

Interactive Learning Media On Dynamic Electrical Materials For Concept-Based High School Students

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ABSTRACT

The purpose of this study is to develop an interactive learning media based on Canva using the topic of dynamic electricity to increase students' learning interest. The research and development process was carried out using the Borg and Gall development model, which was simplified into several key stages: identifying potential and problems, data collection, product design, design validation, design revision, product testing, product revision, and implementation trial. The validation results of the Canva-based interactive learning media showed that the media received a score of 81.0% from material experts and 78.3% from media experts. Therefore, the interactive learning media are considered feasible and sufficiently effective to be used in physics learning, particularly on the topic of dynamic electricity.

Keywords: *Interactive Learning Media; Dynamic Electricity; Canva; Conceptual Understanding*

INTRODUCTION

Education is the main foundation for building the progress of a nation. Therefore, in the era of the 21st century, which is full of dynamics and rapid changes, it is important for the education system to continue to adapt to be in harmony with the needs of the times. The Merdeka Curriculum is present as one of the innovations in the world of education in Indonesia, with the aim of increasing the relevance of learning to global demands while preparing students to face various complex future challenges. The basic idea of the Independent Curriculum is also rooted in the thought of Ki Hajar Dewantara, who emphasizes that the learning process should be centered on the potential and talents of each student, so that they can develop according to their respective abilities and interests (Seba & Malan, n.d.).

With the development of the times, many technologies can be used by many people, especially in the world of education, so that teaching and learning activities can run according to learning goals. So that students also do not feel bored with learning activities that often use lecture methods, in the Independent Curriculum, which focuses on differentiated learning, learning media that are able to adapt to the needs, interests, and learning styles of students are needed.

Interactive learning media is one of the solutions to create fun, active, and meaningful learning. Through interactive media, students not only receive material passively, but can also be directly involved in the learning process. This is in line with the spirit of the Independent Curriculum, which emphasizes learning independence, active student participation, and the integration of technology in learning.

One of the platforms that can be used to develop interactive learning media is Canva. Canva is an easy-to-use digital-based graphic design app that provides a variety of interesting features, including animations, interactive buttons, illustrations, and other visual elements. By leveraging Canva, teachers can create learning media that is more visually appealing and accessible to students, both online and offline.

Therefore, this research is focused on the development of Canva-based interactive learning media on dynamic electrical materials, which is one of the materials in physics lessons that most students find difficult. It is hoped that this media can increase students' interest in learning and help them understand dynamic electrical concepts more easily and with fun.

METHOD

The research method used is research and development (R&D), referring to the development model presented by Borg and Gall (Sugiyono, 2010), which is carried out by following ten stages of development to produce a final product that is ready to be applied, can be seen in Figure 1. The subject of the research is a material expert, a media expert.



Figure 1 Borg and Gall Development Model

This model has development steps that are in accordance with educational development research, namely research that produces or develops certain products by conducting several expert tests, such as material tests, media tests, and product trials in the field, to determine the use of learning media and the usefulness of a medium. In this development research, seven development steps are needed to produce a final product that is ready to be applied in educational institutions. Product trials are carried out through trial subjects, including material experts, media experts, and students. The data collection instruments in this study were taken using Google Forms in the form of material validation sheets, media validation sheets, and student response questionnaires.

Data analysis techniques include media feasibility. The completed media is then validated to find out the media's eligibility for media members and material experts. Validators fill out a questionnaire with score criteria using the Likert scale (Prihatiningtyas & Alimah, 2021). Data from the questionnaire will be analyzed to get an idea of the learning media developed. After the questionnaire is collected, the percentage of each question item on the questionnaire will be calculated with the following formula:

$$P = \times 100\% \frac{\sum x}{\sum xi}$$

Information:

P = Percentage

Σ x = The total number of answers in the entire item

Σ xi = The total sum of the ideal values in the whole item

100% = Constant

After getting the desired percentage, the next step is to make adjustments to the criteria that have been set. The percentage scale can be found in Table 1.

Table 1 Percentage Scale

Achievement percentage (%)	Criterion
81,0% – 100,0%	Highly valid/feasible
61,0% – 80,0%	Valid/eligible
41,0% – 60,0%	Sufficiently valid/feasible
21,0% – 40,0%	Invalid/Eligible
0,0% – 20,0%	Invalid/eligible

RESULTS AND DISCUSSION

In this discussion, the results of the development, feasibility, and discussion will be described. The results of the research that will be discussed include potentials and problems, data collection, media design, media validation, and media revision. The discussion of the 5 stages of research and development is discussed as follows:

1. Potential and problems.

The development of digital technology today provides many opportunities for the world of education to create more innovative and interesting learning experiences. One of the great potentials that can be utilized is the use of digital-based interactive learning media that can be accessed flexibly, are visually appealing, and easy to use. Canva, as a graphic design platform that supports interactive features, has great potential to be used in the development of learning media that can increase students' interest and engagement in the learning process.

In addition, dynamic electrical matter in physics lessons is one of the topics that has the potential to be conveyed through visual and interactive approaches. This material is closely related to abstract concepts such as electric current, voltage, resistance, as well as laws of physics such as Ohm's Law and Kirchhoff's Law. With the right learning media, students can more easily understand the relationship between concepts and their application in daily life.

However, behind this potential, there are still several problems that are often found in the field. One of them is the low interest of students in learning physics subjects, especially in dynamic electrical materials, which are considered difficult and confusing. In addition, the dominant learning method using lectures and textbooks causes students to be less active and easily feel bored. Teachers also often experience limitations in creating interesting and interactive learning media due to limited time, design skills, or access to appropriate digital platforms.

Based on these potentials and problems, efforts are needed to develop interactive learning media that are easy for teachers to use and attractive to students. The use of Canva as a media development tool is expected to be an effective solution to support more fun, participatory, and meaningful physics learning.

2. Data collection

Data collection in this study was carried out through a validation process by experts to assess the feasibility of the interactive learning media that has been developed. Canva-based interactive learning media is compiled by researchers based on dynamic electrical materials listed in the curriculum. After the media is completed, data is collected by asking for an assessment from two lecturers as experts, namely, material experts and media experts.

Subject matter experts are tasked with assessing the suitability of the content of the material, the accuracy of physics concepts, and the suitability with the curriculum. Meanwhile, media experts provide an assessment of the design aspects, clarity of appearance, interactivity, and readability of the developed media. The assessment was carried out using a validation sheet instrument that had been prepared by the researcher.

The validation results of the two experts were used as data to determine the level of feasibility of learning media. The percentage of scores obtained is the basis for determining whether the media is declared suitable for use or still needs revision. With this data collection method, researchers can guarantee that the media products developed have gone through academic review and are suitable for use in learning.

3. Product design

- Create a storyline
- Preparing the supporting components
- Create a Canva-based interactive Learning Media on dynamic electrical materials.
- Canva-based interactive learning media on dynamic electrical materials. At this stage, the media is divided into three subthemes, including the opening, content of the material, and the closing, each of which can be seen in the image below:

1) The opening of Canva-based interactive learning media includes the cover, main menu, instructions for use, purpose of use, concept map, and material menu, can be seen in Figure 1.

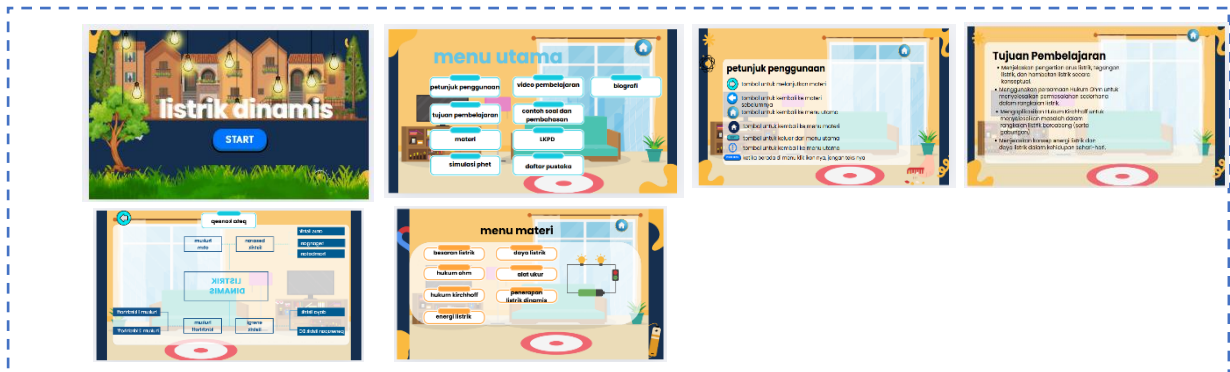


Figure 2 Interactive learning media opener design

2) The content of interactive learning media materials includes, material discussing dynamic electricity, introduction, definition of electric current, electric voltage, electrical resistance, source of direct electric current voltage, factors that affect resistance, ohm's law, kirchoff's law one, kirchoff's law two, electrical energy, electric power, electrical measuring instruments, phet simulations, learning videos, sample questions and discussions. It is also equipped with an interactive LKPD and PhET simulation.

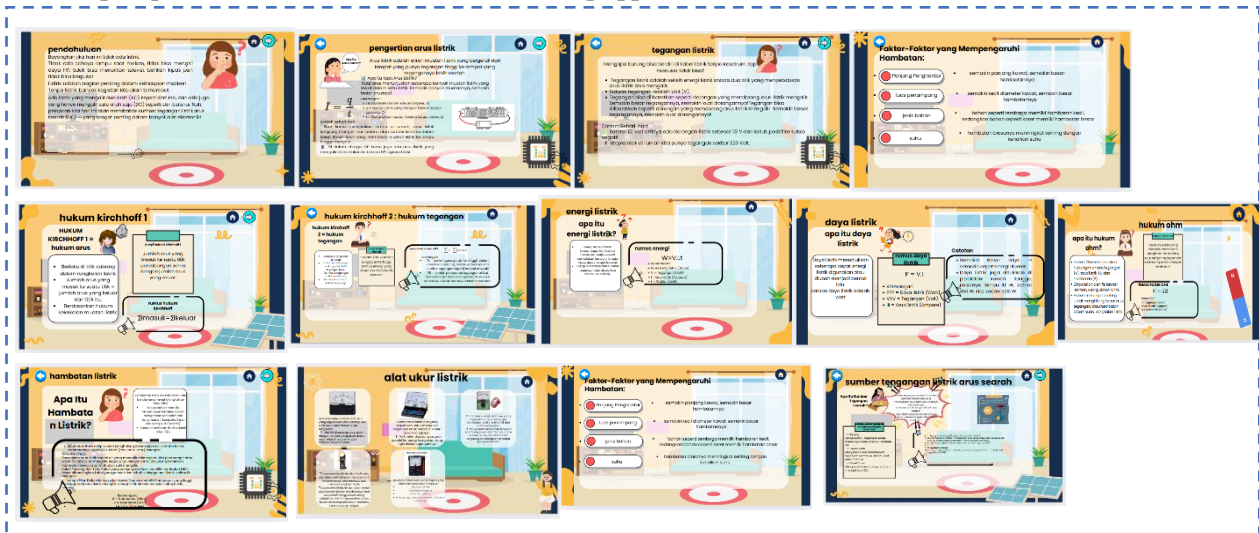


Figure 3 Design of interactive learning media

3) The closing of interactive learning media includes a bibliography and biographies.



Figure 4 Interactive learning media cover design

4) Design validation

At the stage of validation of the design of interactive learning media that has been developed by experts, to determine the feasibility based on the assessment

- Material experts who are competent in the field of physics education;
- Media experts who are competent in the field of learning media.

a. Subject matter expert validation results

Media and material validation was carried out by three lecturers of physics education at the University of Kh. A Wahab Hasbullah Jombang rice pond. Validation by using a validation questionnaire through Google Forms. From the results of the questionnaire filled out by the validator, the percentage in Table 2 was obtained.

Table 2 Media Expert Validation Results

Assessment Aspects	Indicators	Percentage (%)	Average percentage (%)	Criterion
Simplicity	Images and animations in media are easy to understand	83,3	75	Valid/eligible
	Command sentences and navigation are easy to understand	66,7		
Alignment	The order of view between pages is logical and according to the learning flow	75,0	71	Valid/eligible
	Easy-to-follow media usage instructions	66,7		
Emphasis	Effective use of color and text emphasizes important information	75,0	75	Valid/eligible
Balance	Proportional text and image sizes	83,3	83	Highly valid/feasible
Shape	The design and layout are attractive and not confusing	75,0	79	Valid/eligible
	Typeface is easy to read and consistent	83,3		
Color	The combination of background colors and text is easy to see	75,0	88	Highly valid/feasible
	Colors are not too flashy or confusing	100,0		
Average value of media validation		78,3		

Media validation is carried out to ensure that the learning media developed have met the eligibility criteria as effective, interesting, and in accordance with the learning objectives. This validation is carried out by media experts by assessing several important aspects, including simplicity, cohesion, emphasis, balance, shape, and color.

Based on the data presented in Table 2, the following results were obtained:

- The simplicity aspect obtained an average percentage of 75%, showing that the images, animations, and sentences used in the media are quite easy to understand and are understood by users. This shows that the media is considered valid/feasible to use.
- The integration aspect has an average percentage of 71%. This means that the order of the display and the flow of the media is quite logical and in accordance with the expected learning flow. The instructions for use are also considered easy to follow. With this value, the media is categorized as valid/feasible.
- The emphasis aspect showed an average value of 75%, indicating that the use of color and text has been able to emphasize important information effectively. This confirms that the emphasis aspect has been achieved and falls under the valid/feasible category.
- The balance aspect gets a high percentage of 83%, meaning that the size of the text and images is proportional and does not interfere with the overall appearance. This value shows that the media in this aspect is very valid/feasible.
- The form aspect obtained an average of 79%. This means that the design, layout, and typeface have met the principles of readability and consistency, so that the media can be used comfortably. This aspect is categorized as valid/feasible.

- The color aspect obtained the highest score with an average percentage of 88%. The combination of background colors and text is considered comfortable to see, and not too flashy or confusing. This shows that the color selection is very supportive of the user's visual comfort and is categorized as very valid/feasible.

Overall, the average score of the validation results of media experts is 78.3%, which is included in the valid/feasible category. Thus, it can be concluded that the learning media developed have met the feasibility standards for use in learning activities. Although some aspects, such as integration and simplicity, can still be improved, this media is generally good enough and ready to be used to support the learning process of students.

b. Subject matter expert validation results

The results of material validation are obtained in percentage as shown in Table 3 below.

Table 3 Material Validation Results

Assessment Aspects	Indicators	Percentage	Friendly	Criterion
Format	Presentation of interesting and interactive materials	83,3	77,8	Valid/eligible
	Navigation and use of media are easy for students to understand	75,0		
	Preparation of material according to the order of basic competencies	75,0		
Fill	Material according to the curriculum syllabus/focus	91,7	79,8	Valid/eligible
	Clear and applicable explanation of concepts	83,3		
	Images/animations/videos help understand abstract concepts	75,0		
	Practice questions include cognitive aspects	83,3		
	Practice questions according to the content presented	75,0		
	Systematic and logical presentation	75,0		
	Materials according to the student's ability level	75,0		
Language	Language is easy to understand and communicative	83,3	85,4	Highly valid/feasible
	There are no confusing terms	83,3		
	Uncomplicated sentences	91,7		
	Spelling and grammar accordingly	83,3		

Validation of material experts is carried out to assess the feasibility of the content of the material in the developed learning media. The aspects that were validated included format, content, and language, each of which consisted of several indicators that were important to ensure the clarity, accuracy, and comprehensibility of the learning content.

1. Format Aspect

The format aspect obtained an average score of 77.8%, which is included in the valid/feasible category. This assessment shows that the writing of the material is quite interesting, systematic, and follows an appropriate learning structure. Navigation and media preparation are considered quite easy for students to understand. However, a score of 75% on several indicators, such as material preparation and basic design, shows that there is still room for improvement in the technical aspects of media format presentation to be more optimal.

2. Content Aspect

The content aspect obtained an average score of 79.8%, which is also included in the valid/feasible category. The highest score was in the indicator of conformity of the material with the syllabus/curriculum (91.7%) and the presentation of abstract concepts (83.3%), indicating that the content is in accordance with applicable learning standards and is able to explain the material clearly. Even so, there is an indicator that obtained a score of 75%, namely in the presentation of images or videos that explain abstract concepts, showing the need for improvement in visual media to strengthen the understanding of the material.

3. Language Aspect

The language aspect obtained the highest score with an average of 85.4%, included in the very valid/feasible category. This shows that the language used in the media is relatively easy to understand, communicative, does not cause double interpretation, and is in accordance with good linguistic rules. The highest score (91.7%) was found in the indicator of sentence clarity without convolution, indicating that the delivery of material is very helpful in understanding the content of learning effectively.

Conclusion

Based on the results of the validation of the material experts on the three aspects of the assessment, an overall average score was obtained, which showed that the learning media were valid/feasible to use. The language aspect stands out as the strongest aspect, while the format and content aspects are rated well, but still allow for improvement in visual presentation and display structure. Thus, this media has met the feasibility standards of effective material content and is ready to be used in learning activities.

5) Design revision

Validated interactive learning media products are then revised according to expert advice and input during the validation process. The comments and suggestions from validators in Table 4 are as follows.

Table 4 Design Revision

Validator	Comments and suggestions
Material Expert	Overall, it is good; the material is complete. However, it is necessary to give pictures to help students understand dynamic electricity, examples of series and parallel circuits. Given a picture with the aim that the reader can know the series and parallel images.
Media members	Media navigation is difficult to understand. This media is good, just because it is in the form of a PowerPoint, it is necessary to pay attention to the background used, so as not to disturb the writing presented. In addition, the animation presentation of each frame does not need to be much, because it is not good with the limited internet network. It is necessary to be consistent in the use of typeface and font size, and it is necessary to give a quiz or evaluate the learning results.

CONCLUSIONS

Based on the results of the validation that has been carried out, it is concluded that interactive learning media developed on dynamic electrical materials are declared valid and feasible to use. Validation by media experts showed an average score of 78.3%, which is in the valid/feasible category. These results show that the aspects of simplicity, integration, emphasis, balance, shape, and color have been well fulfilled according to the learning media standards.

Meanwhile, the results of validation by subject matter experts resulted in an average percentage of 80.7%, which is also included in the valid/feasible category. This shows that the material presented is in accordance with the curriculum, relevant, systematic, and delivered in a language and format that is easy for students to understand.

Overall, the average validation result from the two experts was 79.5%, which indicates that this interactive learning media has met the eligibility criteria as a teaching medium that can be used in the learning process. This media has the potential to help students understand the concept of dynamic electricity in a more easy, engaging, and fun way, and can improve the effectiveness of learning in the classroom.

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