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Developing Android-Based E-Modules for Project-Based Learning in Basic Electrical

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ABSTRACT

This research aims to develop a validated, useful, and efficient electronic module (e-module) on the Fundamentals of Electrical Engineering using a project-based methodology. The e-module is designed to enhance learners' understanding and improve their learning outcomes. The Research and Development (R&D) approach, consisting of four stages—Define, Design, Develop, and Disseminate—was employed. Descriptive analysis was used to evaluate the validity of the e-module based on assessments by material and media specialists, as well as its practicality for teachers and students, and its impact on student learning. The results show that the e-module's validity was confirmed through descriptive analysis. Media experts rated it with a validation value of 0.88, and material experts gave a value of 0.92, both exceeding the threshold value of 0.61, indicating high validity. The practicality was measured by responses from teachers and students, with teachers giving an average score of 92.00% and students 96.79%, indicating the e-module is very practical. Effectiveness was assessed through the gain score of student learning outcomes, which was 0.65. This score falls into the medium category, as it is between > 0.3 and < 0.7. Therefore, the project-based Fundamentals of Electrical Engineering e-module has been shown to enhance learning outcomes effectively. In conclusion, the e-module has been validated for its content and media, proven practical by positive feedback from teachers and students, and demonstrated effective in improving learning outcomes, making it a valuable educational tool.

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1. INTRODUCTION

Significant advances in science and technology, along with the rapid development of communication systems, have led to changes and progress in various fields of life. This rapid development of technology and information not only impacts the general pattern of life, but also has a significant impact in the world of education (Eslit, 2023) . As changes and progress occur, a continuous attitude of adjustment is needed to remain relevant to ongoing technological developments. Progress

in science and technology motivates renewal efforts in the use of technical discoveries in the context of the teaching and learning process. (Murtado et al., 2023). Using technology as teaching materials can help to create an exciting and enjoyable learning experience. Thus, it is expected that teachers have a variety of learning tools and can control the teaching process with the goal of boosting student engagement and learning results (Arabiah et al., 2023).

The findings from observations and interviews at SMKN 1 Padang in class X Electrical Power Installation Engineering show the existence of the Fundamentals of Electricity Engineering subject. The topic aims to improve cognitive, psychomotor, and affective components, with the objective that students can grasp, master, and apply knowledge in practice. The Fundamentals of Electricity Engineering subject at Vocational High Schools (SMK) represents a form of learning that is productive, combines theory and practice, and encourages the development of reasoning skills. In accordance with the Learning Outcomes related to Elements of Electrical Measuring Instruments and Test Equipment, the learning objective is for students to be proficient in using electrical measuring instruments and test equipment. These skills are considered basic and important, so grade X learners are expected to complete or fully understand this subject, as it is the basis for practice in the Fundamentals of Electricity Engineering subject (Kiptiyah et al., 2022).

From the observation at SMKN 1 Padang related to the subject of Fundamentals of Electricity Engineering, it is known that there is no learning media that presents projects related to the subject. The current teaching and learning process is still fully dependent on educators as the only source of learning. Learners only take information given and explained by educators, so the learning process tends to be teacher-centered, so students are less active in learning (Ozkaya & Sitki, 2023). The learning media used is a powerpoint presentation containing learning theory delivered by the educator through the lecture method. Learners then listen to the explanation and record the subject matter presented.

Furthermore, learning time in class is limited, so educators must convey material as effectively as possible so that pupils understand it. Variations in the use of other learning media have not been applied, so students only get theoretical learning in class without repeating material at home due to limited learning resources (Rice & Cun, 2023). This learning model requires students to always focus on providing material by educators. This situation is not in accordance with the principles of learning outcomes that emphasize student-centered learning (Nisa et al., 2023).

The innovation to be developed is a Project Based Learning-oriented E-module. The e-module will contain materials delivered to readers, especially students, by adopting the concept of project-based learning. E-modules that carry the Project Based Learning approach not only contain text but also include images, videos, and project tasks. Hopefully, this can increase students' learning motivation. By designing and compiling E-modules using the Project Based Learning model, it is expected that students can explore their potential and develop their creativity and curiosity. Therefore, indirectly, learners are expected to be more enthusiastic in participating in learning and the knowledge gained can be better embedded in their memories (Moreno & Escobar, 2021). By referring to this explanation, the researcher proposes a solution in the form of developing an E-module based on Project Based Learning that can be accessed via an Android device, especially for Electrical Lighting Installation subjects in SMK. Hopefully, this solution can increase students' interest in learning and support their understanding of learning materials (Mariatul Kibtiyah, 2022).

An e-module, as a form of electronic module, is a learning media that is structured in a digital or non-print format. E-modules can be used by learners independently or with educators or facilitators in an effective and efficient way. The existence of this electronic media has the potential to make the learning process more interesting and interactive, provide flexibility in time and place of learning, and can improve the overall quality of learning (Gufran & Mataya, 2020). The e-module of Fundamentals of Electricity Engineering to be produced is a comprehensive teaching material that includes contents, methods, limitations, and ways of evaluation in a structured manner. The subject of Fundamentals of Electricity Engineering involves productive learning that integrates theory and practice, emphasizes skills, and encourages learners to have a deeper understanding (Satria, 2021). Therefore, learners need

to have broader knowledge and actively participate in reading to understand concepts, be able to analyze, and apply the learning in everyday life. Therefore, the creation of E-modules of Fundamentals of Electricity Engineering is expected to increase the interactivity of learners. This e-module is equipped with a video as one of the presentation elements to attract interest and facilitate understanding of the material. This E-module learning innovation of Fundamentals of Electricity Engineering will be implemented through electronic devices, such as computers or Android devices (Marsiti et al., 2023).

Project-Based Learning is a teaching technique that requires content requirements in its curriculum. This method emphasizes fundamental questions related to a problem that every teacher must answer. Project-based learning also demands learners' ability to identify real problem topics (Setemen et al., 2023). With a focus on inquiry activities, project-based learning is considered an innovative method that helps the development of understanding in the abstract. Through this method, learners are invited to seek knowledge through cooperation with fellow learners and are directly involved in the learning process (Arlina Arlina et al., 2023).

Project-based learning is a student-centered learning style in which students actively participate in generating a culminating project. At SMK Negeri 1 Padang in Padang city, Indonesia, the independent curriculum is followed, and the Basics of Electricity Engineering is a required subject for the Electric Power Installation Engineering Department. The curriculum encourages students in the skill program to gain mastery in this subject (Tapia et al., 2021). Learners have the option to implement their projects individually or in groups, with a specified timeframe for completion. Project-based learning allows students to get involved in their education and creates a deeper comprehension of the subject matter. This approach encourages more practical and hands-on learning, allowing students to apply their knowledge in real-world circumstances.

Android Studio, an IDE (integrated development environment) is used to generate e-modules. It is software used to create applications for the Android operating system. With Eclipse serving as the basis, Google began developing Android Studio. Later, it was enhanced with the help of IntelliJ IDEA, a popular Java IDE. In order to effectively take Eclipse's place in the future for developing Android applications, Android Studio is still being developed. It is intended that by creating this project-based module teaching resource, teachers and students will be able to utilise it with ease, and the module will be able to effectively increase student learning results (Fradika et al., 2023).

2. METHODS

This research is classified as research and development (R&D). This strategy is used to develop a specific product and evaluate its effectiveness. Research and development have an important role in advancing science and technology, which leads to innovation in education. The product developed in this research is a Project Based Learning-based Fundamentals of Electricity Engineering e-module, intended for grade X students majoring in TITL (Electric Power Installation Engineering)

The 4-D (four-dimensional) model is used for developing learning materials. This model was chosen because it has a simple, methodical procedure, adheres to the intended development research steps, and involves expert opinion in its development. Before the developed media is tested, the four-D development model ensures revisions based on assessments, suggestions, and input from experts. The four-D model's development stages include four steps:

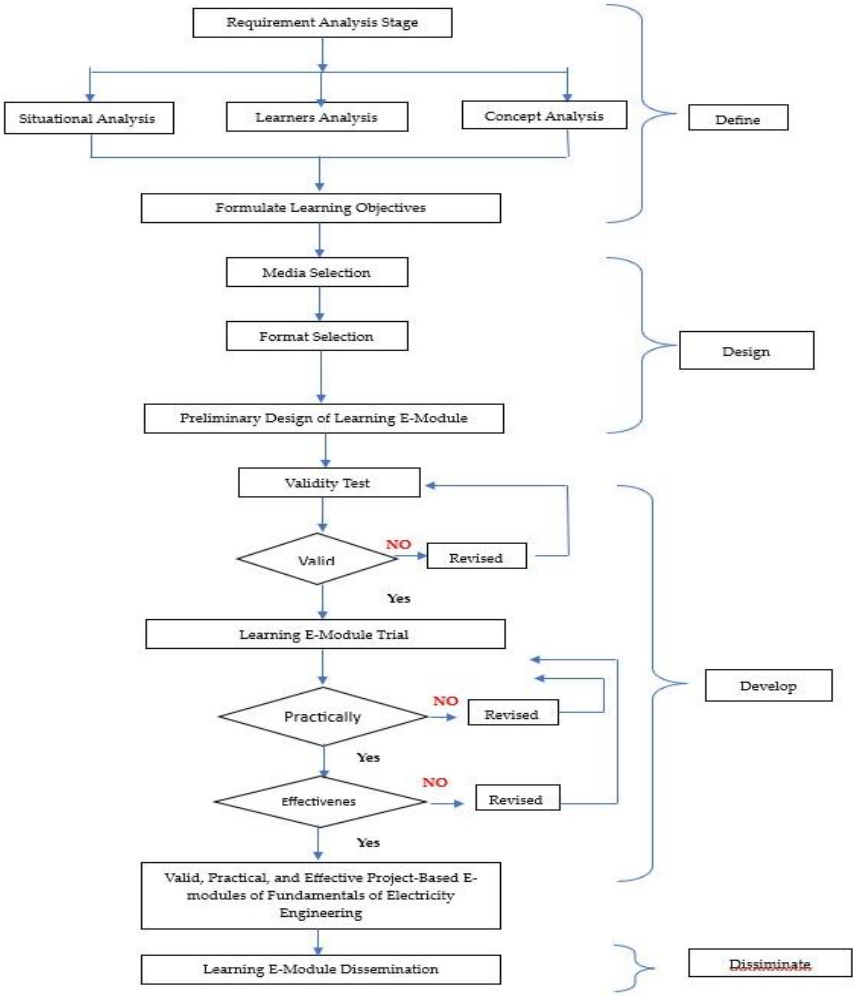

Figure 1. Illustrates the 4D Model Development Procedure
Source: adapted from Thiagarajan (1974: 6-9)

1. Define: This is the needs analysis stage, to put it simply. When developing a product, developers must consult the development requirements, do analysis, and gather data regarding the required level of development.
2. Design: The objective of this step is to develop a prototype for learning media. It entails three steps: During the design phase, Android-based project-based E-module Basics of Electricity Engineering was developed using PCs and smartphones as the media. Initial designs comprised of text, photos, project activities, and videos; learning formats and presentations chosen in accordance with the learning materials employed.
3. Develop: In order to make the e-module legitimate and tested, it is built during the development stage in compliance with the validator's suggested changes. Currently, a number of tests are conducted, including: Test of Validation For a product to be considered genuine, it must undergo validation during the design phase. Experts in their respective fields validate the product through the practicality test. The effectiveness test is conducted to ascertain whether the e-module is effective in enhancing student learning outcomes. The goal of this test is to evaluate the e-module's usability and aesthetic appeal.
4. Disseminate: This stage is accomplished by giving teachers and students majoring in Electrical Power Installation Engineering at SMKN 1 Padang access to the project-based Fundamentals of Electricity Engineering e-module and by implementing the learning process utilising the e-module.

3. FINDINGS AND DISCUSSION

3.1 Define Stage

From the observation at SMKN 1 Padang, it was found that in the learning process, educators only use media in the form of PowerPoint presentations. The delivery of material is still unidirectional, where the educator presents the material and students only listen and take notes in their books. This causes learning to be less effective and feels monotonous.

Based on the problems described, a learning media is needed that can meet the needs of students inside and outside the classroom independently. In field observations, researchers found that all Electrical Lighting Installation students at SMKN 1 Padang have Android Smartphones, but have not used them in the learning process. Therefore, as an alternative solution based on the problems and phenomena found, is to utilize Android Smartphones owned by students as learning media in the form of e-modules.

The learning objectives for the Project-based Fundamentals of Electricity Engineering e-module are aimed at developing the necessary material for learners. These objectives include the ability to use measuring instruments and electrical test equipment, as well as an understanding of basic concepts in electricity, electrical power systems, basic electronics, and digital techniques. The objectives are further explained by detailing the specific material that learners need to master. The main focus of the learning outcomes is the introduction to measuring instruments and electrical test equipment, as these are important for carrying out basic maintenance practices on electrical components. The ultimate goal is for learners to meet the school's standards and successfully achieve the desired learning objectives.

3.2 Design Stage

This text describes the initial draft of a plan to develop an e-module on electricity engineering basics using Android and a Project Based Learning approach in a vocational high school (SMK). The e-module is designed to include text, images, and videos to aid in student understanding of the material. The e-module follows the principles of Project Based Learning, which aims to support classroom learning through a hands-on and practical approach. The initial stage of development focuses on creating a design framework for the e-module, which includes a main menu, a materials menu, an evaluation menu with questions to assess student comprehension, and project tasks to guide students in applying the concepts. Various components are involved in the design of this e-module.

This primary menu page offers information about the application's name and the subject under development. In addition, on this initial page, there is a "start" navigation option that will take the user to the main page.

Figure 2. Start menu page

The Main Menu page has various navigation possibilities, including the guide button, exit navigation, and Learning Elements Menu.

Figure 3. Home Menu

The Guide Menu page is a page that provides instructions for using the Project-based Fundamentals of Electricity Engineering e-module.

Figure 4. Instruction Page

The Elements of Electrical Measuring and Testing Equipment Menu page contains Learning Outcomes related to electrical measuring and testing equipment, material menu, quizzes, projects, learning videos, and navigation buttons to return to the Home Page.

Figure 5. Menu Page of Measuring Instrument Elements and Engineering Test Equipment

The Materials page contains learning modules that include active learning sections, such as Trigger Questions, material reinforcement, discussion, enrichment material, group assignments, and summaries.

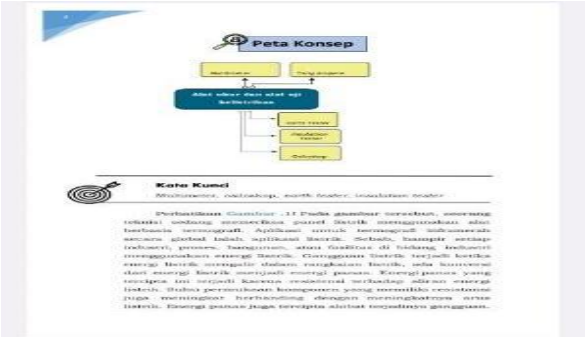

Figure 6. Material page

The Quiz page includes a series of quiz questions about the Electrical Measuring and Testing Equipment topic

Figure 7. Quiz Page

The Project page contains instructions on the execution of a project to be carried out in groups, focused on the use of electrical measuring and test equipment.

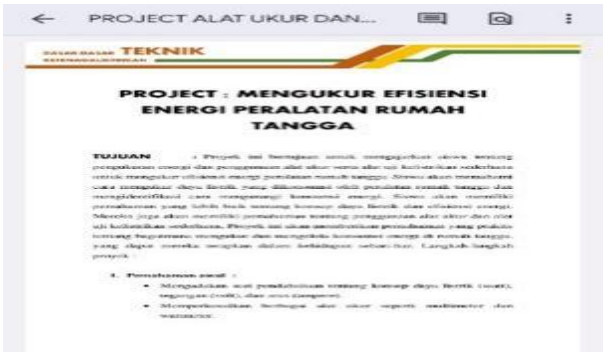

Figure 8. Project page

YouTube learning video page covering the topic of Elements of Electrical Measuring and Testing Equipment.

Figure 9. Learning Video Page

3.3 Development Stage

3.3.1 Validity Testing

The findings of the validity test study undertaken by media professionals yielded a validation value of 0.86, which exceeds the minimum limit of 0.61. Therefore, the e-module Fundamentals of Electricity Engineering based on Project Based Learning in SMK is classified as valid. Furthermore, the findings of validation by material specialists resulted in a validity value of 0.92, which also above the minimum limit of 0.61. This shows that the material on the e-module of Basics of Electricity Engineering based on Project Based Learning in Vocational Schools is also categorized as valid.

3.3.2 Practicality Testing

Based on the evaluation from teachers regarding the practicality of using the Project Based Learning-based Fundamentals of Electricity Engineering e-module, an average of 92.00% was found, which is categorized as very practical. According to the teacher's answer, the e-module that has been produced is quite practical. Meanwhile, the findings of students' reactions to the use of e-modules indicated an average of 96.79%, which is classified as very practical. Therefore, from the students' perspective, the developed e-modules are also considered very practical. Overall, this reflects that the e-modules that have been designed provide convenience for teachers and help students in understanding learning materials.

3.3.3 Effectiveness Testing

Test Instrument Test Questions

1. Validity Test of Trial Questions

The validity test of the questions was carried out through a trial test on Class XI ITTL students at SMK Negeri 1 Padang. From the calculation using the formula, it was found that 20 questions were considered valid, while 5 items were considered invalid. The questions that are considered valid are numbers 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 23, and 24. Meanwhile, the items that are considered invalid are numbers 1, 6, 16, 22, and 25. The validity results of this trial will be a guideline in preparing pretest and posttest questions.

2. Reliability Test of Trial Questions

Question reliability is a measure to determine the extent to which a test can be trusted. Through calculations using Microsoft Excel 2013, a reliability value of 0.82 was obtained, which is included in the reliable category. Therefore, the questions can be considered as reliable and can be continued with testing the level of difficulty and the level of difference of the questions.

3. Differential Test of Trial Questions

Based on the findings of the test of question differentiation using the formula, it was found that there were 1 item in the excellent category, 12 items in the good category, 7 items in the fair category, and 5 items categorized as poor. Furthermore, based on the results of the analysis of the differentiation of learning outcomes questions, these items are recommended to be removed from the learning outcomes test on future occasions.

4. Test Level of Difficulty of Trial Questions

Analyzing the level of difficulty involves assessing the level of difficulty of the test items with a view to selecting the right questions to give to students. It aims to identify easy, medium, and difficult questions. Based on the results of the formula calculation of 25 items, it is concluded that one item is included in the easy category, namely question number 22. Meanwhile, for the medium category, there are 24 questions which include item numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, and 25.

Effectiveness of Student Learning Outcomes

The gain score is calculated based on the increase in student learning outcomes following the pretest and posttest. The N-gain value is measured with the objective of evaluating the effectiveness of applying a method or therapy in research with a pretest-posttest group design (experimental design) or with a control group.

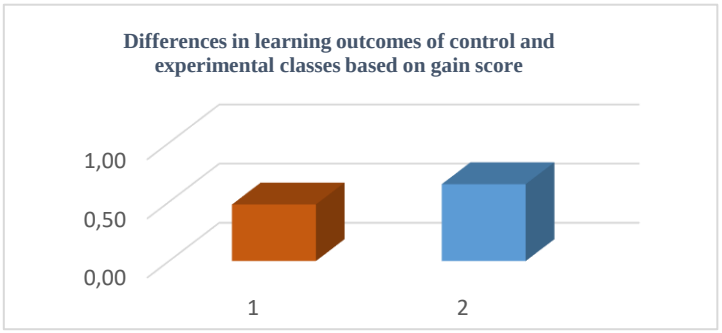

Figure 10. Graphic of learning outcomes of control and experimental classes based on gain score

Analysis of the improvement of learning outcomes in cognitive aspects was carried out using the Gain Score formula .The graph above compares the learning outcomes of the students in the experimental class versus the control group. It is evident from the examination of learning outcomes using gain scores that the experimental class's learning results are greater than those of the control group. The experimental class's learning outcomes, which achieved an average gain score of 0.65, are classified as middling. In contrast, the control class average score is 0.48. (Sulistyana et al., 2023).

At the t-test stage, it is carried out to determine the average Learning outcomes differed across experimental and control groups. Testing using the polled variant t-test formula, the t-test analysis is significant if obtained tcount> ttable and the result of the sig value (2-tailed) <0.05. It is evident from the results of test computations using SPSS by comparing the learning outcomes of experimental and control class pupils.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Belajar Siswa	Equal variances assumed	.651	.423	4.446	58	.000	8.83333	1.98679	4.85635	12.81032
	Equal variances not assumed			4.446	57.558	.000	8.83333	1.98679	4.85570	12.81097

Figure 11. Table of Calculation Results of the effectiveness of learning outcomes using SPSS

Finding the average difference in learning outcomes between students in the experimental class and control class is done at the t-test stage. When applying the polled variant t-test formula, an analysis of the t-test is considered significant if the resultant tcount is greater than the ttable and the 2-tailed sig value is less than 0.05. The project-based e-module Fundamentals of Electricity Engineering has been deemed beneficial since the t test results of the poestest value of the experimental class and the control class obtained 0.00 <0.05.

3.4 Dissemination Stage

After the project-based Fundamentals of Electricity Engineering e-module that has been designed has successfully obtained validity, practicality, and effectiveness, it can be concluded that the e-module has met good criteria and is suitable for dissemination. The project-based Fundamentals of Electricity Engineering e-module that has been ready can be given to other classes that have similar subjects. Dissemination of this e-module can be done by providing application links via WhatsApp messages, so that educators and students can access the e-module through their smartphone devices (Turner et al., 2024).

In the framework of dissemination, students listen to the explanation of how to use the project-based e-module Fundamentals of Electricity Engineering that has been distributed. Based on a study of the distribution results for the project-based e-module Fundamentals of Electricity Engineering, it is possible to infer that the e-module is very practical for use by educators and students.

Discussion

The development of project-based e-modules of Fundamentals of Electricity Engineering is a series of activities or processes carried out with the aim of creating project-based learning e-modules based on development principles. The goal of building this project-based learning e-module is to create a Fundamentals of Electricity Engineering e-module that is valid, practical, and effective. The e-module was created utilizing the 4D development methodology, which includes four stages: define, design, develop, and disseminate (Xue et al., 2023).

In the first step, namely define, situation analysis, learner analysis, concept analysis, and formulation of learning objectives are carried out. Situation analysis is carried out to find out the obstacles and problems that arise during the learning process, with the aim of creating solutions that are in accordance with the situation and conditions at school (Meepung & Pratsri, 2022). The subject given focus is the Basics of Electricity Engineering for class X students majoring in Electrical Power Installation Engineering (TITL). Learner analysis is conducted to evaluate students' abilities, knowledge, and thinking skills. Concept analysis aims to review the concepts of basic competencies used in the development of project-based e-modules of Fundamentals of Electricity Engineering. By detailing the concept analysis, indicators are obtained which will later be used in the design of the project-based Fundamentals of Electrical Engineering e-module, especially in the elements of Electrical Measuring Instruments and Test Equipment (Siew & Chai, 2024).

In the following step, the second stage, namely design, e-module design is carried out by considering the material in accordance with the learning outcomes, learning objectives, and the flow of achieving learning objectives in the Fundamentals of Electricity Engineering subject, particularly in the Electrical Measuring Instruments and Test Equipment. The major actions in this stage include authoring, evaluating, and editing the proposed e-module while considering language, word structure, objective format, evaluation, project tasks, and video material. The e-module design is based on the outcomes of situational analysis, learner analysis, idea analysis, and learning objective formulation. Thus, the e-modules built using Android Studio can be accessible via learners' cell phones anywhere and anytime. The e-module follows the function of m-learning as a learning support. When learning only uses presentation media such as PowerPoint, this e-module can provide additional material for learners that can be used in personal learning. In addition, the e-module can also be used as an

independent learning resource for students, both inside and outside the school environment (Fenanlampir et al., 2021).

In the third stage, referred to as the development stage, the e-module is made in accordance with the revisions and input from the validators, resulting in a valid e-module that is ready to be tested. At this stage, the validity, practicality, and effectiveness of the e-module are tested. The validity of a media is considered fulfilled if the results of validity testing using the Aiken's V formula are within the range of values that are considered valid according to the provisions. Based on validity testing by two lecturers from Padang State University, who acted as media expert validators, the e-module was declared valid. Furthermore, two professors of Basic Electricity Engineering subjects at SMK performed material validation, and the results of the validity test by material specialists confirmed the e-module's validity. After being amended with advice from media and material specialists, the final e-modules meet the validity standards for learning media that are appropriate for use.

After the e-module has been validated, the next stage is to assess its usefulness by issuing a questionnaire to teachers and students. A media is considered practical if it gets a practicality assessment from teachers and students in accordance with the practical interpretation. This questionnaire was given to two teachers/practitioners (Basic Electricity Engineering subject teachers) and 30 students from the trial class. The results of the practicality test from the teacher/practitioner showed a percentage value in the very practical category, as well as the practicality test value obtained from students, which was also included in the very practical category.

From the analysis of the results of the practicality questionnaire filled out by teachers and students, it can be concluded that the e-module developed provides convenience in several aspects, including technical aspects, effectiveness, design, interpretation, and equivalence. Learners' responses to the e-modules created showed some bright aspects. The material presented is easy to understand by teachers and students, and the use of this e-module is easy and interesting for students during learning. Therefore, the conclusion is that the Project-based Fundamentals of Electricity Engineering e-module that has been made is very practical and can be utilized as an easy-to-use learning resource for Fundamentals of Electricity Engineering.

After the e-module has been demonstrated to be very practical based on instructor and student feedback, the next stage is to test its effectiveness. The effectiveness of a medium can be judged by the improvement of students' learning results. If there is a significant difference in students' learning outcomes after using the learning media, it is termed effective (Sriwindari et al., 2022). Analysis utilizing the t test and gain score reveals a significant difference between the post-test scores of the control and experimental classes. Therefore, it can be concluded that the Project-based Fundamentals of Electricity Engineering e-module that was designed using Android is effective (Siregar & Harahap, 2020). The results showed that the Project-based Fundamentals of Electricity Engineering e-module developed using Android consists of text, images, project tasks, and videos available online, so it can be accessed by students at any time. This e-module is practical for teachers and learners because it has been adapted to the Android platform. The e-module is in accordance with the expected learning achievements and has proven effective based on post-test results (Afriani et al., 2022). The data analysis revealed significant disparities in the utilization of project-based e-modules on student learning outcomes. Students who use project-based e-modules have better learning results than students who use traditional learning techniques (Made Sri Dewi & Nyoman Ayu Lestari, 2020).

According to the responses of educators and students to the use of project-based e-modules, the e-modules received very positive responses, especially in terms of appearance, ease of use, and their ability to improve student learning outcomes (Simamora et al., 2022). The utilization of e-modules can greatly increase student learning outcomes. The use of project-based e-modules effectively improves critical abilities and scientific attitudes as well as the achievement of students' learning outcomes (Natalia & Jalinus, 2021). The usage of Project-based Fundamentals of Electricity Engineering e-modules in the learning process can help students understand the subject faster and promote interaction between educators and students because students are already familiar with the material.

This e-module enables students play a more active role in learning and engage better with the learning process (Nirmayani & Dewi, 2021).

The Project-based Fundamentals of Electricity Engineering e-module will present simple material that is easy to understand, making it easier for students to understand the lesson better (Saleh & Triyono, 2022). In addition to text and illustrations that can be easily understood by students, the videos included in the Project-based Fundamentals of Electricity Engineering e-module are also a source of reference for students in solving various problems they face (Barnett-Itzhaki et al., 2023). After going through the process of define, design, and develop, the final stage carried out by researchers is the disseminate stage. At this stage, the developed Project-based Fundamentals of Electricity Engineering e-module is disseminated. Dissemination occurs after the e-module is deemed legitimate, practical, and effective based on evaluations from validators and trials that have been completed (Johan et al., 2022).

4. CONCLUSION

This research successfully developed a project-based Fundamentals of Electricity Engineering e-module for Android. The e-module includes learning materials, videos, tests, and project assignments, accessible anytime and anywhere via smartphone. The e-module was found to be valid, practical, and effective based on feedback from experts, teachers, and students. It supports modern teaching methods, aligning with current curriculum and national education goals, and encourages independent, creative, and enjoyable learning. Teachers should consider this e-module as an additional learning tool and receive training to create and use similar e-modules for other subjects, enhancing the availability of flexible, engaging teaching materials in schools.

This study focused solely on the Fundamentals of Electricity Engineering, limiting the generalizability to other subjects. The assessment of the e-module's effectiveness relied heavily on qualitative feedback, which may introduce bias. Additionally, the study did not examine the long-term retention of knowledge or the broader impact on academic performance. Future research should expand to include other subjects and educational levels to enhance generalizability. Incorporating quantitative measures and longitudinal studies would provide a more comprehensive evaluation of the e-module's impact. Additionally, exploring diverse educational settings and student demographics, as well as integrating advanced features like adaptive learning technologies, could further improve the e-module's effectiveness and engagement.

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