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Development of Interactive Multimedia Using Problem Based Learning Model in Class VIII Integrated Science Subjects Junior High School

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Abstract: This study addresses low student learning outcomes due to limited use of interactive multimedia and lack of interest in learning using the same model. The aim is to develop valid and practical interactive multimedia through a problem-based learning approach for science subjects. This research is a development research (R&D) with the ADDIE development model. The results of research on learning media development by media validator 1 were obtained " 4.95" with the category "Very Valid". While the results of the assessment of media validator 2 obtained "4.95" with the category "Very Valid", and material validators obtained "4.71" with the category "Very Valid ". The results of the practicality test to students on interactive multimedia can be concluded that the assessment carried out by students obtained 3.51 results with the category "Practical". The results of the effectiveness test were obtained from the comparison of pre-test and *post-test* scores of students and obtained the results of the *Wilcoxon signed rank test* showed that *Sig. (p value)* of 0.00 < 0.05, so interactive multimedia is declared "Eeffective" because there are significant differences. It can be concluded that interactive multimedia products are suitable for use in the learning process.

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Introduction

The introduction must contain (in sequence) a general background, a state of the art as a basis for statements of scientific novelty from articles, statements of scientific novelty, and research problems or hypotheses. At the end of the introduction, the purpose of the article review must be written. In the format of scientific articles, the literature review is not permitted as in the research report but is manifested in the form of a state of the art study to show the scientific novelty of the article. Technological advances in the world of education are increasingly developing in the current era of globalization, this has asignificant impact on the world of education. Global challenges encourage the education sector to continue to adapt to technological developments to improve the quality of education. One of the things to focus on is the use of technology in the learning process. The use of technology in education brings many benefits. This technology allows access to a wider and faster variety of information and learning resources. Students can learn from a variety of sources, not just limited to textbooks. In addition, technology also allows the learning process to be more interactive and engaging through the use of multimedia, simulations, and innovative educational software.

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The era of globalization brings changes in the world of education today. Education is not only carried out conventionally, but also uses communication and information technology devices. A large number of learning resources have become available to learners. According to Rohmah and Bukhori (2020), there are challenges that teachers have to integrate the use of technology in learning. This aims to make the learning atmosphere more active, and teachers do not only act as educators. In addition to acting as educators in presenting learning materials for students, teachers are also required to be able to package learning to be more innovative by using technology, one of which is using learning media that can encourage students to learn optimally learning in class and learning independently.

In line with Hamalik (1986) the use of learning aids or learning media can increase desire and interest, as well as arouse stimulation in the learning process and affect student psychology. Assistance in the form of learning media in the learning process, aims to make it easier for students to achieve the goals of learning and be able to understand the learning material. In the teaching and learning process, learning media as a very important tool in delivering material. According to Criticos in (Daryanto 2013: 4), a tool or media is a component of communication that serves to introduce a stimulant from the communicator (teacher) to the communicant (student). If communication is not appropriate, then the message conveyed by the teacher will be difficult for students to understand. Conversely, if communication runs effectivelyand efficiently, then learning goals can be achieved better.

The development of learning media that can generate motivation and independence of the student learning process, one of which is interactive multimedia. Interactive multimedia is an interactive system that provides stimulants with sound, computer graphics, animation, video frames, static images, and text (Tashpulatovich, 2021). Interactive multimedia can be used as an alternative in explaining messages by teachers to students. Interactive multimedia in the form of teaching materials, is a combination of several digital media (graphics, text, audio, animation, images and videos) that can be manipulated by users in carrying commands and natural behavior from the delivery of teaching materials (Prastowo, 2014: 40). To create interactive multimedia, it takes help from applications that allow designing features and creating desired products. Various applications and interactive learning media design software can be accessed for free. An example is *Articulate Storyline*, a software that allows the creation of learning media without having to use programming code. In addition, the product development process also involves various other design applications and websites such as *Adobe Illustrator, Canva, PNG Wing, Lottie Files,* and so on.

This Interactive Multimedia, using computers and *mobile phones* as aids in runningit. According to Ali (Ali M 2009), revealing that using computer-based learning aids has a significant influence on students in learning the competencies described. In line with that, Dale (1969) (Arsyad, 2014: 13) predicts that the acquisition of learning evaluation with vision ranges from 75%, for hearing as much as 13%, and through other senses around 12%. This can be able to increase the evaluation value of students. So that it can relieve educators to explain learning material, and can help students in mastering learning plans.

As revealed by Elmurodov (2020) that the use of multimedia equipped with color videos and animations will make the learning process faster and better understood. According to Diamond (2011) one of the subjects that must be known by students in depth is Science (Natural Sciences). Science subjects are related to honing students' curiosity about nature and relationships with actual reality (Bobrowsky, 2007). This is needed by students in the future. Learning applied today is increasingly focused on the desire to read *science*, study the upper t level (*high order thinking*), and exchange standard learning methods that were previously more

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oriented towards memorizing learning material in the face of learning evaluation. Understanding the teaching and learning process of science knowledge which is still relatively low can be caused by the low use of effective learning media by teachers in teaching science material.

Based on the results of interviews with science teachers at SMP Al-Azhar 32 Padang, information was obtained that the main difficulties in learning science are students' lack of interest in learning aids (media), as well as the teaching style of educators. So students are lazy to try to understand the basic concepts of science. In addition, the Integrated Science learning process also does not use digital learning media. The learning process uses printed books, LKS, or *Power Point* displayed through a *projector*. The school already has facilities in the form of computer labor, but has never been used for integrated science learning.

Based on the results of the analysis of the researcher's needs for one of the student learning outcomes, the Integrated Science subject, on the human circulatory system material at SMP Al Azhar 32 Padang grade VIII, researchers obtained data on student learning outcomes in the following table:

Table 1. Class VIII Daily Test Scores in Integrated Science Subjects Human Circulatory System material.

No	Sample	Number Of Student	Complete	Unfinished	Average Score of Learning Outcomes
1	Class VIII A	23	15	8	65,21
2	Class VIII B	22	16	7	69.56
3	Class VIII C	25	17	6	73.91

Source: List of Human Circulatory System Daily Test Scores of SMP Al Azhar 32 Kota Padang for the 2022/2023 school year

The data in the table explains that the average learning outcomes of students, in the Integrated Science subject, human circulatory system material grade VIII SMP Al Azhar 32 Kota Padang for the 2022/2023 school year. This table shows that there are 3 classes led by teachers, with a total of approximately 70 students. Based on the data above, the results of the author's observations when conducting observation activities and initial data collection at SMP Al Azhar 32 Padang, In learning Integrated Science subjects, most teachers only use auxiliary media such as textbooks, PowerPoint presentations, and other conventional methods. This causes learning not to attract the attention of siswa during learning. The limitations of these media make learning feel monotonous for students. As a result, many students lose their enthusiasm for learning and do not focus on the learning process. In this case, itis necessary to approach and use teaching aids that are more innovative and interactive in increasing participants' interest in learning and motivation in Integrated Science subjects. The teacher also revealed that currently the school uses learning aids in the form of modules using a conventional learning model , namely lectures. The use of this method tends to make students inactive in teaching and learning activities.Educators have a more dominant role than the role of learners, and this is contrary to the current curriculum objectives.

Responding to the above problems, a learning model is needed that can develop and explore fully student knowledge and stimulate them to learn together, making it easier for them to understand the concepts presented and connect their ideas. The *problem-based learning* (PBL) model is the right approach to overcome these challenges. Menurt Rusman (2014: 229) argues that PBL is a newer learning innovation because in the teaching process (PBM), students' thinking skills are optimized through a systematic group or team work process, so that

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students can be empowered, honed, continuously tested. and develop their thinking skills. Therefore, the learning modeln PBL can allow students to be more active in the learning process and improve mastery of concepts and critical thinking skills on an ongoing basis.

Based on Arends' view (Trianto, 2007: 68), *PBL* is an approach model that places students as the main focus and uses real problems in learning activities. The purpose of PBL is to build the frame of mind of learners in practicing independence, as well as their self-confidence, and develop various skills in solving a problem. PBL model, focuses on students as a learning center or *student-centered learning.* In this model, students are more active in the learning process, where they have a role as problem solvers or information seekers, while educators have a role as *facilitators* and guides in supporting the development of student understanding and skills.

Problem based learning (PBL) has a distinctive focus on real-life problems, where students are encouraged to be active in inquiry and problem solving. In this learning process, students will develop all their thinking skills, because they have to look for various problem solving from various aspects, to understand and overcome the given problem. The use of the PBL model is expected to encourage students to be not passive in learning, in line with the objectives of the applicable learning design. In this model, students become active learning agents and play an important role in understanding the subject matter more deeply. By combining the PBL model and the use of Interactive Multimedia, students can be directly involved in learning, thus creating an inspiring and effective learning ecosystem.

This research aims to develop interactive multimedia devices using *PBL* learning models that are in sync with the feasibility of the media used and the material to be achieved in science subjects, through interactive multimedia. Based on the previous presentation, the researcher intends to conduct a research entitled "**Development of Interactive Multimedia Using *Problem Based Learning*** Models in **Class VIII Integrated Science Subjects in Junior High School".**

Method

This research uses the type of Research & Development research. The following research refers to research that produces, develops, or creates a product or service. Here's areview of why this development research was conducted: 1) o assess the feasibility of a product that has been produced. 2) The resulting interactive multimedia development is assumed to produce media that is able to meet the learning needs of students, because this development will go through various stages of development including expert tests as a program validation stage. 3) This development methodology is very much in line with the field of educational technology, namely development supervision.

This research based on the *application Articulate Storyline* establishes a model developed by Dick and Carry, ADDIE (1996). The design is structured with programmed stages in an effort to solve problems about knowledge sources that are tailored to the needs and characteristics of students. According to Sugiyono (2019: 28), this development model consists of 5 stages, including:

1. Analysis Phase

At this stage, various initial data are collected which are used as material in the development of a learning aid . At this stage, researchers also carry out data collection activities in the form of user needs analysis, learning material needs analysis, user hardware analysis, and software analysis.

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a. Needs analysis

This stage of need is to find out the needs of learning media in the form of information on the problems found.The stage is carried out through observation activities, and interviews with one of the teachers.

b. Curriculum Analysis

This curriculum analysis stage has the aim of determining a material, the content of the material, and the limitations of the material contained in the media.

2. Design Stage

This stage is the stage in designing the picture of the interactive multimedia to be created. At the beginning of this design activity, a flowchart was created that serves to provide a rough overview of the product to be developed and this *flowchart* also functions so that the multimedia work process can run in a directed and systematic manner. After the design of the *flowchart*, the next design stage aims to provide a design overview of the products developed using Canva.

3. Development Stage

At this stage, the results of product design at the design stage are then developed to produce real products to be tested for validity before implementation. Development is carried out on the design that has been made and the validation stage. The following are the stages carried out:

a. Development and implementation of the *design*, this stage is carried out the collection of various initial materials, content materials, and some programming. The design of this product framework, will be applied into an initial interactive multimedia product.
b. Validation, to test the validity of interactive multimedia developed to obtain suggestions and product improvements before the product is tested in learning. The product is validated by two media experts and one material expert.
c. Revision, is an improvement of the product in accordance with suggestions, as well as input from validators.

4. Implementation Phase

At this stage, interactive multimedia trials are carried out to students. This trial aims to determine the level of practicality and response of student assessment on the interactive multimedia created. The trial was carried out on the subject of this development was grade VIII students at SMP Al Azhar 32 Kota Padang as many as 25 participants.

5. Evaluation Phase

This stage is a step in assessing matters related to product development. This is done in order to find out any shortcomings, weaknesses of the interactive multimedia under study. Interactive multimedia that has been tested, the next stage is improved according to the results of implementation by students and revisions from media experts, as well as material experts.

6. Data Analysis

The results of the validity and practicality test results are calculated using the following formula (Ernawati &; Sukardiyono (2017):

$$\bar{x} = \frac{\sum x}{n}$$

While the effectiveness test result data will be calculated by the Wilcoxon signed rank test using the help of a statistical application, namely SPSS.

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Result and Discussion

Interactive multimedia is used in integrated science learning grade VIII and is supported by text, audio, image, and video content that is tailored to the purpose of learning and attracts students' attention. This allows students to directly engage in learning activities. To produce valid and practical interactive multimedia, researchers conducted validity tests on media and material validators and questionnaire sheets for students using Likert scales. After providing an assessment, validators provide improvement suggestions that serve as guidelines in interactive multimedia improvements.

1. Learning Media Validation Results

Table 2. Media Validation Results 1 (Validator 1)

Assessed Aspects	%
Media Suitability	5,0
Media Use	5,0
Media Presentation	4,83
Design and Layout	5,0
Sum	**4,95**

In the media validation test on the first validator of media suitability, media use, media presentation, design and layout where the results are included in the "**Very Valid**" category.

Table 3. Media Validation Results 2 (Validator 2)

Assessed Aspects	%
Media Suitability	5,0
Media Use	5,0
Media Presentation	4,83
Design and Layout	5,0
Sum	**4,95**

In the media validation test on the second validator of media suitability, media use, media presentation, design and layout where the results are included in the "**Very Valid**" category .

2. Learning Material Validation Results

Table 4. Mater Validation Results

Assessed Aspects	%
Tothe Contents service	4,62
Serving	5
Evaluation	4,5
Sum	**4,71**

Based on the results of validation tests by material validators for aspects of content suitability, presentation, and evaluation where these results are included in the "**Very Valid**" category**.**

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3. Practicality Test Results

Table 5. Recapitulation of Product Trial Results Data

Assessment Aspect	**%**
Display	3,51
Ease of Use	3,51
Presentation of Material	3,51
Usefulness	3,52
Average	**3,51**

The results of the media practicality test were assessed by 25 grade VIII students of SMP Al-Azhar 32 Kota Padang which results were included in the category "**Practical**". Students revealed that it was helped by the interactive multimedia that the researchers developed.

4. Effectiveness Test Results

The effectiveness test is carried out using pre-test and *post-test* questions done by students before and after learning the material with interactive multimedia. The calculation of the final score of the pre-test and *post-test* implementation is tested with *a paired t test* (Widiyanto, 2013). The paired *t test* is used to determine whether there is an average difference between two paired data from the same *sample*. In the normality test, it is known that it is not normally distributed, so a *paired t* test pair is used, namely the Wilcoxon signed rank test. The final decision is that if the Sig. (p value) is 0.05, then there is no significant difference in the pre-test and post-test data. The calculation of effectiveness test results is carried out using SPSS statistical software. The results of the effectiveness test can be seen in the following figure.

RANKS

		N	Mean Rank	Sum of Ranks
Posttest - Pretest	Negative Ranks	0[a]	.00	.00
	Positive Ranks	25[b]	13.00	325.00
	Ties	0[c]		
	Total	25		

Test Statistics

	Posttest - Pretest
Z	-4,383[A]
Asymp. Sig. (2-tailed)	**.000**

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

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Conclusion

Based on the results of research and development of interactive multimedia in integrated thematic learning grade IV elementary school using the Canva application and also with several other supporting applications, it can be concluded as follows: 1) The process of developing interactive multimedia in Integrated Science learning using *a problem-based learning* model on human circulatory system material in junior high school went well and in accordance with the expectations of researchers. 2) The results of the material and media validation test show that interactive multimedia using *a problem-based learning* model in Integrated Science subjects, human circulatory system material is declared "**Very Valid".** 3) The results of the practicality test by users at SMPN Al-Azhar 32 Kota Padang, showed interactive multimedia using *a problem-based* learning model in Integrated Science learning, "**Practical**". These results illustrate that the learning media developed can help the learning process in the classroom. 4) The results of the effectiveness test by users at SMP Al-Azhar 32 Kota Padang, showed interactive multimedia using *a problem-based* learning model in Integrated Science learning, The results of the Wilcoxon signed rank test showed that Sig. (p value) was 0.00< 0.05, so that this interactive multimedia, declared **effective** Because there are significant differences in student learning outcomes before (pre-test) and after (post-test) the use of multimedia in learning.

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