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Development of Interactive Multimedia Based on Contextual Approaches on Natural Resource Conservation Materials

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Abstrak

Penelitian pengembangan ini dilaksanakan karena media yang digunakan oleh guru kurang komunikatif, menarik dan bervariatif, sehingga menjadikan siswa mudah bosan dan jenuh. Tujuan pengembangan untuk menciptakan multimedia interaktif berbasis pendekatan kontekstual pada materi pelestarian sumber daya alam muatan pelajaran IPA. Penelitian ini menggunakan model ADDIE. Subjek penelitian meliputi ahli isi pembelajaran, ahli desain pembelajaran, ahli media pembelajaran dan 12 siswa. Metode pengumpulan data menggunakan kuesioner. Analisis data menggunakan teknik analisis data deskriptif kuantitatif. Hasil review ahli isi pembelajaran menunjukkan kualifikasi sangat baik (100%), Hasil review ahli desain pembelajaran menunjukkan kualifikasi baik (88,63%). Hasil review ahli media pembelajaran menunjukkan kualifikasi sangat baik (91,25%). Hasil uji coba perorangan menunjukkan kualifikasi sangat baik (79,1%), dan hasil uji coba kelompok kecil menunjukkan kualifikasi sangat baik (87,2%). Jadi multimedia interaktif layak digunakan dalam pembelajaran IPA di kelas IV SD. Implikasi dari penelitian ini yaitu penggunaan multimedia interaktif mampu menjadikan siswa tidak mudah bosan dan jenuh.

Kata kunci: *Multimedia Interaktif, IPA, Kontekstual*

Abstract

This development study was carried out because the media used by the teacher was less communicative, interesting and varied, thus making students easily bored and bored. The development goal is to create interactive multimedia based on a contextual approach to natural resource conservation material for science lessons. This study uses the ADDIE model. The research subjects included learning content experts, learning design experts, learning media experts and 12 students. Methods of data collection using a questionnaire. Data analysis used descriptive quantitative data analysis techniques. Results review learning content experts show very good qualifications, Results review learning design experts showed good qualifications. Results review learning media experts showed very good qualifications. The results of individual trials showed very good qualifications, and the results of small group trials showed very good qualifications. So interactive multimedia is suitable for use in science learning in fourth grade primary school. The implication of this research is that the use of interactive multimedia can make students not easily bored and bored.

Keywords: Interactive Multimedia, Science, Contextual

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1. INTRODUCTION

Current technological developments have a significant influence in every aspect of life, including in the world of education, especially the learning process, one of which is the use of technology in supporting the learning process, namely learning media (Rasvani & Wulandari, 2021; Saini & Salim Al-Mamri, 2019). The use of learning media to support the learning process in elementary schools is important to do and needs special attention from the teacher, this is because the level of understanding of students in elementary schools is still limited in understanding abstract material, so most students will find it difficult to understand the material if not supported by the use of learning media (Hamidani et al., 2022; Qistina et al., 2019; Saputra & Musafanah, 2017). There are various types of learning media that can be used to support the learning process, namely visual media, audio, audio visual, and multimedia (Handayani et al., 2017; Novita & Novianty, 2020; Pattemore & Muñoz, 2020). One of the media that contains a combination of various types of media is multimedia.

Multimedia is a combination of several elements such as text, sound, images, videos and animations that are presented to users in order to obtain information more easily (Mair & YuniKartika, 2021).

The use of multimedia in the learning process is currently relevant to the rapid development of science and technology which has become a demand for teachers and students (Fauyan, 2019; Heo & Toomey, 2020). This is because multimedia material is packaged by combining several elements so as to encourage student curiosity and help students understand teaching and learning materials. can increase students' learning motivation (Kurniawan et al., 2019; Sagita et al., 2021). One of the multimedia types of learning media is interactive multimedia. Interactive multimedia is a combination of several types of media that have interactive functions in learning because it involves two-way communication between users (*users*) who can interact with *software*/applications (Wilsa, 2019). The use of interactive multimedia in the learning process makes students required to be active in responding to the material or questions presented and interactive multimedia will respond back to students so that they can interact with each other (Mukhtar et al., 2022).

Learning carried out in schools currently refers to the 2013 curriculum. In accordance with the 2013 curriculum, learning especially in elementary schools is carried out using integrated or integrated thematics. Thematic learning is a learning activity that integrates material from several subjects into one theme or topic of discussion (Ananda & Fadhilaturrahmi, 2018; Sari et al., 2021). One of the lesson content that is integrated into thematic learning is science. Science is a science that studies nature and its contents (Dhaniawaty et al., 2021; Nixon et al., 2019). The concepts learned in the content of science lessons are related to everyday life, especially to see the phenomena that occur in the natural surroundings. In this regard, an innovation is needed in carrying out learning, especially in the content of science lessons so that what is learned by students can be linked to real-world situations, so that learning becomes more meaningful. One way that can be done is by implementing science learning using a contextual approach. The contextual approach is a learning approach that helps teachers relate the material being taught to students' real-world situations, and strives for students to build relationships or linkages between their knowledge and its application in everyday life (Masalubu, 2018; Suryawati & Osman, 2018; Tapingkae et al., 2020; Yustina et al., 2021). Therefore, it can be said that learning with a contextual approach will be student-centered, while the teacher acts as a motivator and facilitator for students in learning.

Based on the results of interviews conducted with homeroom teacher for grade IV at SD Negeri 9 Padangsambian Denpasar which was conducted on September 27, 2021, it is known that teachers still find it difficult to innovate in developing a learning media that can make it easier for students to understand the material being taught because the teacher not too familiar with technology that is developing so rapidly. To obtain more accurate information, after the interview was conducted, it was continued with observation activities. The results obtained are that the teacher's strategy in teaching does not arouse students' interest in learning, it can be seen from the learning media used by the teacher is less varied and monotonous, namely in the form of learning videos taken from *YouTube* only. This will have an impact on students who quickly feel bored and bored, because the learning media used by teachers are also less communicative.

The learning process is expected to be able to create an effective learning atmosphere and make students active, supported by the use of varied learning media, in fact what is happening today is that the learning process is carried out using monotonous learning media. Less varied learning media tend to make students bored and bored (Lubis & Hidayat, 2021; Widyatmojo & Muhtadi, 2017). Therefore we need a variety of learning media, interesting, fun to help students learn independently, according to the characteristics and needs of

students. The appropriate learning media is interactive multimedia. Interactive multimedia is a media consisting of a combination of several media such as text, graphics, images, audio, video and animation equipped with control devices (Anggreni et al., 2021; Putra & Negara, 2021). Interactive multimedia can help students more easily understand teaching materials. This is relevant to the opinion that interactive multimedia can improve user understanding so that getting information also becomes easier (Dewi et al., 2018; Moniaga et al., 2019; Yuniarni et al., 2020).

This development research is relevant to previous research which states that interactive multimedia is feasible to be used in the learning process seen from the results of expert validation and testing of interactive multimedia products which are in very good qualifications (Dwiqi et al., 2020; Geni et al., 2020; Prasetyo et al., 2021). This study aims to develop learning media in the form of interactive multimedia by describing the design and knowing the validity of the developed media. The importance of carrying out this research is because students can more easily understand teaching materials and are not easily bored and bored when studying if they are assisted by using communicative, interesting, and varied media. With the development of this interactive multimedia, the objectives of learning science, especially on natural resource conservation materials, can be achieved properly.

2. METHODS

Type of research carried out is research and development or *Research and Development* (*R&D*). The development research carried out refers to the ADDIE model which consists of five stages, namely, *analyze, design, development, implementation,* and *evaluation* (Tegeh, 2014). The ADDIE development model was chosen because the evaluation will be carried out at each stage of the development activity. This will have a good impact on the quality of a product being developed. By doing an evaluation at each stage of development, deficiencies or errors in the product development process up to the final stage can be minimized. The subjects in this development research are one learning content expert, one learning design expert, one learning media expert, three students as individual test subjects, and nine students as small group test subjects.

The data collection method used in this development research is the questionnaire method. The questionnaire method or questionnaire is a method used to collect data by sending a list of questions or it can also be in the form of statements to respondents or research subjects to be answered in writing. This questionnaire or questionnaire is used to collect data on the validity of media products from experts, and product validity (readability) by test subjects (users/students). The instrument grids for learning content experts, instructional design experts, instructional media experts, individual trials, and small group trials are presented in Tables 1, 2, and 3.

Table 1. Grid of Learning Content Expert Instruments

No.	Aspect	Indicator
1	Curriculum	a. Basic Competency
		b. Indicator
		c. Learning Objectives
2	Material	a. Clarity of presentation of material
		b. Understanding of material
		c. Interesting of material
		d. Importance of material
		e. Depth of material

No.	Aspect	Indicator
		f. Material supported by appropriate media
		g. Compatibility of material with students' real life
3	Grammar	a. Use of clear and appropriate
		b. Language compatibility with student characteristics

Table 2. Grid of Learning Design Expert Instruments

No.	Aspect	Indicator
1	Objectives	a. Clarity of learning
		b. Objectives Conformity of learning objectives with the material
2	Strategy	a. Delivery of material
		b. Giving examples
3	Evaluation	a. Presentation of questions
		b. Instructions
		c. For giving feedback

Table 3. Grid of Learning Media Expert Instruments

No.	Aspect	Indicator
1	Text	a. Readability (text clarity) Text
		b. Presentation Text
		c. Size and type
2	Image	a. Layout Image
	Image	b. Quality
		c. Use of images that support understanding of the material
3	Video	a. Quality of video
		b. Use of video that supports understanding of material
4	Animation	a. Quality of animation
		b. Interesting animation
5	Audio	a. Audio clarity
		b. Appropriateness of use audio and narration
6	Color	a. Composition and color combinations that are right and match
		b. Color clarity
7	Operation	a. Instructions for use of multimedia
		b. Ease of use of multimedia

Table 4. Grid of Individual and Small Group Trial Instruments

No.	Aspect	Indicator
1	Learning	a. Increase students' learning motivation
		b. Provide relevant examples in presenting material
		c. Provide interactive learning activities
2	Material	a. Understanding material
		b. Usefulness of the material in students' real life
		c. Difficulty level of questions
3	Media	a. Ease of use of media

No.	Aspect	Indicator
		b. Display c. Ease of understanding the instructions for using the d. Media used to help understanding the material

The data analysis technique used in this development research is a quantitative descriptive analysis technique. Quantitative descriptive analysis method is a way to analyze or process data by systematically compiling in the form of numbers or percentages, regarding an object under study, in order to obtain general conclusions. In this development research, quantitative descriptive analysis was conducted to process the data obtained through a questionnaire in the form of scores. In order to determine the validity of interactive multimedia, a measurement scale of 4 (*Likert*) was used, namely a score of 4 with a statement Strongly Agree (SS), a score of 3 with a statement Agree (S), a score of 2 with a statement Disagree (TS), and score 1 with a statement Strongly Disagree (STS) (Sugiyono, 2017). To be able to give meaning and make decisions are presented in Table 5.

Table 5. Conversion of Achievement Levels with a Scale of 5

Achievement Levels (%)	Qualifications	Description
90-100	Very good	No need for revision
75-89	Good	Revised as necessary
65-74	Sufficiently	heavily
0-54	Totally	revised
55-64	Very Less	revised

(Tegeh, 2014).

3. RESULTS AND DISCUSSION

Results

Development of interactive multimedia refers to the ADDIE model which consists of five stages, namely, *analyze*, *design*, *development*, *implementation,* and *evaluation* (Tegeh, 2014). The first stage carried out in this development research is Analysis *(Analyze).* In the analysis phase, the first is an analysis of the needs of students and teachers through interviews and observations. At this stage it was found that during the learning process the teacher only used learning media in the form of PPT and videos taken from *YouTube* and only used thematic books. Furthermore, an analysis of student characteristics was also carried out, at this stage it was found that the characteristics of each student were different, there were students who were fast in understanding the material and there were also those who were still slow in understanding the material. After that, a material analysis was carried out to find out which material was suitable for making media. Based on the material analysis, it was found that the appropriate material content is the material for the preservation of natural resources. The last stage carried out is conducting a competency analysis to find out what competencies must be mastered by students after using the developed product. Basic Competencies and Indicators on the themes used in Table 6.

The second stage is the design stage, at this stage the preparation of *software* and *hardware* that will be used to develop interactive multimedia is carried out. The main software used is *Articulate Storyline* 3, while the software used to help is *Adobe Illustrator CC* 2018, *Animaker*, and *Video Scribe*.is also prepared *hardware* such as a laptop that is used

to operate *software* used. Next step is making media design in the form of *storyboards* and *flowcharts* to make it easier to design the appearance and layout of the content that will be used in interactive multimedia. After the design is made, then the material will be presented using interactive multimedia. After that, the next activity is to make a product assessment instrument in the form of a questionnaire/questionnaire that will be used to assess the feasibility of interactive multimedia. The instrument in the form of an assessment questionnaire/questionnaire is used to validate the product in the form of interactive multimedia in accordance with the aspects that will be assessed from the media. Finally, the preparation of a learning implementation plan (RPP) was carried out. The Learning Implementation Plan (RPP) is prepared in accordance with the components that make up the RPP.

Table 6. Basic Competencies and Indicators

Competency	Indicators
(1)	(2)
3.8 Explaining the importance of balancing and preserving natural resources in the environment	3.8.1 Identifying types of natural resources in the environment 3.8.2 Analyzing the importance of efforts to conserve natural resources in the environment 3.8.3 Linking efforts to conserve natural resources Nature with environmental quality 3.8.4 Summarizing the objectives of efforts to conserve natural resources in the environment 3.8.5 Determine examples of efforts to conserve natural resources in the environment

The third stage is the development stage, at this stage the products that have been designed in the previous stage will be realized into a complete media. At this development stage, the product components are made first, such as making learning material videos using *Video Scribe*, making animated videos using *Animaker*, making *backgrounds* using *Adobe Illustrator CC 2018*, and so on. After all the components are finished, the next step is to manufacture the product. After the product has been developed, validation activities for interactive multimedia products based on a contextual approach are carried out using a questionnaire/questionnaire by learning content experts, learning design experts and learning media experts to determine the validity of the products that have been developed. After validation by experts on the product developed, then individual trials, small group trials, and field trials on students are carried out to find out how students respond to the products developed, and it can be seen whether there are obstacles in using the product so that it can be done. repair. Product trials are carried out by giving questionnaires to students to be filled in according to the assessed aspects.

The fourth stage is the implementation stage, at this stage the product is in the form of interactive multimedia that has been validated and then applied to the learning process. However, in this study it could not be carried out due to limited conditions in the field. The fifth stage is the evaluation stage, at this stage evaluation activities are carried out through formative evaluation. Formative evaluation is carried out in order to find out and correct the deficiencies that still exist in the developed product. Formative evaluation is carried out through *a review* of experts, namely learning content experts, learning design experts, and learning media experts as well as product trials on students, namely individual trials and small group trials, so that the shortcomings of the products developed are known and then

made improvements. The results of the validity of interactive multimedia obtained from the results of the *review* of learning content experts, learning design experts, and learning media experts as well as those obtained from individual and small group trials can be presented in Table 7.

Table 7. Product Validity Test Results

No.	Test Subject	Validity Results (%)	Information
1.	Learning Content Expert Test	100	Very Good
2.	Learning Design Expert Test	88.63	Good
3.	Learning Media Expert Test	91.25	Very Good
4	Individual Trial	79.1	Good
5	Trial Small Group	87.2	Good

In accordance with the results obtained during *review*, then these results are converted to a conversion table for the level of achievement on a scale of 5. The percentage of achievement level of learning content expert results is 100% in very good qualification. In accordance with the results obtained during *review*, then these results are converted to a conversion table for the level of achievement on a scale of 5. The percentage of the learning design expert's achievement level is 88.63% which is in good qualification. In accordance with the results obtained during the review of learning media experts, then these results are converted to a conversion table for the level of achievement on a scale of 5. The percentage of achievement levels of learning media experts is 91.25% which is in very good qualification. In accordance with the results obtained in individual trials, then these results are converted to a conversion table for the level of achievement on a scale of 5. The percentage of achievement level of learning content expert results is 79.1% which is in good qualification. In accordance with the results obtained in the small group trial, then these results are converted to a conversion table for the level of achievement on a scale of 5. The percentage of achievement level of learning content expert results is 87.2% which is in good qualification.

Based on the results obtained, it can be concluded that interactive multimedia is feasible to be used in the learning process. The inputs given by learning content experts, learning design experts, and learning media experts are used as a reference for improving the products developed. The comments and suggestions on interactive multimedia products from learning content experts are continued so that the improvements made are continuing to use the material content as previously presented. Furthermore, comments and suggestions from learning design experts are adding learning instructions, about being replaced with profiles, the layout of instructions being improved so that improvements made are adding learning instructions containing student steps in learning using interactive multimedia, Renaming the "about" menu become a "profile" and add the profiles of supervisor 1 and supervisor 2, as well as improve the layout of the instructions that were originally below to be placed at the top of the main menu. Then, comments and suggestions from learning media experts are to checkthe *minimize and maximize* for the level of media interactivity so that the improvements made are to check the *minimize and maximize* for the level of media interactivity. The size of the media used is 16:9 so that students can freely use the media when in *landscape* on *cellphone.* The results of developing interactive multimedia in this development research are presented in Figure 1.

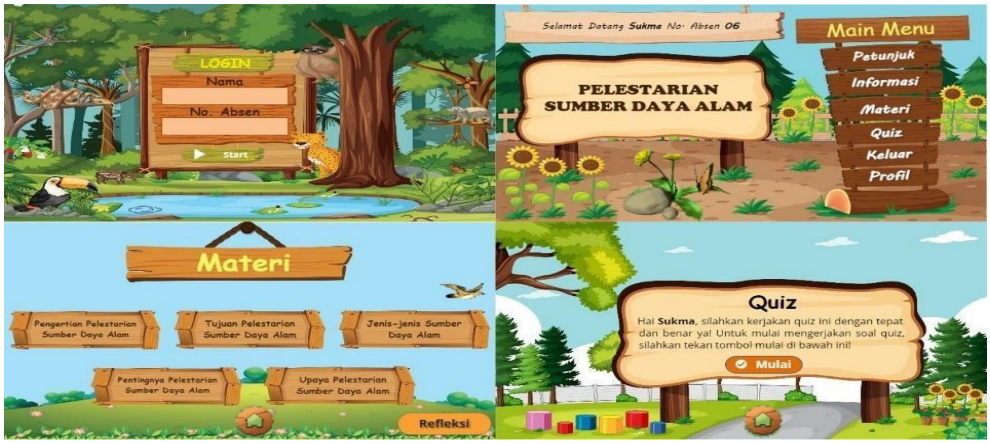

Figure 1. Results of Interactive Multimedia Development

Discussion

In this research, the resulting product is in the form of interactive multimedia based on a contextual approach to natural resource conservation material in the content of science lessons for grade IV Elementary School. The development of learning media in the form of interactive multimedia is due to the lack of use of communicative, interesting, and varied learning media so that learning tends to be monotonous and makes students easily bored and bored. This interactive multimedia can be operated using various devices such as computers, laptops, and *mobile phones* so that it is flexible or in other words it can be accessed by students at any time by using these devices when they want to study independently. The development of interactive multimedia based on this contextual approach refers to the ADDIE development model, so that it has implications for the validity of interactive multimedia based on the contextual approach that was developed and is feasible to use to support the learning process. This is relevant to the results of research showing that the development of interactive multimedia that refers to the ADDIE development model is effectively used to develop products that are suitable for use in supporting the learning process (Arina et al., 2020; Mukmin & Primasatya, 2020). In developing this interactive multimedia, it has gone through several stages, namely *review* stage and the product trial stage for students. Based on the results of these stages, the developed interactive multimedia is feasible to be used in the learning process. This aims to determine the feasibility of the multimedia that has been developed (Andini et al., 2018; Marnita & Ernawati, 2017). This interactive multimedia is feasible to use due to several factors, namely as follows.

The results of the validity of learning content experts on interactive multimedia based on a contextual approach to natural resource conservation material for science lessons get a percentage of 100% with very good qualifications. In the interactive multimedia assessment, the qualification is very good assessed from 3 aspects, namely curriculum, material, and grammar. Very good qualifications are obtained from the compatibility between the material presented with basic competencies, indicators, and learning objectives. This is in line with the opinion that the presentation of a material must be in accordance with the learning objectives (Haqiqi, 2019; Marnita & Ernawati, 2017; Yusuf, 2018). Content and content in interactive multimedia was developed by applying the components of a contextual approach. The application of the components of the contextual approach is carried out because learning will be more meaningful if students can build links between their knowledge and its application in everyday life (Rosalina & Suhardi, 2020; Suryawati & Osman, 2018; Tapingkae et al., 2020). This statement is proven through research results which show that the use of a contextual approach in learning makes learning more meaningful and can make the learning atmosphere more enjoyable, this is because in contextual learning the learning material is associated with

students' real world situations (Anugraheni et al., 2018; Nur et al., 2021; Rosalina & Suhardi, 2020). It can encourage students to connect with the knowledge learned and its application in everyday life (Geni et al., 2020).

The results of the validity of learning design experts on interactive multimedia based on a contextual approach to natural resource conservation material for science lessons get a percentage of 88.63% with good qualifications. In the interactive multimedia assessment, obtaining good qualifications is assessed from 3 aspects, namely objectives, strategies, and evaluation. This is relevant to the opinion that in carrying out the learning process, the teacher must know the goals to be achieved, the strategies that will be used to achieve these goals, and the evaluation that will be given to determine the achievement of these goals (Husna et al., 2021; Novariana, 2021). The results of the validity of learning media experts on interactive multimedia based on a contextual approach to natural resource conservation material for science lessons get a percentage of 91.25% with very good qualifications. In the interactive multimedia assessment, you get very good qualifications assessed from 7 aspects, namely text, images, video, animation, audio, color, and operation. This is relevant to the opinion that interactive multimedia is a media that contains a combination of various media such as text, sound, animation, images and videos that can support learning activities carried out in the current situation (Juniari, 2021; Nilawati, 2020; Noverdika, 2021). This statement is also proven through research results which show that the delivery of material using interactive multimedia combines several elements such as text, images, sound, video and animation in accordance with the effective material to make the material clearer and able to increase student interest and motivation (Lauc et al., 2020; Pratiwi & Ismaniati, 2017; Rosalina & Suhardi, 2020).

The results of product trials, namely individual and small group trials of interactive multimedia based on a contextual approach to natural resource conservation material for science lessons, got their respective percentages, namely in individual trials, the overall percentage of subjects was 79.1% with good qualifications. In the small group trial, the overall percentage of subjects was 87.2% with good qualifications. In the interactive multimedia assessment, obtaining good qualifications is assessed from 3 aspects, namely learning, material, and media. This is relevant to the results of research showing that interactive multimedia can make the learning process more communicative and able to visualize material that is difficult to explain with only one type of monotonous media (Mariamah et al., 2022; Swara, 2020).

The results of this study are relevant to the results of previous studies which found that interactive multimedia was suitable for use in the science learning process in elementary schools (Permana & Nourmavita, 2017; Putra & Wiyasa, 2021). Other research also states that interactive multimedia can make it easier for students to learn and can improve student learning outcomes (Andini et al., 2018; Lauc et al., 2020; Rosalina & Suhardi, 2020). The difference between the current research and previous research is that currently interactive multimedia is being developed based on a contextual approach to natural resource conservation materials. In previous research, there has been no development of interactive multimedia using a contextual approach to natural resource conservation materials. The implication of this development research is that interactive multimedia developed can help students understand the material, become creative, innovative, varied, communicative, and interesting media so that they can eliminate boredom and boredom in students when participating in the learning process.

4. CONCLUSION

The product produced in this development research is interactive multimedia based on a contextual approach to natural resource conservation material in science learning content for grade IV elementary school. From the results of expert reviews and student trials, interactive multimedia based on a contextual approach has proven to be helpful in the learning process for natural resource conservation in the content of science lessons for grade IV Elementary School.

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