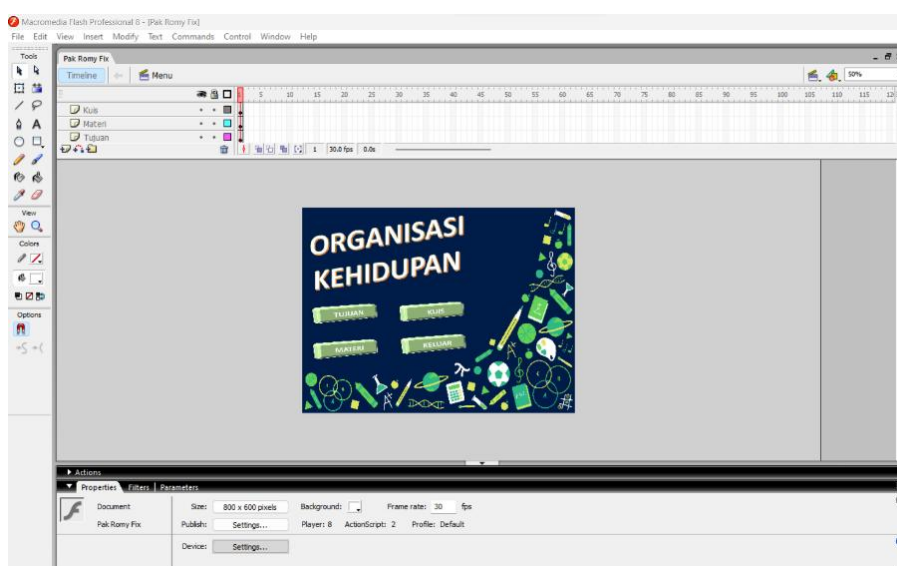


Figure 6. Menu Scene

When the user clicks on one menu, they will be directed to the next menus, following the previously explained navigation structure.

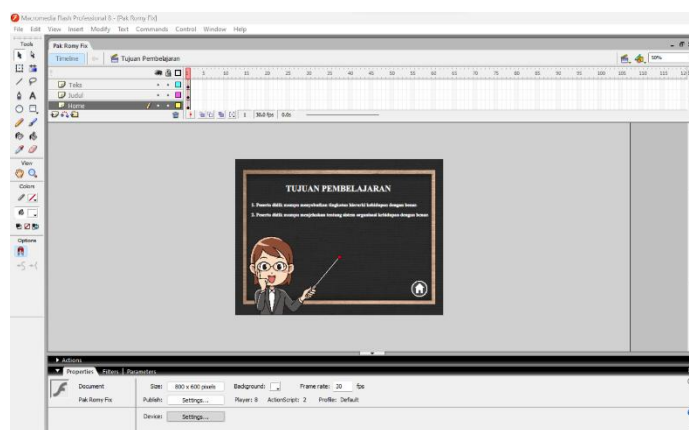


Figure 7. Learning Objectives

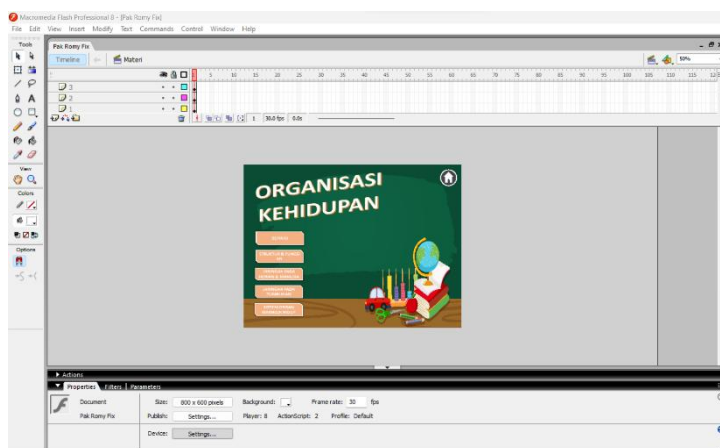


Figure 8. Content Scene

e) Testing

This stage is conducted after the assembly stage is completed. The purpose of testing the learning media is to identify any errors. The results of the testing based on the final testing scenarios conducted repeatedly can be seen in the following table.

Table 2. Testing Results

Aspect	Testing	Results
Images	Background Images	OK
	Button Images	OK
	Supporting Images	OK
Buttons	Home Button	OK
	Menu Button	OK
	Material Button	OK
	Objective Button	OK
	Quiz Button	OK
	Next Button	OK
	Back Button	OK

f) Distribution

This stage is the phase of storing the instructional media in a storage medium, such as the internal storage of a smartphone or a specific SD Card. The application is exported to obtain the .exe application format so that it is ready to be operated or published.

6. Validation of Learning Media

The instructional media undergoes validation by education experts and biology specialists to ensure its accuracy, alignment with the curriculum, and ease of understanding for students. The validation results are utilized for improvements and refinements to the instructional media.

7. Testing of Learning Media

The instructional media is tested using the System Usability Scale (SUS) method, aiming to measure the usability level of the instructional media. The SUS method employed is the one successfully developed by John Brooke in 1986, eliminating the need for further validity and reliability testing. The questionnaire consists of 10 statements, as follows:

- I believe I would prefer to continue utilizing this educational tool.
- I perceived the educational tool as overly intricate.
- I found the educational tool user-friendly.
- I required assistance from a technical expert to operate the educational tool.
- The different features in the educational tool seemed seamlessly integrated.
- I observed considerable irregularities in the educational tool.
- I would assume that the majority of individuals would quickly grasp how to use this educational tool.
- I experienced the educational tool as challenging to navigate, but I felt self-assured in using it.
- I needed to acquire a substantial amount of knowledge before effectively using the educational tool.

Each statement is rated on a scale from 1 to 5. The chosen sample consists of 30 individuals, with 15 students selected from each school. This trial aims to assess student responses, the effectiveness of the instructional media in delivering content, and gather feedback for further refinement. The results of the SUS trial are as follows.

Table 3. SUS Testing Results

R	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	S
1	4	3	3	4	4	3	3	3	3	4	50
2	4	2	4	2	4	2	5	2	4	2	77,5
3	4	2	5	4	4	2	4	2	4	2	72,5
4	5	1	5	2	5	1	5	1	5	4	90
5	4	2	3	4	4	2	4	2	4	4	62,5
6	5	1	5	5	5	1	5	1	5	2	87,5
7	5	2	5	3	5	2	5	2	5	2	85
8	4	2	5	2	4	2	4	2	5	4	75
9	5	1	5	4	5	1	5	1	5	4	85
10	4	3	4	3	4	2	4	2	4	4	65
11	4	2	4	4	4	2	4	2	4	4	65
12	3	2	4	3	4	2	4	2	4	4	65
13	4	2	5	3	5	2	4	1	5	3	80
14	5	2	5	2	5	2	5	2	5	5	80
15	5	2	5	4	5	2	5	2	5	4	77,5
16	5	2	5	3	5	2	4	2	5	4	77,5
17	4	2	4	4	4	2	4	2	4	4	65
18	4	2	4	4	4	2	4	2	4	4	65
19	4	2	4	3	4	2	4	2	4	4	67,5
20	4	3	4	3	3	2	4	3	4	3	62,5
21	5	2	5	3	5	2	5	2	5	3	82,5
22	4	3	3	4	3	3	4	2	3	4	52,5
23	5	2	4	3	4	2	4	2	4	4	70
24	4	2	4	4	4	2	4	3	4	4	62,5
25	4	2	4	2	5	2	5	2	5	4	77,5
26	5	2	4	3	5	2	4	2	5	4	75
27	4	2	4	4	5	3	4	2	4	4	65
28	3	2	4	4	4	2	4	2	4	3	65
29	5	2	5	2	5	2	5	2	5	2	87,5
30	3	3	3	3	4	2	4	1	3	4	60

The total score obtained is 2152.5. Subsequently, this score is divided by the number of respondents, which is 30 individuals. Therefore, the average score is 71.75.

8. Data Analysis

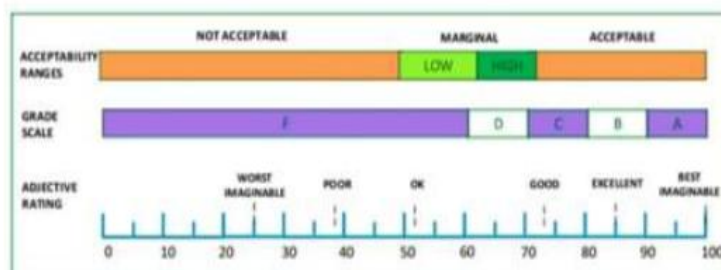


Figure 9. SUS Rating Scale

Based on the SUS rating scale, the average score of 71.75 falls into the "GOOD" category with a grade scale of "C," indicating that the interactive learning media about the organization of life is acceptable for students. The learning media is considered to be beneficial and helpful for users in achieving their set goals.

9. Interpretation of Research Results

The data interpretation involves drawing conclusions detailing the impact of interactive learning media regarding the engagement and enthusiasm of middle school students. These conclusions also explore the consequences of the results for development of education at the junior high school level.

4. CONCLUSION

With a System Usability Scale (SUS) score of 71.75, it can be inferred that the crafted interactive biology learning resources based on the Merdeka Curriculum has a fairly good level of usability. The above-average score indicates that users, in this case, junior high school students, perceive a relatively high level of satisfaction and ease in using the learning media. While further evaluation and deeper feedback could provide richer insights, these results offer positive indications regarding the success of developing interactive learning media in line with the research objectives. Thus, it can be anticipated that this learning media has the potential to effectively enhance the interest and motivation of junior high school students, as expected within the framework of the Merdeka Curriculum.

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