Advances in Social Science, Education and Humanities Research, volume 512
Proceedings of the 1st International Conference on Folklore, Language, Education and Exhibition (ICOFLEX 2019)

Development of Learning Media-Based Digital Book on Modern Physics Learning

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ABSTRACT
The rapid developments in the learning media nowadays were to learn electronic learning and mobile learning. Based on such matters then the lecturer sued to be able to determine the methods or appropriate learning media in the learning process. One of the learning media being interested was mobile learning in the form of the digital-book. Learning media as a source of learning would help teachers, lecturers, and enrich students' insight. Digital Book in this research showed competence, materials, example problems, and evaluation questions. The method used was the Research and Development (R&D) with it was a development process using a model ADDIE (Analysis, Design, Development, Implementation, and Evaluation). ADDIE model development research was done only until the Development stage because this study was limited to develop and produce valid instructional media applications to be implemented based on an assessment validator. Data collection instruments consisted of expert validation sheet material and sheet media expert validation given to 6 (six) people validator that three media experts and three experts material. This study showed that the validation results were to be obtained percentage scoring average of 77, 89% with a valid category. Based on the results of a study and discussion could be concluded that digital book-based mobile learning was valid for use in the learning of physics.

Keywords: *Mobile learning, Digital book, Physics learning media*

1. INTRODUCTION

The rapid development of science and technology (IPTEK) in this era gave birth to a collection of new societies, namely the knowledge society. Besides that, it also has an impact on the rapid development in the world of education [1][2][3]. This can be seen from the many technological computer applications that can support the learning process in the classroom, especially in physics learning. One form of computer application technology is learning media.

The development of Information and communication technology (ICT) is developing very rapidly in line with the development of telecommunications [4]. Learning media has two components, namely hardware and software. ICT-based learning media can be in the form of audio, visual, image, and animation text so that it can stimulate students' thoughts, feelings, concerns, and interests and concerns in such a way that the learning process occurs [5]. To develop learning media, we need to pay attention to the VISUALS principle (visible, interesting, simple, useful, accurate, legitimate, and structured) [6].

But on the other hand, until now the selection of technology-based learning media is still rarely applied, especially in some physics learning. This fact is also in line with research conducted by Afriadi [7] which states that the existing learning media is usually monotonous so that it requires media that can provide learning experiences to students who are considered not to be conveyed properly if delivered with multimedia.

Therefore, as a teacher, lecturers must be better able to stimulate the thought process, help to grow a critical attitude, and can change the paradigm of their students [8]. The learning process can only be said to be successful if it can change the views of students towards a controllable

one and make students understand the problems and phenomena that were initially considered difficult because they are very abstract to be more easily understood [9]. Seeing this reality, researchers are trying to find the right solution to develop physics learning media to produce maximum learning outcomes [10]. Likewise for students to feel more interested in learning physics, easy to understand lecture material, can be studied anywhere quickly and efficiently. One alternative that is used by researchers to overcome this reality is to develop a digital book physics learning media by utilizing the Kvisoft Flipbook in modern physics learning. Media is a tool that has the function of conveying a message, while learning is the process of interaction of students with educators and learning resources in a learning environment. Learning media is a tool that serves to convey learning messages.

The development of digital books encourages a combination of printing technology and computer technology in learning activities. Digital book is a form of presenting media for learning books in a virtual form. Digital book content can consist of a combination of text, graphics, animation, sound, and video in one device [11][12][13]. The device used in making this digital book is Kvisoft Flipbook Maker. Kvisoft Flipbook Maker is software designed to convert PDF files to digital publication or digital book. This software can change the look of PDF files to be more interesting as a book. The prominent strength of digital books compared to PDF is that in PDF they can only display text and images on digital books can display text, images, animation, and music [14][15]. So that it is hoped that the development of digital book learning media will provide variations in the use of instructional media that can attract learning interest, especially modern physics. Besides, this digital book also has practical value because it can be used simply by using a mobile phone. The choice of this modern physics course was based on the opinions of several students who felt that the course was boring because there were found many abstract theories. This has an impact on the low interest of students to study modern physics and developing it so that it has an impact on understanding concepts and low learning outcomes.

2. METHOD

This research used a type of research and development (Research and Development / R & D). Research and development methods (R & D) were research methods used to produce certain products, and test the effectiveness of these products [16]. The R & D model was used as ADDIE (Analysis, Design, Development, Implementation, and Evaluation). The phases of research carried out in developing this digital book learning media was only up to the development phases. This was because the purpose of this study was limited to developing and producing a digital book as a valid learning media to be implemented based on the validator's assessment.

The steps taken in this research were:

1. Analysis, the goal at these phases was to find out what was needed in the development of learning media in the form of digital book physics. The things that needed to be analyzed were curriculum, student character, and needs.
2. The design was the second phase, which was the phases of making a design from the material, design, and instruments that would be used in the development phases. This phase aimed to design a digital book physics format for learning that focused on planning and designing a digital book physics using the kvisoft flipbook maker. In the design phase, the material was adjusted to the results of the analysis.
3. Development (development), in this process carried out by implementing a plan that has been designed at the design phases, then after the finished product was conducted an expert test was later revised based on input from experts. The results of product development were validated by three media experts and material experts.

3. RESULT AND DISCUSSION

The data description was done to provide a general description of the data obtained after the research. The data obtained from this research consisted of product development procedures and product development validation. The digital book development procedure consisted of design and manufacture digital books, digital book design, and validation, and revised digital book results after expert testing. The explanations were as follows:

3.1. Digital Book Development Procedure

Digital book development procedures consisted of designing and manufacturing digital books, draft digital books and validation, digital book revision results, digital book trials, and digital book revision results after the trials. The explanations were as follows:

1. Design and manufacture of digital books
   The initial design was consulted with colleagues to get input and suggestions. After getting input, suggestions, and improvements from peers, the initial design of the module was analyzed, revised, and consulted again.
2. Initial digital book design and validation
   Feedback and suggestions from colleagues were that a digital book must be made by the sap reference and the display must be more attractive in color selection. After receiving input and suggestions from digital book peers, it was revised.

In the analysis phases it was found that the applicable curriculum was based on *Kerangka Kualifikasi Nasional Indonesia* (KKNI), the textbooks used tended to be less attractive and difficult to understand for students because the textbooks use languages that were too complicated and lack of illustrations depicting the material, so it was less

interesting to read and learn it. This textbook difficult to understand made students difficult to understand the material independently, so it was a must to get guidance from the lecturer.

Based on the description, then it was designed to be a media teaching in the form of a digital book. This phase was included in the design step. After designing a teaching media, the next step was digital book validation analysis. This phase was included in the development step. This development step was explained in the digital book development procedure.

Design and manufacture of digital books, initial designs were consulted with colleagues to get input and suggestions. After getting input, suggestions, and improvements from colleagues, the initial design of the module was analyzed, revised, and consulted again. Input and advice from colleagues were that the digital book created must be by SAP's reference and the display must be more attractive in color selection. After receiving input and suggestions from colleagues, the digital book was immediately revised. After that, logical validation and empirical validation were carried out. The term logical validation contained the word "logical" which comes from the word logic which had the meaning of reasoning. With this meaning, the logical validation for an evaluation instrument referred to the conditions for an instrument that met valid requirements based on reasoning. Therefore, the instruments that had been prepared based on the instrument preparation theories were logically valid. The word empirical means experience. An instrument was said to have empirical validation if it had been tested from experience. The results of the conceptual validation of the initial development that was revised from colleagues were then validated by three media experts and three material experts. This validation consisted of four dimensions, namely content, readability, learning approach, and illustration. The validation questionnaire for material experts and media experts could be shown in table 1.

Table 1. The Validation Questionnaire for Material Experts and Media Experts

Dimension Criteria	MATERIAL EXPERTS		
	Indicator	**Number of questions**	**Total questions**
Content	- The suitability of the contents with the level of understanding of students - The truth of the concept - The truth of the contents	1, 5 3,7 2	5
Explication	- The use of language by the stages of student development - Use of terms by the subject matter	10, 12 4,8	4
Learning Approach	- Use of terms by the subject matter - Consistency in order of contents - Evaluation levels are by the stages of student development	6 9 11,15	4
Illustration	- The image clarity by the material presented - Use of illustrations	13 14	2
Dimension Criteria	**MEDIA EXPERTS**		
	Indicator	**Number of Questions**	**Total Questions**
Content	- Accuracy of questions with content/material - Clarity of terms used	3,6 8,11	4
Explication	- Use of Indonesian language rules - Use of straightforward language	12,13 15	3
Learning Approach	- Presentation of content according to the material - The order in which systematic content is presented	1 5,9	3
Illustration	- Image display quality - Layout	2,7 4,10,14	5

Data from the results of the four dimensions validation in the form of scores were converted into values, which were shown in Table 2.

Table 2. The Results of Conversion of the Average Score of the Evaluation of Digital Book Development Become

Dimension Criteria	Score		Actual Score (X)	Value	Category
	Media Expert	Material Expert			
Content	25,00	24,88	24,94	A	Very Good
Explication	25,5	23,93	24,72	A	Very Good
Learning Approach	9	9	9	A	Very Good
Illustration	13	13	13	A	Very Good

(source: results of data analysis)

The content dimension and explication are at an average score of 24,94 and 24,72 with A value in a very good category. This category shows that digital books have used Indonesian language rules, using Enhanced Spelling rules (EYD), language according to the stage of student development, terms by the subject matter and there are explanations for terms that are difficult to understand or not general. The dimensions of the learning approach are at a score of 9 with an A value it's a very good category which means that in the preparation of teaching materials need to emphasize the scientific approach as an inquiry learning process, content or material contains varying cognitive levels so that there is a suitability of the approach to student abilities.

The illustration dimension is at an average score of 13,25 with an A value in a very good category. This excellent category shows that in quality digital book illustrations, images are by the material presented and useful, and the placement of illustrations by related

material. From some descriptions of the digital-book assessment, it shows that the digital book developed has been good with several reviews or input from several validators. The display of the digital-book before the expert test is shown in Fig. 1.

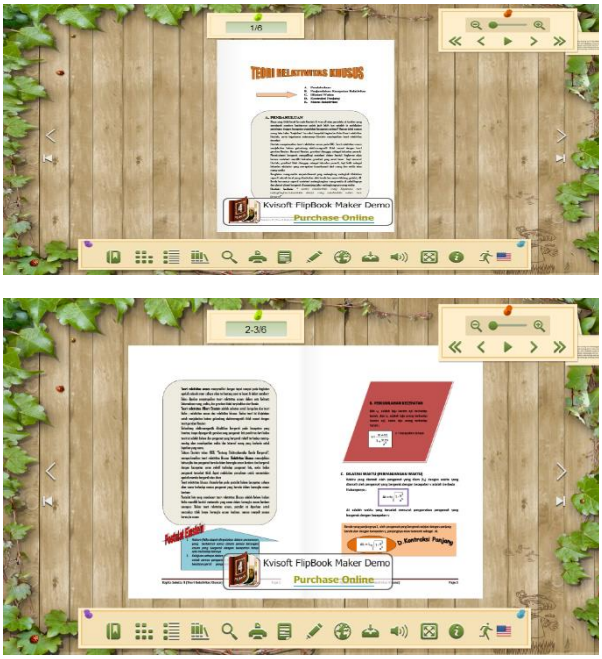

Figure 1. Display of digital book before the expert test

3.2. Revised Digital Book Results

Along with the results of the research that have been revealed in the descriptive part of the data, the researcher found a problem that is during the learning activities taking place there are still many students only focused on the material delivered by the lecturer. So that the work on the matter of understanding or counting with variations of other problems have difficulty. As a result, students become less understanding of the material so that in working on problems experiencing problems [17][18][19]. The final impact of these effects is the value of student learning outcomes is less than the maximum.

Textbooks used for physics education study programs tend to be less interesting and difficult to understand for students [20][21] because of the use of language that is too complicated and the lack of illustrations that illustrate the material so it is less interesting to read and learn. This poorly understood textbook makes it difficult for students to understand the material independently so they must get guidance from the lecturer.

Based on the description of the data obtained from the media experts and material experts, it can be seen that the dimensions of the contents of the digital-book have good feasibility because they are at an average score of 24,94 with an A grade in a very good value. This category shows that the content of the material presented in the digital book has the truth and current content, the truth of the concept, the suitability of the content with the level of understanding of students, the accuracy of material coverage, the correctness of the terms used, and conformity with SAP lectures.

The review or input from media experts I am to improve the digital book component, clarifying the delivery of material by the level of understanding of students, clarifying the illustration to be proportional. While the reviews or input from media experts II and III are digital book material referring to the textbook material used, illustrations are clarified and a proportional size.

Review or input from material experts I and II include material reference sources, show pictures, and tables so that the purpose of the images and tables is clear, and use the equation in writing the physics equation. While the review or input from material experts III is to improve the quality of the illustration and material referring to the textbook. Digital book revisions include material revisions and digital book formats. The display of digital books after being revised based on expert input can be seen in fig 2.

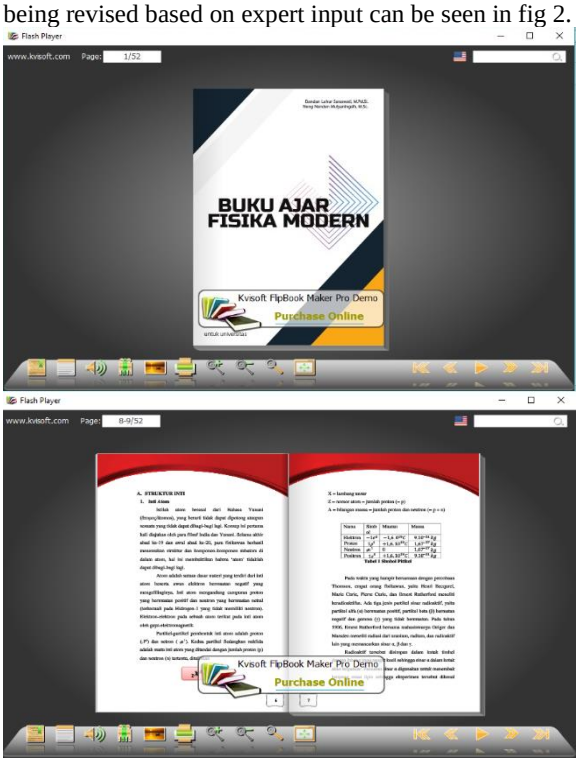

Figure 2. Display of digital book after being revised based on expert

Based on input from experts, the digital book design was revised, the display must be more attractive with color selection and layout. The average score by media experts and material experts was at 77.89% in category A "very good". The validation results state that the developed digital book is feasible to use with revisions by the input from the validator

4. CONCLUSIONS

This study shows that the validation results obtained an average percentage rating of 77.89% with a valid category. Based on the analysis of the results of research and discussion, it can be concluded that the development of digital book-based physics learning media on modern

physics material is declared feasible to use and there is an influence when used in learning towards the understanding of concepts and student learning outcomes. This digital book learning media can add variety to learning media for various subjects. And through digital book learning media can help and facilitate independent learning.

ACKNOWLEDGMENT

This research has been supported with the assistance of LPPM Universitas Indraprasta PGRI number: 0259 / SP3M / KP / LPPM / UNINDRA / IV / 2016.

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