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Development of Interactive Learning Multimedia on Harmony Materials in the Ecosystem

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ABSTRACT

This research aims to develop interactive learning multimedia that is feasible and interesting. This research uses research and development (R&D) methods with research and development procedures using the ADDIE Model which consists of several stages, namely: Analyze, Design, Develop, Implement, and Evaluate. Then the sampling technique used was the saturated sampling technique, where the sample taken used all members of the population, namely 27 students. The model focuses on a systematic learning process. The products that have been designed, validated by subject matter experts with an average percentage of 95% with a very feasible category, validation by linguists with an average percentage of 85% with a very feasible category, validation by design experts with an average percentage of 95% with a very feasible category, and assessments from practitioners in the form of teacher response questionnaires to interactive learning multimedia developed by researchers get a percentage of 95% with the category very feasible, and the average percentage of student response questionnaires for the trial use is 95% with a very interesting category. Based on the description above, it can be concluded that feasibility is determined by the validation results from experts and practitioners as well as the attractiveness of student responses. Furthermore, this research on the development of interactive learning multimedia still focuses on the subject of harmony in ecosystems. Therefore, further research is expected to expand to other abstract and difficult-to-understand materials for students.

A. INTRODUCTION

Education in elementary school requires innovative learning media so that students are more interested in the material taught. The development of interactive learning multimedia is expected to be a solution to attract students' attention to learning, especially in harmony materials in the ecosystem. The development of interactive multimedia-based learning media requires compatible software, both in handling multimedia objects and in handling interactive. (Widiati et al., 2023)

Output of this study is interactive learning multimedia that can be used by teachers and students in the learning process, this is in line with previous research where interactive learning multimedia is an intermediary whose position has a role as a support for the success of an ongoing learning process. (Zega et al., 2022)

Education in elementary school requires innovative learning media so that students are more interested in the material taught. Educators can also create and design materials by creating learning media that can be given to students. In this way, learning will continue and students will not miss lessons (Rhamdan, 2023). The application of

interactive and interesting learning methods, one of which is by using learning media. The use of learning media can make it easier for students to understand lessons more easily and make lessons more interesting to learn. (Rhamdan et al., 2020)

The development of the digital world in the world of education also has a significant influence on the interaction patterns of teachers and students (Sapriyah, 2021). In general, learning media is anything that can channel information from information sources to information recipients. (Rhamdan et al., 2019) In the learning process, teachers still use very simple learning media in the form of powerpoints and learning videos directly from the internet without being accompanied by modifications. (Rhamdan, 2024)

Therefore, the development of systematically designed interactive learning multimedia is crucial to produce media that is not only suitable for use but also effective in increasing student engagement and understanding of the subject of harmony in ecosystems. Based on this description, this research is crucial because it seeks to produce interactive learning multimedia products that are valid, practical, and engaging for elementary school students, while also contributing to the development of more innovative science learning media. The results of this study are expected to provide alternative solutions for teachers in creating more engaging and interactive learning that can enhance students' understanding of ecosystem concepts in greater depth.

Sound slides can be created using a combination of various computer applications such as: *power point*, *camtasia*, and *windows movie maker* (Busyaeri et al., 2016). The use of technology in education is becoming increasingly popular as educational institutions strive to provide the best education for their students. (M. Sahib Saleh et al., 2023)

Multimedia is a media that involves several types of media and equipment in an integrated manner in a learning process or activity. Multimedia is the presentation of material using words and images. In the learning process, the presentation of material in the form of multimedia products provides opportunities for students to process information. This means that multimedia products provide an interactive channel for learners to understand the material in various aspects such as text, images, videos, audio and animation.

The use of video in interactive multimedia will provide a new experience. (Andari, 2019). Visualization with media, the material is packaged in a multimedia manner containing text, animation, sound, and video according to the demands of the material. (Pratika, 2021). The materials used are applicative, process, difficult to reach, dangerous if practiced directly, have a high level of accuracy Learning media can be described as media that contains information or instructional messages and can be used in the learning process. (Hasan et al., 2021)

The development of interactive learning multimedia is expected to be a solution to attract students' attention to learning, especially in harmony materials in the ecosystem, this is in line with previous research which stated that interactive learning multimedia is designed to help make it easier for students in the learning process, where in the learning process the materials delivered by teachers are supported by the reinforcement of images, sounds, videos, and animations contained in the multimedia to clarify material that is difficult for students to understand. Thus the learning material will become more interesting and easy to understand. (Geni et al., 2020)

Multimedia is a combination of various media (*file formats*) in the form of text, images (*vectors or bitmaps*), graphics, sound, animations, videos, interactions, and others that have been packaged into digital (computerized) files, used to convey or deliver messages to the public. (Pagarra, Syawaluddin, Krismanto, et al., 2022). In interactive learning multimedia there are interactive videos where students can interact while using the

media, according to interactive video is a form of learning media that allows users to actively engage with videos and take certain actions, such as clicking or tapping certain areas of the video to access additional content, answer questions, or choose a different story path. (Asari, 2023)

Most previous studies have focused on the general use of multimedia in learning or on multimedia development for various subjects without specific emphasis on ecosystem harmony materials in elementary school science learning. In many cases, the multimedia products developed are still limited to presenting learning content without integrating interactive features that actively involve students in exploring the relationships among ecosystem components. Moreover, some existing learning media are not specifically designed based on a systematic instructional design model that ensures the effectiveness of the learning process.

Therefore, this research offers novelty in several aspects. First, this study develops interactive learning multimedia specifically designed for harmony materials in the ecosystem for grade V elementary school students, which has not been widely explored in previous studies. Second, the multimedia product is developed using the ADDIE instructional design model, ensuring that the development process is conducted systematically through the stages of analysis, design, development, implementation, and evaluation. Third, the developed multimedia integrates interactive elements that allow students to actively engage with the learning content, such as exploration of ecosystem components, visual representation of ecological balance, and interactive learning activities that support conceptual understanding.

Through these innovations, the research is expected to contribute not only to the development of multimedia-based learning media but also to the improvement of science learning quality in elementary schools, particularly in helping students understand the concept of harmony in ecosystems in a more meaningful and engaging way.

B. METHODS

The research and development procedure uses the ADDIE Model which consists of several stages, namely: Analyze, Design, Develop, Implement, and Evaluate. This research and development procedure has the goal of developing products, seeing the feasibility of the product and seeing the attractiveness of the products that have been produced. This development research using the ADDIE model is presented in the following figure:

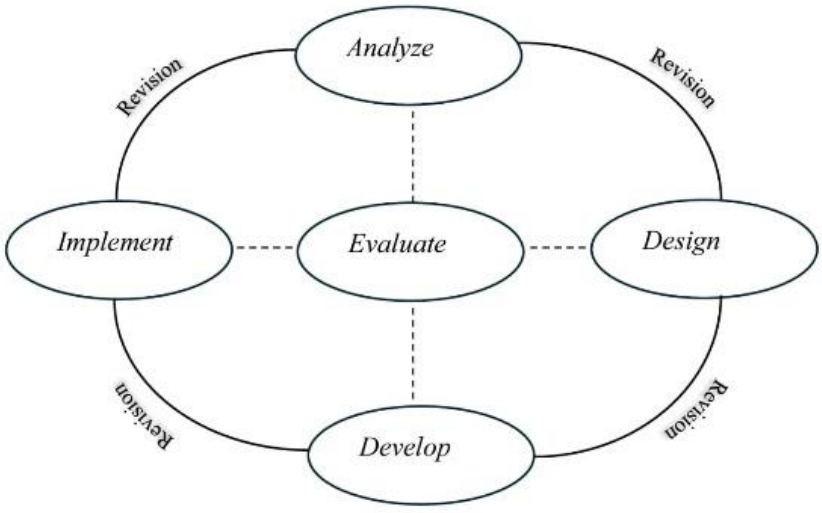

Figure 1. ADDIE Model Development Procedure Scheme
Sources: (Branch, 2009)

Then the sampling technique used was the saturated sampling technique, where the sample taken used all members of the population, namely 27 students in grade V of SD Muhammadiyah III Al Hilal Tarakan.

C. RESULTS AND DISCUSSION

1. Data Analysis Stage

The research conducted is a research and development of interactive learning multimedia on harmony materials in the ecosystem at SD Muhammadiyah III Al Hilal Tarakan, where the purpose of this research is in line with previous research, namely to determine the development and feasibility of interactive multimedia. In addition, to find out the feasibility of multimedia learning. The presentation of the results of data analysis is to explain the analysis of trial data on multimedia learning obtained from validation tests and student response questionnaires to find out the attractiveness of interactive learning multimedia. (Sarwendah, 2023)

There is a problem in the classroom, namely when the teacher explains the material on Harmony in the Ecosystem, students look bored, sleepy, there are also students who play alone and disturb their other friends, so they do not focus on learning, the learning process does not attract the attention of students. So with the problems mentioned above, learning media that attracts students' attention is needed. This is in line with previous research where at this stage, information gathering activities were carried out in the form of user needs analysis, learning material needs analysis, user hardware analysis, and software analysis.(Khairul Nisa & Syafril, 2023)

The data analysis technique is carried out using quantitative descriptive analysis techniques, namely by analyzing quantitative data obtained from test results. The data analysis technique uses scores obtained from the Likert scale. (Widyatmojo & Muhtadi, 2017). The attractiveness test was seen from the aspect of the questionnaire of student responses, the use trial was filled by twenty-seven students in grade V of SD Muhammadiyah III Al Hilal Tarakan. Filling out the questionnaire was carried out to find out the level of attractiveness of the interactive learning multimedia developed, in previous research this interactive learning multimedia as a learning support that can be used without space and time limitations and as a medium to further improve student understanding. (Muthahharah et al., 2022)

2. Design Stage

At this stage, the researcher designs or plans interactive learning multimedia. The design stage by the researcher is carried out by preparing learning objectives on harmony and ecosystem materials, designing learning multimedia design concepts, creating interactive learning multimedia frameworks, and establishing displays, images and sounds. The following is the part of the interactive learning multimedia display on harmony materials in the ecosystem:

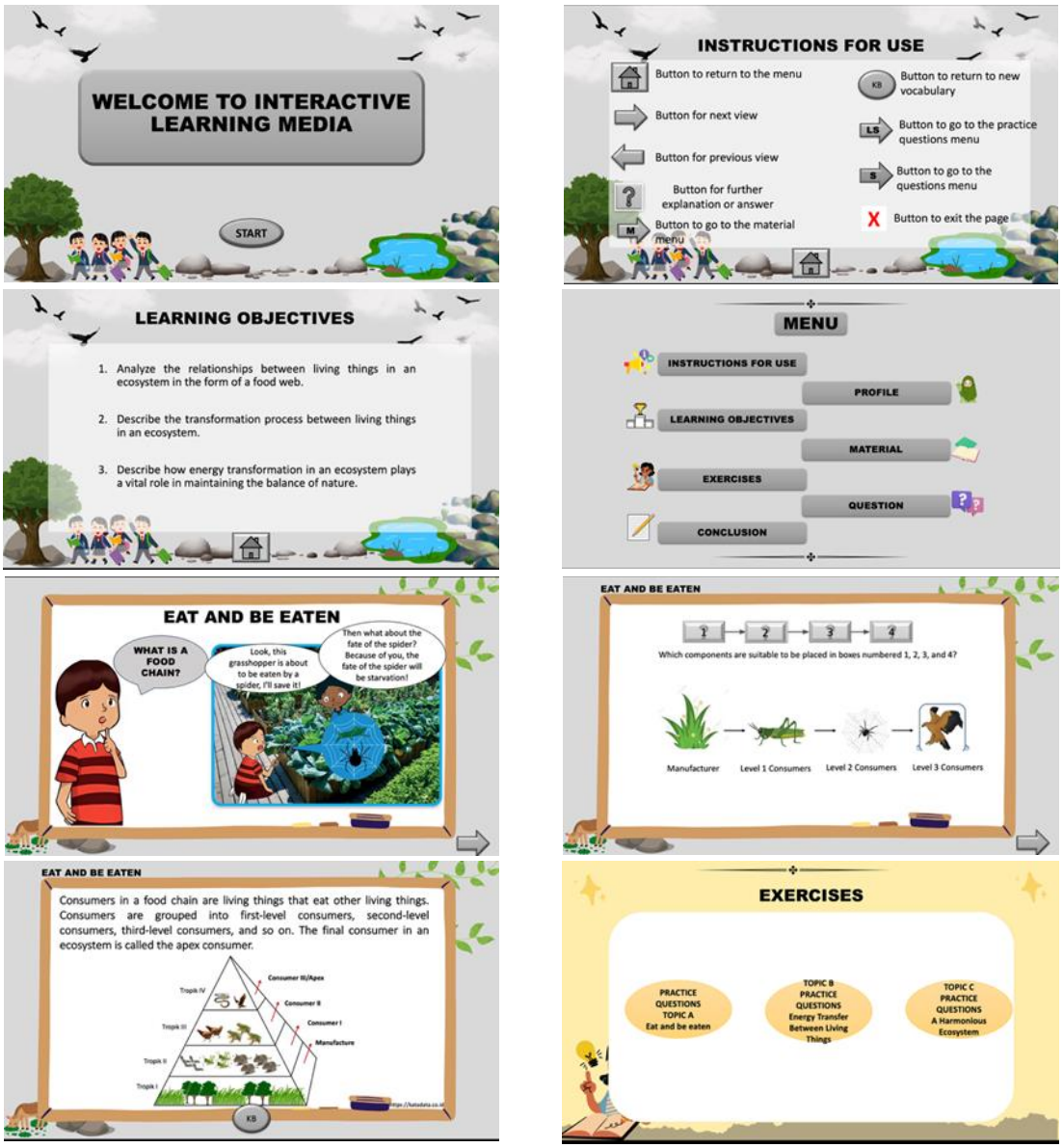

Figure 2. display on interactive learning multimedia

3. Development Stage

Before the product is tested, developed based on the validation results of experts or experts, product validation is carried out on media experts, and material experts. Validation of the Material Expert Test. In the aspect of assessing the suitability of materials with Basic Competencies in multimedia, interactive learning is carried out by material experts. The following is a presentation of the test data of material experts. (Anggraeni et al., 2021)

Table 1. Results of Material Expert Assessment on the Material Suitability aspect

No.	Indicator	Score	Percentage	Remarks
1.	Completeness of the material.	4	100%	Highly feasible
2.	Breadth of material	4	100%	Highly feasible
3.	Depth of material	4	100%	Highly feasible
	Achievement rate		100%	Highly deserving

The results of material expert assessment on the material suitability aspect in table 1 show an assessment with a percentage value of 100%, without any improvements regarding the material contained.

Table 2. Results of Material Expert Assessment on the Accuracy of Material Aspects

No.	Indicator	Score	Percentage	Remarks
1.	Accuracy of concepts and definitions.	4	100%	Highly feasible
2.	Accuracy of data and facts.	4	100%	Highly feasible
3.	Measurability of indicators of learning outcome achievement.	3	75%	Worthy
	Achievement rate		91%	Highly deserving

The results of the material expert assessment of the accuracy of the material aspects in Table 2 show an assessment with a percentage value of 91%, where improvements still need to be made in the Measurability of learning outcome achievement indicators.

Table 3. Results of Expert Assessment on the Aspect of Multimedia Presentation of Interactive Learning

No.	Indicator	Score	Percentage	Remarks
1.	Interactive learning multimedia is easy to use.	4	100%	Highly feasible
2.	Interactive learning multimedia forms a hands-on experience.	4	100%	Highly feasible
3.	Practice questions are easy to use.	4	100%	Highly feasible
4.	Encourage curiosity.	4	100%	Highly feasible
	Achievement rate		100%	Highly feasible

The results of expert assessment on the aspect of multimedia presentation of interactive learning in table 3 show an assessment with a percentage value of 100%, without any improvements regarding the material contained in the interactive learning multimedia.

The data obtained from the accuracy of the material, depth of the material, and presentation, when combined from the 10 indicators, obtained a percentage of 95% with the category of very feasible and can be piloted at the next stage.

Table 4. Analysis of Linguist Validation Results

No.	Indicator	Shoes	Percentage	Remarks
1	The language used is simple, and easy to understand.	4	100%	Highly feasible
2	Use enhanced spelling rules	4	100%	Highly Worth It
3	Using good and correct Indonesian rules.	4	100%	Highly Worth It
4	Use vocabulary that is easy to understand.	3	75%	Worthy
5	Use sentences that are easy to understand.	3	75%	Worthy
6	Use consistent words, terms and sentences.	3	75%	Worthy
7	The nature of the language used to communicate.	3	75%	Worthy

No.	Indicator	Shoes	Percentage	Remarks
8	The sentence used represents the content of the information you want to convey	3	75%	Worthy
9	The language used with the student's level of emotional maturity.	3	75%	Worthy
10	The language used evokes a sense of pleasure.	4	100%	Highly Worth It
	Average Presentation		85%	Highly Worth It

The results of the linguist validation analysis in table 4 show the assessment of linguists with a percentage value of 85%, with improvements in grammar and inconsistent sentences. So the researcher had to revise the grammar on the interactive learning multimedia that was developed.

Expert Design Test. In the aspect of design assessment. The following is a presentation of data and test results of design experts on the presentation of interactive learning multimedia that was developed. Test the design experts in the following table:

Table 5. Analysis of Design Expert Validation Results

No.	Indicator	Shoes	Percentage	Remarks
1	The appearance of *the cover page* is attractive.	2	50%	Quite feasible
2	*The cover layout* is in accordance with the subject matter.	4	100%	Highly Worth It
3	The type and size *of the font* used are readable.	4	100%	Highly Worth It
4	Color suitability on interactive learning multimedia.	4	100%	Highly Worth It
5	Display on interactive learning multimedia is organized.	4	100%	Highly Worth It
6	The multimedia appearance of interactive learning is interesting.	4	100%	Highly Worth It
7	The display on multimedia is clear.	4	100%	Highly Worth It
8	The appearance of harmonious layout elements has unity and consistency.	4	100%	Highly Worth It
9	The field of view and margin are proportional.	4	100%	Highly Worth It
10	The placement of background does not interfere with text and numbers.	4	100%	Highly Worth It
	Average Presentation		95%	Highly Worth It

Table 5 presents data by the assessment of design experts with a percentage of 95% categorized as very feasible. However, there is an improvement with the initial display, the researcher also had to revise the initial display on the interactive learning multimedia that was developed for testing.

Then the trial was also carried out by practitioners, following the results of the test results carried out by the teacher of grade V.

Table 6. Results of Analysis of Response of Grade V Elementary School Teachers

No	Indicator	Shoes	Percentage	Remarks
1	Interactive learning multimedia can achieve learning indicators.	4	100%	Highly feasible
2	Learning multimedia according to core competencies and basic competencies.	4	100%	Highly feasible
3	The language used is simple, straightforward, and easy to understand.	4	100%	Highly feasible
4	Learning multimedia according to the specified time allocation.	3	75%	Worthy
5	Interactive learning multimedia emphasizes the student's skill process.	4	100%	Highly feasible
6	The steps of learning activities on interactive learning multimedia are easy to understand.	4	100%	Highly feasible
7	Interactive learning multimedia is easy to implement.	4	100%	Highly feasible
8	Multimedia Design is an interesting interactive learning.	4	100%	Highly feasible
9	learning multimedia is easy to use.	4	100%	Highly feasible
10	The instrument questions are easy and practical.	3	75%	Worthy
	Average Presentation		95%	Highly feasible

Table 6 presents an assessment of the teacher's response questionnaire to interactive learning multimedia developed by the researcher and obtained a percentage value of 95% with the category of very feasible to be used at the next stage, namely the field trial without further revision.

4. Implementation Stage

At this stage, field trials were carried out to see the attractiveness of students. This is in line with previous research where in developing learning multimedia was declared successful as seen from interesting learning multimedia. The results of the field trial for attractiveness were obtained from 27 students explained as follows (Rofiq et al., 2019)

Table 7. Results of Student Response Questionnaire Field Trials

No	Aspects	Max Score	Total Score	Percentage	Remarks
1	Is learning multimedia interesting?	54	52	96%	Very Interesting
2	Do you find it easy to use multimedia?	54	52	96%	Very Interesting
3	Do you like learning to use multimedia?	54	51	94%	Very Interesting
4	Do you want to learn how to use multimedia frequently?	54	51	94%	Very Interesting
5	Do you like to work on problems using multimedia?	54	51	94%	Very Interesting
	Average	54	51,4	95%	Very Interesting

Based on table 7, it shows that the average percentage of student response questionnaires for the trial use is 95% with a very interesting category. This is in line with the results of previous research where the use of multimedia in learning is more

able to attract the attention of students so that it is easier to understand the material. (Dwiqi et al., 2020)

5. Evaluation

Evaluation is carried out based on the results of validation by material experts, linguists, design experts, practitioners, and use trials. Where this is in line with the evaluation stage in the previous research, namely the final revision of media validation, material experts, education practitioners, and student respondents to interactive multimedia learning media. After evaluation, suggestions and comments from experts there are several suggestions to improve the interactive learning multimedia that has been developed. (Oktafiani et al., 2020)

D. CONCLUSIONS AND SUGGESTIONS

Based on the results of validation by experts. The product that has been designed, the results of the validation of material experts with an average percentage of 95% with the very feasible category, validation by linguists with an average percentage of 85% with the very feasible category, the validation of design experts with an average percentage of 95% with the very feasible category, and the assessment of practitioners with an average percentage of 95% with the very feasible category, as well as the average percentage of the student response questionnaire for the trial of the use trial of 95% with the category of very interesting. Based on the description above, it can be concluded that feasibility is determined by the results of validation by experts and practitioners and the attractiveness of the results of student responses. Then the research on the development of multimedia interactive learning is still focusing on harmony material in the ecosystem, so it is hoped that for further research, it can develop on other materials that are abstract and difficult to understand by students.

CONFESSION

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