



Development of Learning Media in the Form of Electronic Books with Dynamic Electricity Teaching Materials

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ABSTRACT

Purpose of the study: This study aims to develop learning media in the form of electronic books with the subject matter of Dynamic Electricity for class X SMA semester II that meet the good criteria.

Methodology: This development research uses research and development methods. The development model used in this study is a procedural model, namely a descriptive model that shows the steps that must be followed to produce a product in the form of learning media. Data obtained through interviews and questionnaires. The data analysis technique used is descriptive qualitative analysis.

Main Findings: Based on data analysis in this study, it was concluded that the results of the development of electronic book media obtained very good criteria in terms of material and media aspects.

Novelty/Originality of this study: Making and presenting electronic books as learning media in the form of digital media is done using the Corel Draw X4 and Kvisoft Flipbook Maker Pro 3.6.5 programs and then saving them in the .exe format.

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1. INTRODUCTION

Physics is a science that studies natural phenomena in which there are many formulas for calculating physical events in nature [1]–[3]. From the past until now, students understand physics only from its formulas, without knowing the basic concepts implied in physics itself [4], [5]. The mindset about physics that is scary from the minds of students is not something that is easy to get rid of [6], [7]. In this case, the physics teacher plays an important role in reducing the scary mindset about physics that is already attached to the students' minds. The cause of Physics is still a frightening specter for students is the presentation of physics teaching [8]–[10].

Many teach not with fun. Even though teachers should teach more fun, more fun [11], [12]. Don't talk about formulas first, if you can talk about theories and concepts first. Someone who can master the concept well, in the future Physics questions will feel easier [13]–[15]. So, what frightens the children is that the teachers still focus on formulas first, not theories and concepts first. In fact physics should be fun because it's fun, it should be conveyed in a fun way too [16]–[18].

Learning aids or media are needed as a means of supporting the learning process, in addition to conventional or face-to-face learning transformation (lectures) in the classroom. The use of learning aids or media is an inseparable part and is already an integration of the learning methods used [19]. Learning aids are one of the dynamic elements in learning. The position of the tool has an important role because it can help the student learning process. The use of aids can make abstract things more concrete and make an unattractive learning atmosphere interesting. Many learning aids or media are created for independent learning at this time, but to find a choice or solution for a really good tool so that the learning process becomes effective, interesting, interactive and fun is a problem that needs to be solved. Tools or media for self-study in the era of technological advances are needed in the learning process [20], [21]. This is needed to create human qualities that do not only depend on the verbal transfer of knowledge, whether it is carried out by schools or universities or non-formal educational institutions at this time.

Learning media has many types and not one media is the best compared to other media. Each medium has advantages and disadvantages of each. Therefore, teachers need to be familiar with various media with their respective characteristics. Thus the teacher can choose and use it according to basic competencies, student characteristics, material to be delivered and learning experiences. Therefore, the selection of physics learning media by teachers is very important. There are many learning media that can be used, one of which is the electronic book media. Literally, an electronic book is a printed book that is converted into a digital format through a digitization process so that the book can be displayed on a computer. A similar definition was also put forward in several online dictionaries, where it was found that an electronic book is a book that has been converted to digital form, which can be read using a computer or a special reader. The electronic books currently available are generally in .pdf, .chm, .doc formats, for example, the Electronic School Book (BSE).

The physics material with all the reductions in the formula is presented in a language that is not so formal, supporting pictures and an attractive appearance, it is hoped that the reader will be motivated to read the content contained in the e-book. So it really needs to be made electronic books that are packaged digitally which aim to make students interested in physics and increase students' reading interest in physics. The basic assumption that causes the low interest of students in physics if from the reality on the ground is the media when in the learning process, students only stick to textbooks and LKS (Student Activity Sheets) so that students become bored and not interested in learning physics material. In the dynamic electricity material, in addition to the material related to the discussion, knowledge is also needed about the history of its discovery and so on [22]. It aims to increase students' understanding of knowledge in physics related to dynamic electricity.

From the description of the background which states that the need for interesting, creative and meaningful physics learning, it is necessary to research the development of learning media. Physics material with all its formula derivations is presented in a flowing manner like a series of events, apart from that the appearance of pictures in electronic books captivates the hearts of students as readers. So it is important to provide innovation to make learning physics enjoyable and attractive to students. The urgency of the research was shown by the students who considered physics difficult, abstract learning physics full of formulas and learning media that were less varied and interesting. This e-book was made with the aim that the physics material presented can be easily understood by students and more interesting because physics material is presented with some of the latest information, including animations, videos, pictures and some interesting features that support understanding of the material being studied.

2. RESEARCH METHOD

This research includes development research using research and development (R&D) methods. The product developed in this study is a learning media in the form of an electronic book with the subject matter of dynamic electricity for class X senior high school semester II. The development model is the basis for developing products. In this study, the development model used is a procedural model, namely a descriptive model, showing the steps that must be followed to produce a product in the form of learning media. Because in developing learning media in the form of electronic books it also contains development steps from the initial stage to the creation of learning media.

The experimental subjects in this study were class X students of SMA Negeri 2 Wonogiri. Then, the data collected from the results of the media validation questionnaire, material validation, and students were qualitative data. Quantitative data, namely data on the evaluation of the appropriateness of the content/material and media. Data collection in the study was carried out using several techniques, namely a questionnaire, which aims to measure the feasibility of the content/material and learning media in the form of electronic books. Questionnaires were given to material expert evaluators, media expert evaluators and students according to their needs and goals to measure the feasibility of electronic books developed as learning media. Conducted on resource persons, namely material expert evaluators, and the media in the form of questions and answers. This was done during the validation process for the Physics e-book media. Interviews were also conducted with class X students of SMA Negeri 2 Wonogiri.

The data analysis technique used in this research is descriptive qualitative analysis, namely by describing and interpreting qualitative data [23]–[25]. Before being analyzed, the process of quantifying the data from the questionnaire was carried out and then the data was analyzed qualitatively. The data from interviews and documentation were analyzed using qualitative analysis.

3. RESULTS AND DISCUSSION

This research produces electronic book products that can be used as learning media. After going through several stages of development, we obtained data on needs analysis, media design, media design, and media production. Based on needs analysis, student character and problem analysis, electronic books have great potential to be used as learning media, especially electronic books that can help students understand subjects that are considered difficult for them. However, electronic books are still difficult to obtain. Therefore it is necessary to develop learning media in the form of electronic books so that they can be used to overcome the problems found.

The material in this study is Dynamic Electricity for high school students. The material is adapted to the Regulation of the Minister of National Education Number 22 of 2006 concerning Standard Content for Physics Subjects for High Schools (SMA). Dynamic Electricity material was chosen because this material contains many abstract concepts besides many events in everyday life that are related to light, both in the form of natural phenomena and applications in equipment. Then determine the indicators that will appear from the material that has been selected. In determining the indicators, it is necessary to consult with the supervisor so that the right indicators are obtained to be developed later as contents for physics magazines.

The next stage is product validation which consists of validation by content/material experts and validation by media experts. The first media product validation or expert test was carried out by Owolabi P. Adelana (material expert) and provided information that the transformer animation was improved, equations could be further improved, explanations in pictures needed to be corrected, electric animals that were originally only pictures were replaced with videos, with this it is hoped that the page can look more alive with videos of electrified animals. From the validation of the material experts, notes were found regarding the shortcomings of this electronic book, including the lack of motivation at the beginning of the video and the information conveyed was incomplete. From these notes, revisions were made to the motivation presented in the media and additional information suggested by material experts was carried out.

Table 1. Summary of data for the feasibility aspect of the content/material

Criteria	Frequency	Percentage (%)
Strongly agree	8	80
Agree	2	20
Disagree	0	0
Don't agree	0	0
Strongly Disagree	0	0
Amount	10	100

Based on the validation of material experts, quantitative data was also obtained which showed that e-books in terms of content feasibility were included in the good criteria (96%). Furthermore, this electronic book gets recommendations from material experts to be tested on students. Media product validation was then carried out by Talal Alasmari (media expert) and provided information that the images/animations did not match the screen display, the images/animations were not clear on the screen display, there was an inaccurate selection of fonts, there was an inaccurate selection of font colors and the contrast of text and background colors is not considered so that some text cannot be read clearly. From the validation of media experts, it was found notes regarding the shortcomings of this electronic book, namely regarding the compatibility of electronic books. From the notes and information, revisions were made to the typefaces used as well as repairs to images that were not clear. To demonstrate the compatibility of e-books, e-books are opened with various types of hardware, namely PCs, laptops and netbooks.

Table 2. Summary of data for aspects of media eligibility

Criteria	Frequency	Percentage (%)
Strongly agree	16	100
Agree	0	0
Disagree	0	0
Don't agree	0	0
Strongly Disagree	0	0
Amount	16	100

Based on the validation of media experts, quantitative data was also obtained which showed that learning videos in the aspect of media feasibility were included in the very good category (100%). Furthermore, this learning video gets recommendations from media experts to be tested on students.

The test was carried out by running an electronic book with a PC to class X students at SMA Negeri 2 Wonogiri who had obtained Dynamic Electricity material. The electronic book was tested on 30 students and then they were given a questionnaire containing 22 statement items covering aspects of content/material feasibility and media aspects (presentation/display). Tests were carried out to determine student responses to electronic books packaged in digital format. The trial data is shown in the table below.

Table 3. Summary of data for each aspect of the student questionnaire

Aspect	Criteria	Frequency	Percentage (%)
Content/Material	Strongly agree	89	67,42
	Agree	41	31,06
	Disagree	2	1,52
	Don't agree	0	0,00
	Strongly Disagree	0	0,00
Amount		132	100,00
Media	Strongly agree	241	45,64
	Agree	264	50,00
	Disagree	22	4,17
	Don't agree	1	0,19
	Strongly Disagree	0	0
Amount		528	100,00

Based on the trials, quantitative data was obtained which showed that this learning video was 89.27% in terms of content feasibility and media aspects so that it was included in the good criteria. This research includes development research, namely product-oriented research whether it is good or not. The product developed in this study is in the form of learning media in the form of electronic books for high school physics material, the subject matter of dynamic electricity.

After going through various stages of development, an Electronic Book for Dynamic Electricity material is produced which can be used by students anywhere and anytime. In this electronic book, content is presented which contains articles containing Physics material. The layout, both the background display, the colors, the featured images in this electronic book are meant to be attractive. As for the content, articles that discuss natural phenomena and progress in Science and Technology (IPTEK) related to the material of light are highlighted here to further explain the material in a concrete manner. In the middle is given a simple practicum content to lure students to do experiments presented in an electronic book. At the end of the article, an evaluation example is given with completion to find out how far students understand the article they read. In accordance with the initial design, electronic books were developed as learning aids. Electronic books as a tool in learning are emphasized to make it easier for students to understand the material presented in learning.

The electronic book products that are produced are then content validated by a validator consisting of supervising lecturers who aim to get input and suggestions as well as to get recommendations so that electronic books can be tested on users. Several records were generated from the validation. In terms of material and appearance, revisions were made to the use of simplified language, image explanations, contrasting text and background colors, margins for each page and a more attractive cover. After being revised, this electronic book was allowed to be tested on students.

At the trial stage the magazine was shown to class X high school students and then given a questionnaire to find out the usefulness of this media and interviews were also conducted to find out students' responses to this electronic book. Based on questionnaires and interviews, data was obtained that this electronic book met the good criteria to be used as a companion learning media for students. While notes for media that can be used for further development. From the results of interviews students assessed that this media attracted students to learn more about Physics material. The media expert evaluator considered that this electronic book was in good criteria with a percentage of 100%. The Material Evaluator rated this electronic book in good criteria with a percentage of 96%. The average result of media and material evaluators is 98% (in good criteria). This strengthens the validator's opinion that this electronic book is feasible to be tested on students. Finally obtained learning media in the form of electronic books for dynamic electricity material that meet the good criteria.

The implication of this research is that this physics electronic book can be used as a learning medium for students either independently or in class. even better if the Electronic Book can be used for group study both in learning activities and outside of learning activities so that discussions can be held about the material presented in the Electronic Book. In previous studies, professional flip pdf electronic teaching materials were

developed on the material of optical instruments in high schools and the results obtained were that the teaching materials were valid in the high category. In previous research, it was known that the existence of electronic teaching materials made it easier for educators and students to access optical equipment material [26]. In line with this research, this research was conducted to facilitate students and educators in the learning and teaching process. The difference between this previous research and the current research lies in the materials and software for developing electronic books.

4. CONCLUSION

The conclusion that can be drawn in this study is that electronic books are learning media that can not only be used for learning in the classroom but can also be used for learning outside the classroom which is carried out independently by students. The process that must be taken to get the final product in the form of an Electronic Book that meets the good criteria, begins with analyzing needs, designing media, making media designs, making media, and validating and finally testing media. The results of content validation on the feasibility aspect of the content/material and visual/appearance aspects have stated that this e-book is feasible to be tested on students. Furthermore, it can be concluded that the learning media in the form of electronic books with the subject matter of dynamic electricity for class X SMA semester II which has been developed, is included in the very good criteria as a learning medium. Supported by the results of the evaluator's assessment of material experts by 96% and media experts by 100%, giving an average rating of 98%. The results of testing on students give the result that the media is included in learning media that meets very good criteria. Supported by the results of individual trials of 76.82%, small group trials of 84.09%, and large group trials of 89.27%. So that testing on students gives an average of 84.06%. In further research, the researcher recommends that research be carried out regarding whether this electronic book can increase students' interest and physics learning outcomes, how it influences student academic achievement.

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