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DEVELOPMENT OF INTERACTIVE MULTIMEDIA BASED ON LOCAL WISDOM OF JAMBI ORIENTED BY STUDENTS' CREATIVE THINKING ABILITY IN HIGH SCHOOL PHYSICS SUBJECTS

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Abstract. This research is development research in the form of interactive multimedia based on Jambi local wisdom. This research aims to develop interactive multimedia based on Jambi local wisdom which is oriented towards students' creative thinking abilities in learning physics in high school, using the Lee and Owen Method. This method integrates the principles of instructional design, action research, and innovative approaches to produce a multimedia product that is effective in improving student understanding and skills. The initial stage of research involves analyzing student needs and identifying creative thinking abilities relevant to physics material. Then, action research was carried out to understand the dynamics of physics learning in high school and design appropriate multimedia. The multimedia development process was carried out iteratively, involving media and material expert validators, feedback from teachers and field tests on grade 10 high school students. Multimedia implementation is carried out in the context of classroom physics learning, where its effectiveness is evaluated through questionnaires and interviews with teachers and students. The evaluation results are used to improve and enhance multimedia so that it is more responsive to student learning needs. It is hoped that this research can contribute to the development of learning models that combine local wisdom with innovative approaches in teaching physics in high schools, as well as improving students' creative thinking abilities through the use of multimedia technology.

INTRODUCTION

Education plays a very important role in improving human quality, in fact it is one of the important foundations in developing a country. Education is all learning knowledge that occurs throughout life in all places and situations that have a positive influence on the growth of each individual creature (Annisa 2022). Learning is one of the processes carried out in education that will increase insight and skills. Learning is a seriesactivity either between teachers and students, with peers or can even learn through digital media that can be accessed. Technological developments have continued to develop very rapidly, sincefound it computers in the 20th century, then the internet emerged and until now digital technology has

become an inseparable part of humanity. Information and communication technology also has a very important role in the world of education, where technology will make it much easier for teachers to create learning devices and media. According to (Rizal et al., 2016) Learning technology is defined as theory and practice in designing, developing, utilizing, managing and evaluating learning processes and resources.

The 2019 pandemic means that learning must be done from home, so teachers must be technologically literate by learning and tryingutilization technology in learning. In fact, quite a few teachers create tutorial content for making learning media. One form of use of technology in education implemented by the government is by creating an independent teaching platform which contains teachers' works with a teacher creation and sharing system. Learning media are all forms of objects and tools used to support the learning process (Batubara, 2020). Learning media is a form of technology implementationin education, which is able to provide wider and more flexible access to learning. Learning web is one of the learning media developed to support learning. The web is structured systematically to improve the quality of learning according to objectivesinstructional, written completely, systematically and using language that is easy to understand. so that students can easily learn and understand independently, because the website is very clear and equipped with learning instructions.

Physics is one of the subjects in the natural sciences family. Learning Natural Sciences (IPA) is a process of systematically finding out about nature to master a collection of knowledge in the form of facts, concepts, principles, discovery processes and having a scientific attitude (Sevtia, 2022). Physics discusses science or natural sciences related to quantity, motion andbehavior in the scope of space and time. Many discussions in physics lessons discuss the concept of events around us. However, if the concept is explained only using the lecture method, it will result in students becoming bored and not liking the physics material. Even though the science of physics cannot be separated from the life and activities around us. One of the discussion topics studied in physics subjects is measurement, material that requires explanations and application examples so that it is easy to understand. Books with too much writing make students lazy to open them. Insufficient use of learning media causes low motivation to learn because they feel bored with simple learning media and lack of variety (Sevtia 2022). Plus, the book design is less attractive and the content contains lots of formulas, making students even more lazy to study and even repeat the material at home. So innovative and contextual learning media are needed to help students understand physics concepts better.

Jambi is a province that has natural, social and cultural riches. Geographically, Jambi is locatedin the middle the island of Sumatra has 11 city districts, each city district has natural, social and cultural riches that need to be preserved. The application of local wisdom in education is considered important because it can improvecreativity, students' interest and understanding of physics learning material which is integrated with the local wisdom of the Jambi region becomes more interesting. Introduction through learning is not only delivered by the teacher but also utilizes learning media to be used as a means of demonstrating local regional wisdom to optimize the character of students (Hidayanto et.al., 2016). From this background, it is necessary to develop physics learning media that are more interesting and fun while adding insight into the local wisdom of the Jambi region in class X Physics subjects. Integration of local wisdom in physics learning can enable students to link abstract concepts with reality. their daily lives, thereby making learning more relevant and interesting. The use

of web technology allows better accessibility for students in various areas of Jambi and allows independent learning. Its potential positive impact on learning, as well as the challenges that may arise in its implementation. Apart from that, this research will also contribute to the development of physics curriculum and learning strategies that are more contextual and relevant in Jambi and may also be applied in other areas that have unique local wisdom.

It is hoped that the development of Interactive Multimedia will help teachers teach more effectively. Teachers can use this interactive multimedia to access various learning resources and provide more personalized guidance to students. A creative response to a problem is a response that is new, good, and relevant (Kaufman et.al., 2010). So researchers are interested in developing interactive multimedia in the form of a learning web entitled "Development of Interactive Multimedia Based on Jambi Local Wisdom Oriented to Students' Creative Thinking Ability in High School Physics Subjects".

The problem formulation of this research is: How is the process of developing interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities in high school physics subjects? What is the theoretical and procedural feasibility of developing interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities in high school physics subjects? based on the validation of material experts and media experts? What is the practitioner's (peer) assessment of the Development of Interactive Multimedia Based on Jambi Local Wisdom Oriented to Students' Creative Thinking Ability in High School Physics Subjects? Can the Interactive Multimedia development product developed be used forall levelability students? How do students respond to the development of interactive multimedia based on local wisdom in Jambi, oriented towards students' creative thinking abilities in high school physics subjects? What is the practical effectiveness and feasibility of interactive multimedia based on Jambi local wisdom, oriented towards creative thinking abilities?

METHOD

This research was carried out in a development model which we call research and development with the aim of producing a new product from the development process. The R&D method is a research method used to produce certain products and test the effectiveness of these products (Sugiyono, 2013). This development research uses the Lee & Owens development model which consists of five stages, namely 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation.

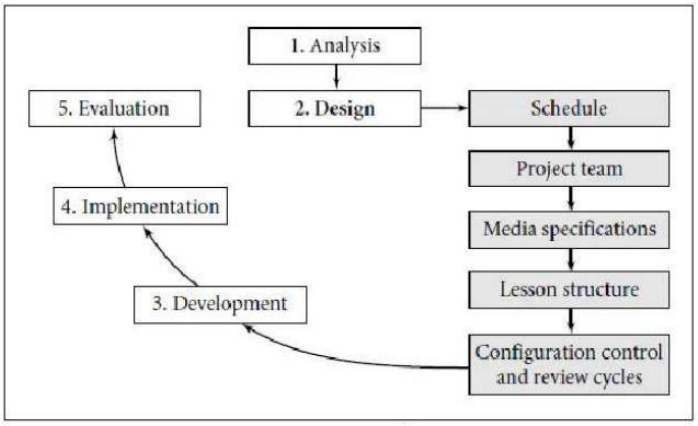

Image 1. Lee & Owens

In this study, the subject of validation consisted of validation from media experts, namely lecturers at the Master of Educational Technology Study Program at Jambi University, validation from material experts, namely physics education lecturers at Jambi University, practitioner assessments, namely Physics teachers at SMA IT Ash-Shiddiiqi, and class X students at SMA IT Ash-Shiddiiqi. that uses interactive multimedia. In this research, the data analysis techniques used are qualitative descriptive analysis techniques and quantitative analysis techniques. Quantitative Descriptive Analysis is an analysis carried out based on field studies that can be observed directly for the needs of interactive multimedia development. Quantitative analysis in this research is in the form of observations.

Qualitative Analysis is analysis obtained from expert validation and student assessment questionnaires in the form of scores on the interactive multimedia developed. The level of validity of interactive multimedia is seen from the instruments that have been filled in by expert lecturers and physics teachers to determine the validity of the product being developed. Steps in analyzing interactive multimedia that have been assessed by experts. Scoring for each criterion.

Table 1. Expert Assessment Guidelines

Score	Criteria
5	Very suitable
4	In accordance
3	Not suitable
2	Inappropriate
1	Very Inappropriate

The level of validity of interactive multimedia is seen from the instruments that have been filled in by expert lecturers and physics teachers to determine the validity of the product being developed. Then the calculation results are interpreted using an interpretation scale. Interpretation scale with Likert as follows.

Table 2. Range and Quality Criteria for Expert Products

Percentage score (%)	Criteria
81% − 100%	Very Valid
61% − 80%	Valid
41% − 60%	Less Valid
21% − 40%	Invalid
0% − 20%	Very Invalid

The percentage data obtained, comments and suggestions are used as a basis for revising the interactive multimedia being developed.

After the product has been validated and applied in learning, students then take a final test (posttest) which will be compared with the results of the initial test (pre-test) which was held before using the developed interactive multimedia. This test aims to measure the effectiveness of learning by determining the magnitude of the increase in students' creative thinking abilities in physics who use interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities in high school physics subjects. According to Paul (1972) there are 4 indicators to assess creative thinking abilities, namely:

Fluency, Flexibility, Originality, and Elaboration. After the data was obtained, data analysis was then carried out with the help of the SPSS program. The normality test is carried out as a requirement for further testing of the hypothesis data to be tested. Interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities in high school physics subjects can be said to be effective if the value of the results of the paired sample t-test with normally distributed data has a sig value smaller than 0.05, which means there is a difference in the results of the posttest and the results pretest.

RESULTS AND DISCUSSION

Analysis Stage

The analysis stage began by conducting interviews with physics teachers at Ash-Shiddiiqi IT High School and a questionnaire filled out by Ash-Shiddiiqi IT High School students. The curriculum used is the independent curriculum for class 10 and the 2013 curriculum for classes 11 and 12. The average student is 65% hampered in understanding physics material. Student interest in using digital media is 91% and interest in learning physics using interactive multimedia is 88%. The school also provides wifi in each class as a means for students to access learning materials. 98% of students have smartphones, and 100% of students have learning tools in the form of tablets. This means that digital learning devices are very supportive.

Design Stage

From the results of the analysis carried out, the next step is designing interactive multimedia with several stages in the design: Research was carried out from August 2023 to April 2024, the material developed was measurement material, then creating*flowchart* as a reference in developing multimedia and designing*storyboard* as an illustration of the arrangement of interactive media being developed.

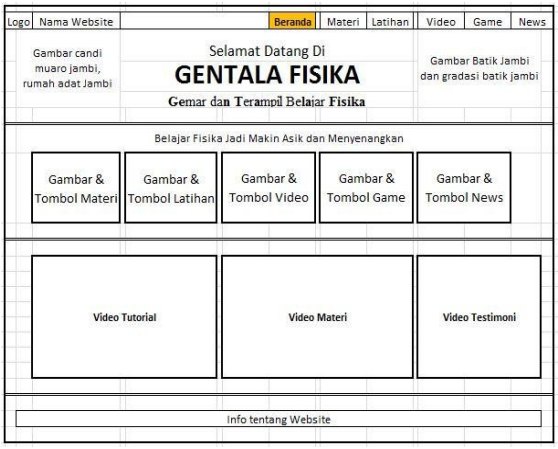

Figure 2.*Storyboard* interactive multimedia

Interactive multimedia design is carried out based on the analysis and design that has been carried out. Researchers develop interactive multimedia using Google Sites. Apart from Google Sites, several applications are also supported, including Canva for designing displays, Google Forms and Quizizz for practicing questions, Wordwall for games and YouTube for viewing videos.

Figure 3. Interactive Multimedia Display

Material expert validation of Jambi local wisdom-based interactive media includes aspects of appropriateness of content, grammar,*assassment* and integration of local wisdom. The material validator results obtained a total score of 65 with an average of 4.33 when presented to 87%. The results of material validation after revision obtained a total score of 74 with an average of 4.93 when presented to 99% in the interval 81% - 100%.

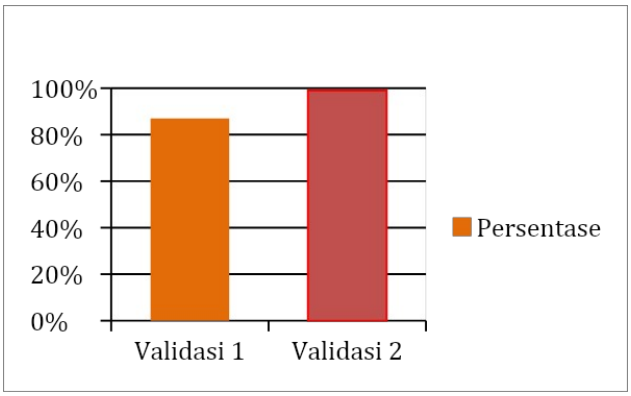

Figure 4. Percentage of material expert scores for stages 1 and 2

Media expert validation is carried out to determine the suitability of the multimedia being developed. The score from the media validator is 56 with an average of 4.00, which if presented becomes 80%, meaning the media developed is in the range of 61% - 80% or worthy of improvement. after being corrected, the score became 62 with an average of 4.43, which if the percentage is 89%, means that the media developed is in the range of 81% - 100% or very, very suitable for testing.

Field Practitioner assessment using the practitioner questionnaire, the total score was 58 with an average of 4.83 or in percentage terms, namely 97%. From these results, the multimedia is suitable and suitable for testing.

Development Stage

The Development Stage is carried out after the multimedia is declared suitable by validation results and has been revised. Next, the media was implemented to 10th grade students at Ash-Shiddiiqi IT High School. Small group trials were carried out on 8 grade 10 students at

Ash-Shiddiiqi IT High School. students are selected based on the student's level of knowledge.

Table 3. Results of small group trials

Question Number	A1	A2	A3	A4	A5	A6	A7	A8	Percentage
1	5	5	5	5	4	5	5	4	95%
2	5	4	3	3	4	4	4	4	78%
3	3	5	5	5	5	4	4	4	88%
4	5	4	4	4	4	5	4	4	85%
5	5	4	4	4	4	5	5	4	88%
6	5	5	4	5	5	5	5	5	98%
7	5	5	4	4	4	4	4	4	85%
8	5	5	4	4	5	5	4	5	93%
9	4	4	4	4	3	5	5	5	85%
10	5	5	4	5	4	5	4	5	93%
11	5	4	4	4	4	4	5	4	85%
12	5	4	4	4	5	4	5	5	90%
13	5	5	4	5	5	5	5	5	98%
14	5	5	4	5	5	5	4	5	95%
Amount	67	64	57	61	61	65	63	63	
Rata-Rata	4,79	4,57	4,07	4,36	4,36	4,64	4,50	4,50	
Percentage	96%	91%	81%	87%	87%	93%	90%	90% Rate 89%	

The average percentage of interactive multimedia from the student questionnaire, namely 89%, is in the range of 81% - 100%, which means that interactive multimedia is very suitable to be used to support physics learning in measurement material.
The field trial was carried out in class Being in the criteria range of 81% - 100%, it can be concluded that the interactive multimedia on the Physics Gentala web is declared very suitable for use in the process of learning measurement material for grade 10 high school.

Implementation Stage
Interactive multimedia that has been developed and validated is then tested and applied in physics learning. The trial involved 30 grade 10 students at Ash-Shiddiiqi IT High School. Learning meetings are held in three activities, namely opening, core activities and closing.

Figure 5. Learning process

The beginning of the learning activity begins with the opening of the lesson and then a pretest activity is carried out to test students' creative abilities. Next is the main activity, the researcher instructs students to prepare learning tools or tablets, then the QR code that has been prepared is displayed. The QR code contains a link that leads to interactive multimedia using Google sites. Students were directed to see instructions for using interactive multimedia and researchers monitored the process of student activities. Students are directed to study the material by reading and watching learning videos and then understanding example questions. Next, the researcher directed students to try games and work on practice questions. It ends with a closing activity by summarizing together the material learned that day. Next, a test is carried out to determine students' abilities after learning using multimedia.

Evaluation Stage

The evaluation stage was carried out to measure the final competency of learning using interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities on measurement material.

Table 4. Pretest and post-test results

No.	Student Name	Pretest	Posttest	No.	Student Name	Pretest	Posttest
1	S1	73	93	16	S16	58	93
2	S2	40	89	17	S17	40	93
3	S3	53	89	18	S18	63	93
4	S4	50	90	19	S19	58	95
5	S5	44	83	20	S20	25	85
6	S6	48	93	21	S21	43	90
7	S7	60	80	22	S22	48	90
8	S8	45	85	23	S23	45	83
9	S9	50	93	24	S24	40	83
10	S10	45	93	25	S25	44	93
11	S11	43	90	26	S26	30	88
12	S12	43	89	27	S27	45	85
13	S13	45	90	28	S28	53	88
14	S14	40	83	29	S29	38	85
15	S15	35	85	30	S30	63	95

The pretest and posttest data were then analyzed using the SPSS program. Normality test to determine whether the test sample studied comes from a distributed population or not.

Table 5. Normality test table

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Say.	Statistic	df	Say.
post_test	,175	30	,020	,922	30	,030
pre_test	,174	30	,020	,962	30	,339

In the output of the test of normality results, it can be seen that the Sig. from Kolmogorov Smirnov and Shapiro is greater than 0.05, which means HO is accepted, meaning the data is normally distributed.

Paired Sample Test was carried out to determine the effect of interactive multimedia which was tested using pretest and posttest.

Tabel 6. Tabel Paired sample test

Paired Differences								
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Say. (2-tailed)
Pair 1 pre_test – post_test	-41,90000	9,13255	1,66737	-45,31015	-38,48985	-25,129	29	,000

It can be seen that the t count is -25.129 with a probability/significance level of 0.000 < 0.05, then H0 is rejected or the two population averages are not identical (the average pretest and posttest scores are significantly different). It can be concluded that before and after the implementation of interactive multimedia there is a difference in the average physics test scores of IT Ash-Shiddiiqi High School students. So interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities in high school physics subjects is appropriate to be applied in order to improve creative thinking abilities.

CONCLUSION

Research on the development of interactive multimedia based on Jambi local wisdom oriented towards students' creative thinking abilities in high school physics subjects was successfully developed using the Lee and Owens development model which produced interactive multimedia in the form of the Gentala Physics website. Interactive multimedia was declared feasible based on material experts and media experts, both in the range of 81% - 100%, so that interactive multimedia was declared very feasible. Practitioner assessment carried out by IT Ash-Shiddiiqi High School physics teacher based on a questionnaire filled in by practitioners obtained a percentage of 97 % or declared very feasible. Likewise, the results of small group and large group trials with questionnaires produced percentages in the range of 81%-100% in the category of very feasible or can be used for all levels of student ability. In implementing creative thinking skills through*pretest* and*posttest* where the resulting data was processed using SPSS, normality test results were obtained which stated that the data was normally distributed and the results of the paired sample test showed that the average pretest and posttest scores were significantly different. So interactive multimedia in the form of the GENTALA PHYSICS web is appropriate to apply in order to improve creative thinking abilities.

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