
DEVELOPMENT OF INTERACTIVE LEARNING MEDIA RANTAI NATURA ON FOOD CHAIN MATERIAL AT MI ASWAJA 1 TAMBAN KEDIRI REGENCY

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Abstract

Interactive learning media is needed to support an interactive and interesting learning process. However, in reality there are still many classroom learning methods that only use lecture methods, so that students feel bored and have difficulty understanding indirect materials such as food chains. This study aims to develop an interactive learning media Rantai Natura, determine its feasibility, and obtain responses from class V students of MI Aswaja 1 Tamban. This study uses the Research and Development (R&D) method with the ADDIE model. The results of the study show that the Rantai Natura media was successfully developed well and obtained a very feasible category, with a score of 86% from material experts and 90% from media experts. Student responses also showed very good results with a percentage of 85.50%. Thus, this media is suitable for use to support science learning on food chain material.

Keywords: *development, interaktif, learning, rantai natura, food chain material*

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1. Introduction

Education serves as the primary foundation for national development and the key to opening the gates to a brighter future. The urgency of education lies in its role in shaping national character, improving quality of life, and fostering a generation with robust integrity capable of navigating the challenges of the times [1]. Without education, social and economic progress would be difficult to achieve; therefore, education represents the best investment for a nation's sustainability and prosperity.

Advancements in information technology, particularly Android-based devices, have created significant opportunities in education. The proliferation of Android devices can certainly encourage students to utilize these operating systems in their daily lives. The widespread adoption of smartphones in Indonesia has had a major impact on daily routines; however, their use remains largely limited to social media. The utilization of smartphones for learning activities is still minimal, despite the fact that modern applications have made accessing information easier than ever. In today's digital-oriented era of education, teacher-centered instruction is considered less

effective. Teachers are expected to generate more creative ideas and utilize learning media to capture students' attention [2].

Students at the *Madrasah Ibtidaiyah* / MI (Islamic elementary school) level require Integrated Natural and Sosial Sciences (*IPAS*) instruction, as it plays a vital role in forming a fundamental understanding of natural and social phenomena [3]. The food chain material is a key concept that explains the integration of living organisms within an ecosystem. Understanding this concept is essential for students to grasp how energy cycles through ecosystems and why the natural order must be maintained. Consequently, the use of learning media is necessary to support the learning process. However, *IPAS* instruction at MI Aswaja 1 Tamban still faces various obstacles, particularly in presenting abstract material such as food chains. This is exacerbated by a lack of interactive learning media which should have stimulated student interest and the frequent reliance on conventional, unvaried teaching methods, leading to low and superficial comprehension of scientific concepts among students.

According to research conducted at SDN Sukamaju, the primary obstacles in *IPAS* instruction include limitations in learning resources, low learning enthusiasm, and a lack of parental involvement in the learning process. The integration of technology into learning media has been proven to boost student participation and motivation. This demonstrates a clear increase in learning motivation, which contributes to more engaging learning experiences for students [4]. Other relevant research, such as the study conducted at SDN Keras 1, Jombang Regency, developed Google Sites based interactive modules using a problem-based learning model for food chain material. This media demonstrated a high level of feasibility, with media, material, and language feasibility scores of 91%, 92%, and 95%, respectively. Furthermore, the use of this media significantly increased student enthusiasm and learning outcomes, indicating that the development of engaging interactive media has a positive impact on education [5].

Previous studies discussing the development of interactive educational materials have shown positive results in enhancing student understanding and motivation. Therefore, it is crucial to develop similar interactive learning media. Based on observations at MI Aswaja 1 Tamban, Kediri Regency, *IPAS* instruction specifically regarding food chain material still utilizes conventional methods. Students tend to be passive because learning is teacher-centered, relying heavily on lectures. This highlights the limited availability of interactive learning media at the school. While the development of interactive learning media for food chains has been widely studied previously, the gap addressed in this study lies in tailoring the development of interactive media to the specific characteristics and needs of the students at MI Aswaja 1 Tamban. The Rantai Natura media is developed by considering the background and local conditions of the students, making the material more relevant and easier to understand. Additionally, this media does not only focus on cognitive understanding but also emphasizes strengthening students' motivation, interest, and positive attitudes toward *IPAS*, which are aspects that have rarely received attention in previous studies.

The development of the Rantai Natura interactive learning media is expected to provide an innovative solution to the limitations in *IPAS* learning media and offer teachers an alternative to improve the quality of instruction. Furthermore, this media is expected to enable students to learn actively, rather than remaining passive recipients, thereby making the learning process more meaningful. Based on these conditions, this study is expected to make a tangible contribution to the creation of two way teaching tools, particularly in the realm of *IPAS* education within the madrasah environment. The core objective of this research is to design and evaluate the Rantai Natura interactive educational media as a tool for teaching food chain concepts in *IPAS*. This study also addresses the various challenges often encountered in unengaging and ineffective *IPAS* instruction, with the aim of fostering students' interest and critical thinking skills in learning about food chains.

2. Methodology

The research method employed in this study is Research and Development (R&D). The selection of the R&D method is intended to ensure that the researcher is not only capable of producing a product but also of testing its feasibility. The product development process begins with a needs analysis, while assessing its effectiveness requires testing to ensure that the product functions correctly and is acceptable to a wider audience.

In its implementation, the researcher utilizes the ADDIE development model (Analyze, Design, Development, Implementation, and Evaluation). The selection of this model is based on its highly systematic characteristics and logical flow, which facilitate the researcher's ability to manage and ensure product quality at each stage.

3. Results and Discussion

3.1 Development Process of the Rantai Natura Interactive Learning

3.1.1 Analyze

One of the important initial stages in the ADDIE method is the analysis stage. Developers need to understand the needs of the learners, learning objectives, and their characteristics. A thorough analysis will result in a clear understanding of the strategies, tactics, materials, and assessments that must be used [6]. Here are the analysis stages carried out by the researcher:

1) Curriculum Analysis

MI Aswaja 1 Tamban implements the Kurikulum Merdeka in its learning. The competencies to be achieved by students can be seen in the Learning Outcomes (*Capaian Pembelajaran / CP*). After understanding the CP to be used, the teacher designs the Learning Objective Flow (*Alur Tujuan Pembelajaran / ATP*) which breaks down the CP into Learning Objectives (*Tujuan Pembelajaran/TP*). In its achievement, the teacher only utilizes the learning media available to be used in learning the food chain material. The purpose of this curriculum analysis is used to identify the gap between formal curriculum provisions and the actual needs of learning.

2) Needs Analysis

Based on the results of observations and data collection in class V of MI Aswaja 1 Tamban, it was found that students need an update in the way they receive lesson materials. So far, the learning process is still dominated by the lecture method and the use of printed *LKS* (student worksheet) books which are one-way. This causes students to need to be stimulated so that they do not get bored quickly and are actively involved in learning, so that understanding of abstract concepts is maximized. In addition, the characteristics of students in this current generation are very close to digital devices. They show higher interest when learning involves visual elements, colors, and direct interaction. Therefore, a learning medium is needed that is not only able to convey information clearly but also provides a fun learning experience

3.1.2. Design

The next step after the analysis is carried out is followed by the planning or design stage, which is used to create learning media products. Based on field observations, taking notes, doing *LKS* book assignments, and using the lecture approach still dominate learning. The researcher was inspired by these findings to create an Android application-based learning media. The next design stage appears after the identification of problems at the research location and the development of learning media as a solution. During this stage, the researcher focuses on creating the final result. This design stage involves the following steps:

1) Formulating Material and Analyzing *CP*, *TP*, and *ATP* Components

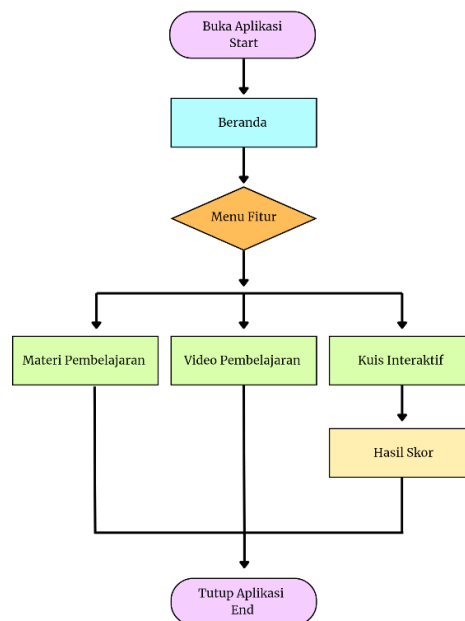
At this stage, the researcher identifies food chain material for class V in accordance with the curriculum applied by the madrasah, namely the Kurikulum Merdeka. Here are the *CP*, *TP*, and *ATP* components:

Table 1. *CP, TP*, and *ATP* Components

Components	Description
Learning Outcomes (CP)	Students identify the role of living things (producers, consumers, decomposers) in the ecosystem and compile simple food chains and food webs in the surrounding environment, including energy transfer and ecosystem balance.
Learning Objectives (TP)	1. Students can explain the concept of the food chain and the role of each level (consumers I, II, III). 2. Students can compile food chains from the surrounding environment (example: rice fields, forests). 3. Students can analyze food webs and the role of decomposers.
Learning Objective Flow (ATP)	The learning flow starts from the introduction of basic food chain concepts, followed by compiling food chains from surrounding environmental examples such as rice fields or forests, then analyzing food webs and energy pyramids, and ending with evaluation and reflection on ecosystem balance.

2) Flowchart Creation

The definition of a flowchart is a graphic instrument or chart used to describe the operational chronology of a program and connect the statements and processes within it. This chart uses certain symbols, this chart shows how one process is related to other processes in a program [7]. Here is the flowchart of the learning media development that was made:



Picture 1 Flowchart

From the description of the flowchart that has been displayed, the workflow of the Rantai Natura interactive learning media begins when the user runs the application, namely with the open application stage (start). After the system is successfully loaded, the user is directed to the home screen, which is the main view of the application before entering the core features. In the feature menu, users are free to choose one of the three features provided. The feature choices include learning materials, learning videos, and quizzes. After the quiz work is finished, the user can know the score obtained, and ends at the closing application stage (End).

3) Storyboard Creation

A storyboard is an idea illustration of the application to be developed, so that it can provide an overview of the application that will be produced. A storyboard is a series of images used to show the story flow or interactive media flow, such as an interactive web page[8] .

4) Compiling Teaching Modules

The teaching module is developed as a systematic guide that contains a collection of learning materials arranged according to the curriculum to achieve the competencies that have been determined [9]. In this study, the preparation of this module not only functions as an instructional guide in the classroom but also aims to integrate the use of learning media.

5) Creating Feasibility Test Instruments

To measure the quality and validity developed, the researcher compiled a feasibility instrument in the form of a questionnaire. The instrument is designed to collect data from three main points of view, namely by media experts, material experts, and users, namely students. The questionnaire contains in-depth statement items related to learning media.

3.1.3. Development

The development stage is the realization of the design that has been made into a tangible product. The main focus of this stage is to analyze users and determine the gap between the product being developed and existing products. At this stage, the resulting product is also validated or assessed by experts [10]. The media developed at this stage is in the form of an interactive android application, which is named Rantai Natura. This learning media was developed using Jagel App. Jagel App is an online platform that allows users to create android applications without needing coding. The suitability of the designed design pays attention to the needs based on field needs, namely in class V of MI Aswaja 1 Tamban. Here are the results of the learning media development that has been carried out as follows:

1) Application Home Feature



Picture 2 Application Home Appearance

The home view of the application is in the form of pictures of animals and plants that illustrate nature, this is in accordance with the name of the application which is named Rantai Natura, namely the word natura which comes from the word nature which has the meaning of natural condition or everything that is not man-made. This image was created using the help of Canva AI, after the image was downloaded, the image was uploaded to Google Drive. Afterward, the link was copied and then pasted into the Jagel App Application.

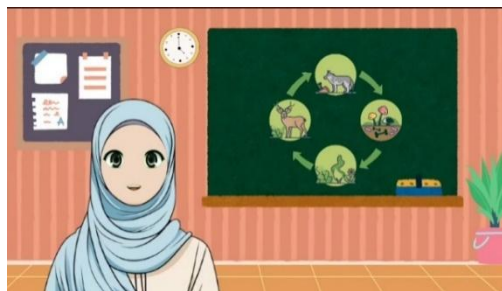
2) Learning Material Feature



Picture 3 Learning Material Appearance

Food chain material is presented visually and interactively, thereby increasing students' understanding of the concept of food chains between elements. The development process began with designing learning materials using the Canva application. Canva was chosen because it already has complete features such as providing elements used as food chain illustrations. The material was edited based on instructional design principles, including the selection of colors and fonts that are easy to read. After the design was finished, the material was exported in PDF format. The PDF file was then converted into a digital flip book using the Book Creator application, which allows the addition of advanced interactive features such as pages that can be flipped animatedly. Afterward, the finished flip book file was published for the public. After being published, the access link to the flip book was copied and then integrated into the Jagel App application as the main learning material feature. The flip book link is displayed as a direct button that opens the content in full-screen or embedded view mode.

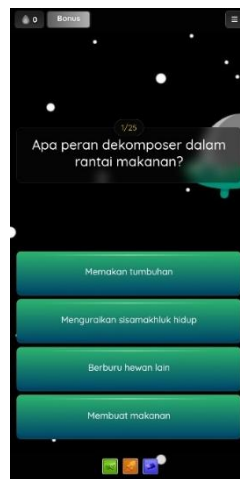
3) Learning Video Feature



Picture 4 Learning Video Appearance

In the development of the learning video feature, it was designed to convey the concept of the food chain dynamically through visual animation, narration, and illustration. The process began with creating a script for the voice over which was then converted into sound using TTSMaker, which is a text-to-speech tool and AI voice generator that changes text to sound. After the voice over was finished, video editing began by creating a video background, preparing animations, and supporting illustrations created using the Canva application. After everything was finished, all elements were overlaid, and added with voice over. After all elements were finished, the video was exported in MP4 format, then uploaded to Google Drive. The resulting Google Drive access link was then integrated into the Jagel App application through the Learning Video menu, where the link is displayed as a direct play button with embedded player mode, equipped with pause and playback speed features.

4) Quiz Feature



Picture 5 Quiz Apparance

The development of this learning media is enriched with an interactive quiz feature using the Quizizz website which is equipped with a visual and audio reaction system for correct/incorrect answers, specially designed to test the understanding of food chain concepts through responsive gamification that provides instant feedback to strengthen students' memory retention. After being published, the Quizizz link is integrated directly into the Jagel App application through the Quiz menu, where the access button opens the quiz in full-screen.

3.1.4. Implementation

The implementation of the Rantai Natura interactive learning media was carried out on February 2, 2026, this activity was held to assess the Rantai Natura teaching materials, which had been validated by validators and students, data were obtained from 16 respondents from the initial plan of 17 respondents. This reduction of one respondent occurred because of technical factors (student sick). The main focus at this stage is to see how the learning media is implemented and the students' response to the learning media. The large group field trial activity began with learning preparation, after greeting and apperception, the researcher gave trigger questions and brief material about the food chain material. Furthermore, students were directed to access the media through their respective smartphones. The use of media was carried out independently with the guidance of teachers and researchers. The use of media included the learning material menu, learning videos, and doing evaluation quizzes. Based on observation results, the implementation process of the learning media showed a positive response, students were very enthusiastic when doing the quiz, because the quiz used is interactive, namely by appearing feedback if the answer is correct or wrong. After the quiz work was finished, students were given a questionnaire to find out what their level of response was to the Rantai Natura learning media. The data that had been obtained were processed into data in the form of a feasibility percentage with the help of Microsoft Excel software.

The data obtained a score of 85.50% as proof that the product developed is very feasible and interesting to be used in IPAS learning for food chain material in class V of MI Aswaja 1 Tamban as the user subject. This high number of responses is inseparable from the success of the visual and interactivity aspects offered by the application. During the implementation stage, the researcher observed that students showed high enthusiasm when operating the Rantai Natura application. One of the main factors that triggered this positive response was the interactive quiz feature that provided feedback. This created a learning atmosphere that was challenging yet still fun, so that students felt actively involved in the learning process. This score achievement also proves that the design developed by the researcher through the Jagel App is quite simple and easy

to understand. Students can run the application without experiencing significant technical obstacles.

This response result of 85.50% confirms that the stimulus provided through the Rantai Natura media has succeeded in forming a strong relationship with the positive response of students. The use of colors, animations, and appropriate audio elements has successfully combined the students' varied learning styles.

3.1.4. Evaluation

The results of the evaluation of the product developed are discussed in the evaluation stage. Formative and summative assessments are two categories of evaluation in the ADDIE methodology. During the development process, formative assessment is used to evaluate product quality, and the findings are applied to make adjustments. Summative assessment is an assessment that includes pretest and posttest as learning tools, attempting to measure how well students have acquired the taught competencies. However, only formative evaluation was carried out in this study. This is consistent with the research objective, which is to assess the feasibility of the resulting media rather than measuring its effectiveness. In this study, the assessment step is related to changes made to the previous process, including suggestions given by validation experts to make the media better and more suitable to be used as learning material.

Based on validation from material experts, the Rantai Natura media obtained a feasibility percentage of 86% which is included in the very feasible category. The material feasibility assessment has been in accordance with the Learning Outcomes and Learning Objectives. Meanwhile, media expert validation provided a percentage of 90% which is included in the very feasible category, so that the media can be used in learning. The evaluation process was also carried out after a small group trial was carried out. In this case, a percentage value of 74% was produced which is included in the feasible category. Furthermore, at the implementation stage, the Rantai Natura media obtained a score of 85.50% with a very feasible category. This indicates that the learning media is able to increase students' interest and understanding.

The validator's suggestions and input were used as a basis for refining this media, such as suggestions from material experts to reduce sentences that are too descriptive and add roles to food chain components. And suggestions from media experts to improve the home screen display and the addition of illustrations. After revisions were made, the media was declared to meet the feasibility aspects and was ready to be used in the learning process.

3.2. Results of the Rantai Natura Interactive Learning Media Validation

3.2.1 Material Expert Validation Test

In development research, good and quality learning media must go through a validation process by experts. This is in line with the purpose of learning media validation, which aims to assess the feasibility of the developed product, to ensure that the media is appropriate and ready to be used in learning activities. Validation is carried out at the development stage, where the development stage emphasizes initial testing to reduce the risk of non-conformity at the implementation stage. A good media design in general must be able to motivate students and be easy to use technically, so as not to provide additional burden due to difficult operation[11]. Therefore, media expert assessment is carried out to ensure that this learning media has met aesthetic and functional standards. Based on the principles of such learning media, the learning media was then validated by a media expert. This validation aims to see the quality of the media from aesthetic and technical sides.

On January 27, 2026, media validation was carried out. The purpose of this media expert validation is to collect evaluations and suggestions through a questionnaire, which will later be used as input for changes to the educational media product created. This media validation

includes several aspects, namely, visual appearance aspect, multimedia aspect, navigation and interactivity aspect, and instructional clarity and technical compatibility aspect.

Table 2. Material Expert Validation Results

No	Assessment Indicator	Score	Max Score	P (%)
1	Food chain material is in accordance with the curriculum and reference sources	5	5	100%
2	Material content is correct and does not contain factual errors	4	5	80%
3	Material is arranged systematically and logically	4	5	80%
4	Presentation of material is interrelated and coherent	4	5	80%
5	Material supports the achievement of <i>IPAS</i> competencies	5	5	100%
6	Material is in accordance with Learning Objectives (<i>TP</i>) and Learning Outcomes (<i>CP</i>)	5	5	100%
7	Language of the material is easy to be understood by MI level students	4	5	80%
8	Language usage is in accordance with good and correct grammatical rules	4	5	80%
9	Terms and concepts are conveyed clearly and simply	4	5	80%
10	Sentences are well-structured and easy to be understood	4	5	80%
Total		43	50	86%

Based on the validation results table for the material on the learning media above, it obtained a score of 86%. If matched with the score feasibility criteria table, this score falls into the very feasible category. Suggestions for improvement by the material validator include reducing descriptive material and adding role images in the food chain. With the conclusion that the material on the learning media developed is feasible to be used or tested in the field after revisions are made.

3.2.2. Media Expert Validation Test

In development research, good and quality learning media must go through a validation process by experts. This is in line with the purpose of learning media validation, which aims to assess the feasibility of the developed product, to ensure that the media is appropriate and ready to be used in learning activities[12]. Validation is carried out at the development stage, where the development stage emphasizes initial testing to reduce the risk of non-conformity at the implementation stage. A good media design in general must be able to motivate students and be easy to use technically, so as not to provide additional burden due to difficult operation[13]. Therefore, media expert assessment is carried out to ensure that this learning media has met aesthetic and functional standards. Based on the principles of such learning media, the learning media was then validated by a media expert. This validation aims to see the quality of the media from aesthetic and technical sides.

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several aspects, namely, visual appearance aspect, multimedia aspect, navigation and interactivity aspect, and instructional clarity and technical compatibility aspect.

Table 3. Media Expert Validation Results

No	Assessment Indicator	Score	Max Score	P (%)
1	Suitability of colors with the theme and media purpose	4	5	80%
2	Consistency of font selection (type, size, and color)	5	5	100%
3	Neat and aesthetically pleasing layout of visual elements	4	5	80%
4	Clarity of sound (Narration) and smoothness of learning video playback	4	5	80%
5	Alignment between images, text, and audio in conveying information	5	5	100%
6	Ease of navigation between media sections	5	5	100%
7	Responsiveness of buttons and interactive features	4	5	80%
8	Simplicity of language that is easily understood by the user	5	5	100%
9	Compatibility of media with android devices	4	5	80%
10	Smoothness of media when run without technical disturbances	5	5	100%
Total		45	50	90%

Based on the learning media validation test table above, a score of 90% was produced, so it is in the very feasible group when compared to the criteria table. Suggestions from the media validator for improvements include adding illustration images, improving the home screen design, and reducing content that is too dense on one page. Following up on suggestions from the validator, the researcher made several improvements to the Rantai Natura media. The researcher reduced the amount of text on one page so that it was not too dense and easier to be understood. In addition, the researcher added illustration images in the food chain to clarify concepts and improved the home screen display design to be more attractive and interactive. In conclusion, with the necessary modifications, the teaching materials created are feasible to be used or tested in the field.

3.2.3. Small Group Field Trial

After going through the validation stage by experts, the next step in this research is to conduct a small group trial. This trial was conducted on 5 students who were taken randomly (random sampling) from grade V of MI Aswaja 1 Tamban. This sampling aims to obtain an initial picture regarding readability, ease of use, and the attractiveness of the learning media developed in the actual learning situation. Random sampling ensures that the data obtained is not biased towards students with a certain cognitive level, so the input obtained is more objective. Although conducted on a limited scale, the results of this trial provide very important data for the researcher.

Based on the data obtained, it shows that the students' response to the Rantai Natura interactive learning media shows a value of 74%. If referring to the score criteria, the value is in the feasible criteria. Sa'dun Akbar stated that if the validation level is more than 70%, the learning device is considered valid and can be used [14]. However, this still leaves room for improvement

(product refinement). The researcher views that the students' response in this small group field trial is input to improve the parts that are considered less than optimal. This is in line with the purpose of the small group field trial stage, which is to identify obstacles that were not detected at the expert validation stage and is an important aspect for the researcher to make product revisions before the large group trial is conducted. There is one thing that needs to be revised, namely the researcher needs to deactivate the restriction for students doing the quiz, because it will require students to log in before doing the quiz. So the researcher activated the default feature that allows students to be able to do the quiz without having to log in first.

4. Conclusion

The "Rantai Natura" interactive learning media to support IPAS learning in grade V at MI Aswaja 1 Tamban was developed by referring to the systematic ADDIE development model. The initial stage began with an analysis of the curriculum and the needs of students in grade V at MI Aswaja 1 Tamban, where it was found that the learning process was still dominated by conventional methods (lectures), so media innovation was needed to increase student engagement. In the design stage, the preparation of learning tools was carried out, including Learning Outcomes (CP), Learning Objectives (TP), and the Learning Objective Flow (ATP), as well as the design of flowcharts and storyboards as the operational framework of the application. Furthermore, in the development stage, the design was realized into a complete product. The feasibility of this product was validated by experts through a questionnaire with a score of 86% from the material expert and 90% from the media expert, so that overall it was declared "very feasible" based on the feasibility criteria table. It was then continued with a small group trial to identify and minimize technical obstacles that might arise in the field. After going through a series of improvements, the media was declared ready to be implemented in grade V at MI Aswaja 1 Tamban. In the implementation phase, the Rantai Natura media showed very positive results; students appeared to show high enthusiasm, especially when interacting with the quiz feature that provides direct feedback. This enthusiastic response was also confirmed empirically through questionnaire data showing a very high level of satisfaction with the use of the media. Finally, in the evaluation stage as the closing phase, based on the entire series of validation, improvement, and trial processes that have been carried out, it can be concluded that the Rantai Natura learning media is declared very feasible to be used as supporting media in learning activities by obtaining a score of 85.50% and is included in the very feasible category to be used in learning activities.

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