Development of H5P-Based Learning Media on Momentum and Impulse Materials

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Abstract: This study aims to develop H5P-based learning media on momentum and impulse materials in class XI SMA that are valid and practical to use in the learning process. The development of this learning media is carried out to maximize learning and make it easier for teachers to deliver material with multimedia devices and make it easier for students to receive the material. This research uses the type of research and development (R&D) with the ADDIE model which includes five stages, namely the analysis stage, the design stage, the development stage, the implementation stage and the evaluation stage. This study used a data collection instrument in the form of a validation sheet filled out by 3 validators and a practicality instrument that was tested on a small scale at SMAN 9 Tanjung Jabung Barat, Jambi, Indonesia by 20 students. The analtechnique isis data by calculating the validation assessment using the validity index of the Aiken V formula was obtained by 0.89. Learning media is stated to be practically used by students from the aspect of comfort and design, aspect of satisfaction and aspect of efficiency with an average practicality index value of 73.83%.

Keywords : H5P-based learning media, E-learning, Momentum and Impulse

I. INTRODUCTION

A learning method that is currently developing rapidly is e-learning. E-learning is an educational tool that includes selfmotivation, communication, efficiency and technology. Because there are limitations in social interaction, students must keep themselves motivated [1]. E-learning is efficient because it eliminates distance and round-trip flow. Distance is eliminated because the content of e-learning is designed with media that can be accessed from computer terminals that have appropriate equipment and other technological means that can access the network or the internet. 58% of learners surveyed by EDUCAUSE stated that the application of elearning combined with traditional classroom models has proven to be very helpful to the learning process[2]. To support the e-learning system to run perfectly, interactive multimedia technology is also needed that fully combines computer, video, and audio technologies, to get a better combination and increase the interaction between users in this case students with computers. Teachers need interactive learning media in the learning process so that the learning process runs more efficiently. Multimedia display will make students more free to choose, synthesize, and collaborate on the knowledge they want to understand. Interactive multimedia also provides opportunities for students to develop learning techniques so as to get maximum results, where multimedia-based learning is learning using multimedia devices as the main means [3].

H5P is the content and learning materials present in the LMS e-learning system that aims to make it easier for everyone to create, compare and reuse interactive HTML5 content [4]. In addition, content is one of the media for delivering e-learning through the content and type of content itself [5]. The purpose in developing and implementing H5P content is to attract the attention of users when accessing H5P content in e-learning. The information and interactive learning materials available in this H5P content include interactive videos, interactive ppt, interactive quizzes and so on based on hypermedia-based content that helps in learning. Hypermedia based content is an extension of Hypertext and multimedia, namely media where information is not only a type of text, but also consists of images, sound, video or multimedia. Hypermedia is an interface page that not only displays just text, but also displays several other multimedia and their links [6].

A hypermedia is intended to present interactive information that can relate to many broader media, where computer-based multimedia systems are connected and provide information using links or websites so that users easily obtain information to other information [7]. Multimedia consists of graphics, audio, video, text and animation which later produce a presentation of some of these multimedia combinations [8]. H5P has been designed to allow everyone to create, share, reuse interactive content. E-learning content that is created, has interactive learning media to be able to cause and add motivation in learning, for that the right media is needed to create interactive content, in order to stimulate a positive response from each learning material delivered. The media used can be in the form of images, videos, ppt, games, and much more so that in the end H5P is able to become a much more interesting and easy learning media so that users capture and understand every content of the material provided.

Based on the background above, it is necessary to develop an interactive e-learning application in the form of H5P-based learning media which will later support the effectiveness of the learning system.

II. METHODOLOGY

This research is a type of Research and Development (R&D) research with ADDIE (Analyze, Design, Development, Implementation and Evaluation) instructional design. The ADDIE learning design model was developed by Reiser and Mollenda, then redeveloped in 1996 by Dick and Carry to design and build a better learning system Sugiarta [9]



Figure 1 ADDIE Stages [10]

This study used research instruments in the form of validation sheets and practicality assessments on a small scale. The validation assessment sheet is in the form of design feasibility aspects, pedagogic feasibility aspects, content feasibility aspects and technical feasibility aspects. Validation was carried out by 3 validators including 1 lecturer in postgraduate physics education at Riau University and 2 bachelors of physics education. After validation, the trial of the practicality of learning media on a small scale was continued. The trial was conducted at SMAN 9 Tanjung Jabung Barat, Jambi, Indonesia with a sample of 20 class XI students using a likert scale as shown in Table 1.

Table 1. Validity Sheet Assessment Categories

Number	Category	Score
1	Agree	5
2	Agree	4
3	Disagree	3
4	Disagree	2
5	Strongly disapproving	1

(Sugiyono, 2015) [11]

Furthermore, the validity value is calculated by the Aiken V formula as follows:

$$V = \frac{\sum s}{n(c-1)}$$

With :

 $s = r - L_0$

V = Aiken validity index

 $L_0 =$ Lowest validity rating number (1)

c = Highest validity assessment number (5)

r = Validator scored

n = Number of validators

The learning medium for momentum and impulse materials is declared valid if all indicators of the instrument's assessment of validity and practicality have a value of the Aiken coefficient V > 0.4.[12] The determination of the category of the Coefficient V Aiken can be seen in Table 2.

Table 2. Interpretation of Koefficient Aiken's V

Number	Value	Category
1	$0,80 < V \le 1,00$	Very High
2	$0,60 < V \le 0,80$	Tall
3	$0,40 < V \le 0,60$	Enough
4	$0,20 < V \le 0,40$	Low
5	$0,00 < V \le 0,10$	Very Low
	(\ -	wer in Dinote 2017) [12

(Azwar in Dinata, 2017) [13] Practicality analysis used percentage values (%) as follows: $Practicality \ value = \frac{Jumlah \ skor \ yang \ diperoleh}{Jumlah \ skor \ yang \ diperoleh}$ x100%

Jumlah skor maksimum

After the percentage of practicality values is obtained, the grouping is carried out according to the criteria contained in Table 3 below: Table 2 Drasticality Assagement Criteria

Table 5. Fracticanty Assessment Cintena			
No	Percentage (%)	Criterion	
1	81 - 100	Very Practical	
2	61 - 80	Practical	
3	41 - 60	Quite Practical	
4	21 - 40	Less Practical	
5	0-20	Practical	

(Riduwan, 2010) [14]

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III. RESULTS AND DISCUSSION

This development research resulted in a product in the form of learning media berbasis H5P on momentum and impulse class XIt material.

This R&D type development model consists of 5 stages of development:

- 1. Analyze, the stages of interpreting the problem so that a development of based learning media is needed. The analysis carried out by the researcher consists of a development analysis including a needs analysis that analyzes problems / difficulties and characteristics of students in learning momentum and impulses as described in the study and task analysis, namely material structure analysis by examining Learning Outcomes (CP) and learning objectives flow (ATP) contained in the curriculum. After knowing the structure of the material, it is hoped that the learning media designed can achieve these learning outcomes.
- 2. Design, stages of designing H5P-based learning media in accordance with the analysis carried out previously. The steps taken at this stage are in the form of designing scenarios, creating historyboards, creating storyboards, and compiling materials that will be used in the learning media.
- 3. Development, this stage is a real step torealize the design that has been made. The development is tailored to the needs that have been analyzed and the design that has been designed. The steps for developing H5P-based media are as follows:
 - a. Create video animations using the Powtoon app
 - b. Create a learning media content chart according to the history board design using branching scenarios in H5P that have been integrated into the lumi education website
 - c. Fill the animated content into graphics in the form of interactive videos according to the pre-designed storyboard. And then it adds evalution in the interactive video.
 - d. Added questions as Quiz in the graph
 - e. Save and publish the content. This learning media is published through the lumi educator website and students can access the learning media online.

The results of the development of learning media can be seen in Table 4.





- 4. Implementation, namely testing the use of H5P-based learning media that has been created. The product is implemented by opening the game website on the https://app.lumi.education/run/slR6Fw so that it can be seen whether this learning media is in accordance with previous planning.
- 5. Evaluation, which is to pay attention to the shortcomings and mistakes that exist in the learning media. This evaluation stage is carried out at each stage of an ADDIE. Based on the evaluation results, researchers can revise the product so that it produces the desired game learning media.

After doing the 5 stages of the ADDIE learning design model, it will finally produce an H5P-based learning media application on momentum and impulse material that is ready to be tested for validity with validators. This validation aims to obtain valid learning media. The results of the validation of H5P-based learning media on momentum and impulse for class XI students are carried out on the aspects of design feasibility, pedagogic feasibility aspects, content feasibility aspects and technical feasibility aspects. The validation results on the design aspect are presented in Table 5.

Number	Assessment Items	Value	Validation Criteria
1	Attractive and appropriate learning media screen design	1	ST
2	The letters used are appropriate and easy to read	1	ST
3	Images in the media according to their content	1	ST
5	Images used help learning	0.83	ST
6	Colors used after reading	0.83	ST
7	The sound used is correct and unobtrusive	0.92	ST
8	The button or sign used is easy to recognize	1	ST
9	Consistent positioning of text, graphics, videos, and markers	0.92	ST
10	Complete software with instructions and user manual	0.92	ST
Average r	number of validity indexes		0.84

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Ket. ST=Very High

Table 5 shows the results of Aiken'V calculations for each assessment indicator on the design aspects of H5P-based learning media. The data shows that all indicators are valid with validity indices ranging from 0.83 to 1 and have an average Aiken validity index of 0.84 with suggestions that clearer instructions for use need to be made. An assessment of the feasibility aspects of pedagogy is presented in Table 5.

Do not	Assessment Items	Value	Validation Criteria
1	Clearly written teaching competencies	0.83	ST
2	Teaching competence can be achieved	0.92	ST
3	Competency formulation becomes a guideline for media users	0.92	ST
4	Presentation of topics attracts the attention of students	0.92	ST
5	The information conveyed is easy to understand	1	ST
6	This medium encourages students to think creatively	1	ST
7	Organized and easy-to-follow presentation of materials	1	ST
8	Examples and exercises given according to the material	1	ST
9	Learning methods suitable for multimedia media	0.83	ST
Aver	age number of validity indexes		0.84

Table 6. Results of Validation of Learning Media in Aspects of Peda	gogy
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Ket. ST = Very High

Table 6 shows the results of Aiken'V calculations for each assessment indicator on the pedagogical aspects of H5P-based learning media. The data shows that all indicators are valid with a validity index ranging from 0. 83 to 1 and has an average Aiken validity index of 0.84. Assessments on the eligibility aspects of content are presented in Table 7.

Number	Assessment Items	Value	Validation Criteria
1	Subject matter in accordance with the Merdeka Curriculum	0.83	ST
2	Subject matter in accordance with competence	1	ST
3	Subject Matter in accordance with the learning objectives	1	ST
4	Lesson materials according to the level of ability of the student	0.83	Т
5	The subject matter corresponds to the basic knowledge of the student	0.83	Т
6	The subject matter contains educational value	0.92	ST
7	The subject matter is accompanied by exercises	1	ST
8	Exercises according to the topic of the lesson	0.92	ST
9	The subject matter is accompanied by formative tests	0.83	ST
10	Formative tests according to the subject matter	1	ST
	Average number of validity indexes		0.9

Ket. T=High; ST=Very High

Table 7 shows the results of the calculation of V Aiken for each assessment indicator on the content aspect of H5P-based learning media. The data shows that all indicators are valid with validity indices ranging from 0.83 to 1 and have an average Aiken validity index of 0.9. An assessment of technical feasibility aspects is presented in Table 8.

Number	Assessment Items	Value	Validation Criteria
1	Users can control the learning process	0.92	ST
2	Media has many branches to other parts	1	ST
3	Users are not stuck while browsing media	0.92	ST
4	The journey of presenting media content is easy to follow	1	ST
5	There is more than one acquisition of information	1	ST
6	Users can easily find the information they need	1	ST
7	Users can exit the media whenever they want	1	ST
8	Easy-to-use (operated) software	1	ST
Average r	number of validity indexes		0.98

Table 8. Media Learning Validation Results on ATechnical Spec

Ket. ST=Very High

Table 8 shows the results of the V Aiken calculation for each assessment indicator on the technical aspects of H5P-based learning media. The data shows that all indicators are valid with validity indices ranging from 0.92 to 1 and have an average Aiken validity index of 0.98.

The practicality of H5P-based learning media was carried out by testing on a small scale on class XI students at SMAN 9 Tanjung Jabung Barat, Jambi, Indonesia as many as 20 people. The results of the practicality of H5P-based learning media on class XI momentum and impulse materials are carried out on the aspects of ease of use and design, aspects of satisfaction and aspects of efficiency. The following are the practical results of class XI students of SMAN 9 Tanjung Jabung Barat shown in Table 9.

Table 9. Results Praktikali	y of Learning Media in Every Aspect
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Number	Assessment Aspects	Practicality Value (%)	Practicality Criteria
1	Comfort and design aspects	72.5	Practical
2	Satisfaction aspect	75	Practical

3	Efficiency Aspects	74	Practical
The average number of practicality indices		73.83	Practical

Based on the analysis of Table 9 data, it is known that H5P-based learning media contains practical statements on all aspects. This means that H5P-based learning media on momentum and impulse materials both from the aspects of comfort and design, aspects of satisfaction, and aspects of practical efficiency are used by students in the learning process.

IV. Conclusions and Suggestions

The results of this study concluded that H5P-based learning media are valid in accordance with valid validation results and are practically used by students in accordance with the results of practicality tests conducted at SMAN 9 Tanjung Jabung Barat, Jambi, Indonesia. H5P-based learning media learning media is set up for problem-based learning models so that these media are worth testing on problem-based learning models in schools.

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