

Development of the Electrical Engineering Drawing E-Module in the Department of Electrical Engineering, Jakarta State University

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Abstract

This study aims to develop an electronic book-based learning media to support the teaching of electrical engineering drawing in the Department of Electrical Engineering at Universitas Negeri Jakarta. Using the Research and Development (R&D) method with the Four-D model (excluding the dissemination stage), the learning media was evaluated by material experts, media experts, and tested with students. The evaluation results show that the learning media achieved an average feasibility score of 91.1% from material experts, 85% from media experts, and 87.1% from students, all categorized as "very good." Based on these findings, the electronic book-based learning media is deemed appropriate to be used as a supplementary tool for the Electrical Engineering Drawing course. This media is expected to enhance students' learning interest through the integration of multimedia elements such as text, images, videos, and animations within a single digital platform.

Keywords: learning media, electrical engineering drawing, flipbook, electronic book.

INTRODUCTION

Education is a means of improving the quality of human resources. The progress of a nation is very influential on human resources and quality human resources are greatly influenced by quality Education. Education is also a very important influence on the future of the Indonesian nation (Antara et al., 2023).

One innovation in the world of education that educators can strive for is creating effective learning methods and modern learning media (Suryadi et al., 2023). It is important for educators to try so that the learning material they convey can be understood well by students (Rahayu et al., 2024).

The development of digital technology in education has encouraged innovation in learning methods and media. One of these innovations is the development of electronic modules (e-modules) which are designed to increase the effectiveness and efficiency of the teaching and learning process (Andhur Maisyir & Legiman Slamet, 2022). E-modules offer access flexibility, interactivity, and the ability to integrate various multimedia elements such as text, images, video, and animation, which can increase student understanding and learning motivation (Sani et al., 2024).

In the context of electrical engineering education, especially in electrical engineering

drawing courses, the use of e-modules becomes relevant.

This course requires an in-depth understanding of complex symbols, standards and procedures, which can be delivered more effectively through interactive media (Adiarta, 2024). Several studies have shown that the application of e-modules in electrical engineering learning can improve learning outcomes and student interest.

However, to date, there is still limited research examining the development of e-modules specifically for electrical engineering drawings. Therefore, this research aims to fill this gap by developing an electrical engineering drawing e-module that suits the needs of electrical engineering students. It is hoped that this e-module can be an effective and efficient learning resource, as well as being able to increase student competence in electrical engineering drawing.

Thus, this research not only contributes to the development of learning media, but also supports improving the overall quality of electrical engineering education.

METHOD

Research into the development of technical drawing learning media in technical drawing

courses is a type of research and development (Research and Development or R&D).

The development model used in this research is a modification of the Four-D Model by Thiagarajan and Sammel. This model consists of 4 development stages, namely Define, Design (planning), Develop (development), and Disseminate (dissemination) (Irsandy et al., 2024). The modifications made in this research only used the initial three stages of the four stages proposed by Thiagarajan and Sammel.

In this study, only the initial three stages of the four Four-D stages were used (Ramadhan et al., 2023). This research was conducted from the define, design, and develop stages. The dissemination stage was not carried out in this research (Mertayasa et al., 2023).

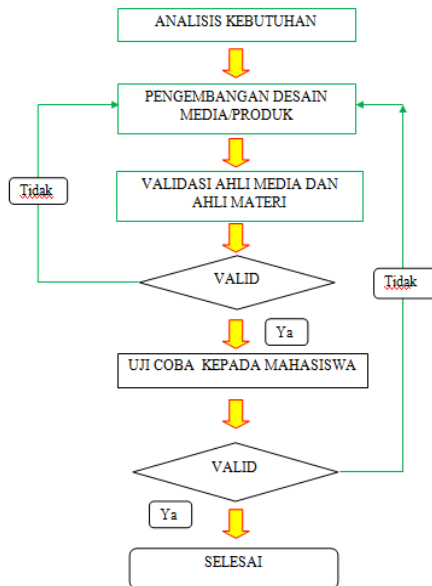


Figure 1. Research Steps

RESULTS AND DISCUSSION

Based on the results of research into the development of technical drawing learning media in the Electrical Engineering Education Study Program, the results were obtained for a learning media product with the following appearance:

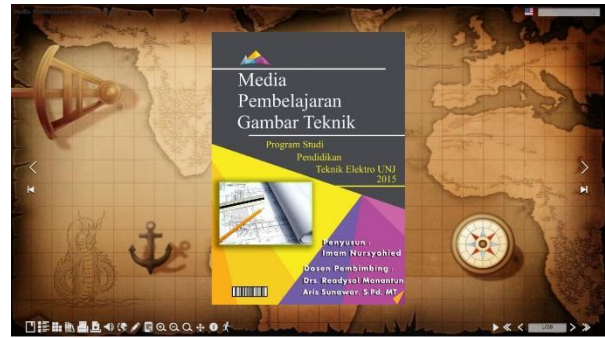


Figure 2. Initial Media Display

The results of the feasibility test by material experts on learning media for three aspects assessed with 17 questions obtained an average score for aspects of suitability of material with topic and substance, namely 100%, learning quality 86.7%, presentation techniques 86.7% with an average of the overall average of all aspects is 91.1%. The results of the feasibility test by media experts on learning simulations for four aspects assessed with 22 questions obtained an average score for the structure presentation aspect of 90%, display presentation 82.5%, illustrations 93.3%, and instructions 82.85% with the average for all aspects being 85%. The results of trials by students on learning media for four aspects assessed with 24 questions obtained an average score for the introduction aspect of 88.3%, learning material 86.5%, illustrations 86.8%, and evaluation 86.8% with the average for all aspects being 87.1%. In terms of material, the following results were obtained:

Table 1. Material Feasibility Test Results

No	Aspect	Material Feasibility Test	
		Percentage	Assessment
1	Suitability of material to topic	100%	Very well
2	Quality of learning	86,7%	Very well
3	Presentation Techniques	86,7%	Very well
	Rate-rate	91,1%	Very well



Picture. 3 Graphics of Material Feasibility Test Results

In terms of appearance obtained the results are as follows:

Table 2. Media Feasibility Test Results

No	Aspect	Material Feasibility Test	
		Percentage	Assessment
1	Presentation of Structure	90%	Very well
2	Display Presentation	82,5%	Good
3	Illustration	93,3%	Very well
4	Instruction Rate-rate	82,85% 85%	Good Very well

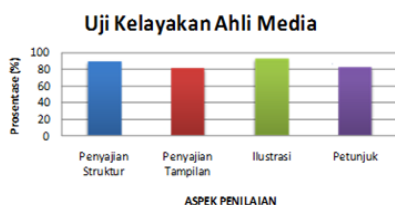


Figure 4. Graphic of Media Feasibility Test Results

The results of the trial on students received the following assessment:

Table 3. Field Test Results

No	Aspect	Material Feasibility Test	
		Percentage	Assessment
1	Introduction	88,3%	Very well
2	Learning materials	86,5%	Very well
3	Illustration	86,8%	Very well
4	Evaluation	86,8%	Very well
	Rate-rate	87,1%	Very well

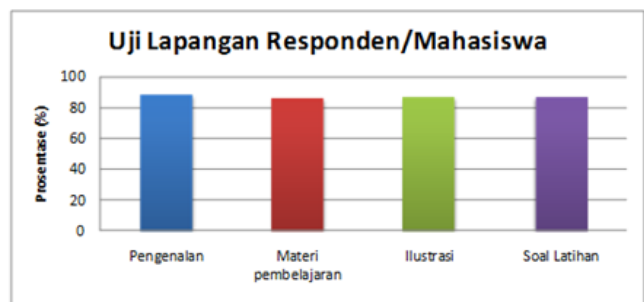


Figure 5. Graph of Field Test Results

The results of material feasibility tests on learning media carried out by material experts received very good interpretations. For the three aspects assessed by material experts with 17 questions, an average score of 91.1% was obtained. This shows that in terms of presentation of the material and content of the learning media it is very good and suitable for use as a learning resource in teaching technical drawing.

The results of the learning media feasibility test conducted on media experts received a very good interpretation. For the four aspects assessed by media experts with 20 questions, an average score of 85% was obtained. This shows that in terms of presentation the appearance of the learning media is very good and suitable for use as a learning resource in teaching technical drawing.

The final results of the student assessment of the electrical engineering drawing

learning media received a very good interpretation. For four aspects with 24 questions, an average rating of 87.1% was obtained. This shows that the media material is adequate and the media display can attract students' interest in learning technical drawing.

CONCLUSION

Based on the development research that has been carried out and the discussion that has been described, the following conclusions can be drawn:

1. The development of electronic book-based learning media for Engineering Drawing for students of electrical engineering education goes through several stages, including: determining the need for material contained in electronic book-based learning media, designing electronic book-based learning media in the form of an initial draft, and developing electronic book-based learning media that has been prepared with the consideration of experts. These stages refer to the Four-D development model by Thiagarajan and Semmel, namely define, design, develop, disseminate with modifications, without including the disseminate stage (Putu et al., 2021).
2. The results of the assessment of the feasibility level of electronic book-based learning media carried out by material experts obtained a feasibility level of 82.41%, with a very feasible category. Meanwhile, media experts obtained a feasibility level of 80.83% in the very feasible category. The assessment of the feasibility level by the subject teachers was 84.87%, with the category very feasible. Meanwhile, the response to the display of electronic book-based learning media by students of electrical engineering education at Jakarta State University was 83.63% in the very appropriate category.
3. So, this shows that electronic book-based learning media for Engineering Drawing is feasible and suitable for use as a learning media for students at Jakarta State University.

SUGGESTION

Based on the research limitations experienced, researchers can provide suggestions, including for future research, to:

1. Develop material content by paying attention to the adjusted curriculum.
2. Carry out a wider dissemination stage, so that electronic book-based learning media is more useful not only at one university level.

BIBLIOGRAPHY

- Adiarta, A. (2024). *Pengembangan Media Pembelajaran Interaktif Dasar Instalasi Listrik Berbasis Ispring Suite 11 1 st Made Dwi Suta Negara 1 , 2 nd IGMSB Pracasitaram* (Vol. 13, Issue 2). <https://doi.org/10.23887>
- Andhur Maisyir, & Legiman Slamet. (2022). *Jurnal Vocational Teknik Elektronika dan Informatika*. <http://ejournal.unp.ac.id/index.php/voteknika/index>
- Antara, P., Santiyadnya, N., Mahardika, W., & Wiratama, P. (2023). *PENGEMBANGAN SISTEM PENYORTIR BAWANG OTOMATIS MENGGUNAKAN SENSOR ULTRASONIK SEBAGAI MEDIA PEMBELAJARAN PADA MATA KULIAH SISTEM KONTROL OTOMATIS* (Vol. 12, Issue 2). <https://doi.org/10.23887>
- Irsandy, F., Putra, E., Santiyadnya, N., Putu, I., & Arsa, S. (2024). *MEDIA PEMBELAJARAN SIMULASI PEMBANGKIT LISTRIK TENAGA AIR BERBASIS TRAINER PADA MATA KULIAH SISTEM PEMBANGKIT TENAGA LISTRIK* (Vol. 13, Issue 1). <https://doi.org/10.23887>
- Mertayasa, G., Putu, I., Arsa, S., Mahardika, W., & Wiratama, P. (2023). *PEGEMBANGAN MEDIA PEMBELAJARAN SISTEM PEMBANGKIT LISTRIK TENAGA AIR (PLTA) PADA MATA KULIAH SISTEM PEMBANGKIT LISTRIK DI PRODI PENDIDIKAN TEKNIK ELEKTRO 1 st* (Vol.12, Issue1). <https://doi.org/10.23887>
- Putu, I., Budi, K., Arsa, S., Mahardika, W., & Wiratama, P. (2021). *MEDIA PEMBELAJARAN SISTEM KENDALI BERBASIS SMART RELAY UNTUK*

MAHASISWA PROGRAM STUDI S1
PENDIDIKAN TEKNIK ELEKTRO
UNIVERSITAS PENDIDIKAN GANES
HA PADA MATA KULIAH SISTEM
KENDALI. *Jurnal Pendidikan Teknik
Elektro Undiksha*, 10(3).

- Rahayu, L., Putu, I., Arsa, S., Mahardika, W., & Wiratama, P. (2024). *PENGEMBANGAN MEDIA PEMBELAJARAN MOBILE LEARNING BERBASIS ANDROID PADA MATA KULIAH RANGKAIAN LISTRIK DI PROGRAM STUDI PENDIDIKAN TEKNIK ELEKTRO* (Vol. 13, Issue 1). <https://doi.org/10.23887>
- Ramadhan, M., Ratnaya, G., Gede, I., Surya, M., & Pracasitaram, B. (2023). *PENGEMBANGAN MEDIA PEMBELAJARAN PENDETEKSI DAN PENGAMAN KEBOCORAN GAS LPG BERBASIS IOT PADA MATA KULIAH SISTEM KONTROL OTOMATIS*. 12(3), 253–262. <https://doi.org/10.23887>
- Sani, A. I., Adiarta, A., Gede, I., & Pracasitaram, S. B. (2024). *PENGEMBANGAN E-MODUL PEMBELAJARAN ANALISIS ALIRAN DAYA DENGAN SOFTWARE ETAP PADA MATA KULIAH ANALISA SISTEM TENAGA* (Vol. 13, Issue 1). <https://doi.org/10.23887>
- Suryadi, P. D., Putu, I., Arsa, S., Mahardika Prasetya, W., & Kunci, K. (2023). *MEDIA PEMBELAJARAN PEMBANGKIT LISTRIK TENAGA SURYA DALAM PENGUKURAN ARUS DAN TEGANGAN LISTRIK PADA RANGKAIAN SERI PARALEL* *Informasi Artikel ABSTRAK*. 12(3), 233–243. <https://doi.org/10.23887>