



# Development of Android-Based Learning E-Modules in Informatics Subjects

Pedi Rianda<sup>1</sup>, Edidas<sup>1\*</sup>, Dedy Irfan<sup>1</sup>, Rizky Ema Wulansari<sup>1</sup>

<sup>1</sup>Postgraduate Faculty of Engineering, Vocational Technology Education, Padang State University, Padang City, 25171, Indonesia.

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Corresponding Author:

Pedi Rianda

[fedi.rianda027@gmail.com](mailto:fedi.rianda027@gmail.com)

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**Abstract:** This research aims to develop an Android-based E-Module as a learning medium for Informatics subjects. The E-Module is designed to enhance students' interest, motivation, and learning outcomes, enabling them to better understand the material comprehensively. The study adopts the IDI (Instructional Development Institute) method, which includes the stages of define, develop, and evaluate. Primary data collected from media experts, lecturers, and students were analyzed using descriptive analysis to assess the validity, practicality, and effectiveness of the media. The findings reveal that, The E-Module is highly valid in terms of material (0.94) and media aspects (0.94). Its practicality is rated as practical by teachers (88.33%) and very practical by students (93.55%). The E-Module effectively improves student learning outcomes, with an increase in the number of students meeting the KKM standard to 88.33%. In conclusion, the E-Module is valid, practical, and effective as a learning medium for enhancing students' interest, motivation, understanding, and competence.

**Keywords:** Android-based learning; Effectiveness; Informatics learning; Validity; Practicality.

## Introduction

Education in Indonesia today is viewed not only as a public service but also as a productive investment that drives growth across various fields and development sectors (Sukmayadi & Yahya, 2020). It serves not just as a marker of national progress but also plays a crucial role in shaping the advancement of the country. The "Freedom to Learn" concept focuses on innovation and change as central principles, aiming to cultivate students with skills in critical thinking, creativity, innovation, along with communication and collaboration abilities that are essential in the era of the Industrial Revolution 4.0. According to Yudianto (2024) teachers should not treat students uniformly, but Education should guide students according to their unique talents and interests, much like planting rice without expecting it to turn into corn. This implies that the learning environment must foster a sense of value and freedom for students throughout the learning process. However, many

teachers still overlook the individuality of each student, leading to boredom, decreased productivity, and suboptimal learning independence. Teachers often prioritize delivering content over truly assessing students' achievements and learning outcomes, which can hinder their growth and engagement.

Rahmadayanti & Hartoyo (2022) the Merdeka Belajar curriculum highlights outcomes and project-based learning, focusing on developing the Pancasila student profile along with essential competencies like literacy and numeracy. Teachers are encouraged to use diverse media within the Independent Curriculum to enhance students' engagement in learning. Research indicates that video-based teaching materials are both practical and effective as resources in the learning process, helping to make learning more appealing for students (Fadilah et al., 2023; Sablić et al., 2021; Wulandari et al., 2023).

Android-based modules are one of the learning media innovations that attract attention because of their

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flexibility, especially in supporting students to learn independently. Observations at SMK 9 Padang show that even though they have used Android-based learning, the current method is less interactive, causing boredom. In addition, the constraints on understanding Microsoft Word applications among students also cause difficulties in compiling standard reports and job application letters. By developing a more interactive Android-based module, it is expected to improve the quality of Informatics learning in the school and prepare students for the needs of the world of work (Hartanto, 2023; Wijaya et al., 2024).

Learning is a process where students undergo change by interacting with their environment (Festiawan, 2020; Suardi et al., 2018). This process includes providing stimuli, guidance, and encouragement to help students reach their learning goals (Lubis & Nasution, 2023; Nur & Rukmana, 2023; Suryaningsih et al., 2024). Learning is not solely about changing behavior; it also involves developing potential and engaging with the environment to enhance individual knowledge and quality (Agustina & Yanthi, 2023; Hasan et al., 2023). Technology education emphasizes problem-solving through technology, while vocational education focuses on developing practical skills. Combining these fields—known as vocational technology education—enhances effectiveness. TVET (Technical and Vocational Education and Training) includes ongoing education to equip individuals with job-related skills. Vocational education prepares individuals for the workforce by cultivating productive skills and positive attitudes.

Informatics education in schools covers a wide range of topics, including understanding information technology, computer programming, networks, databases, and information security. The focus is on computational thinking to help students develop analytical and problem-solving skills. The curriculum begins with a basic introduction to computers and the internet in elementary school and gradually progresses to advanced programming skills and software development in high school. Additionally, critical digital literacy and collaboration skills are taught to prepare students for the rapidly changing world of technology.

The use of learning media in the educational process has a significant positive impact (Fuady et al., 2021; Hardiansyah & Mulyadi, 2022). Media not only stimulates student interest and motivation but also enhances teacher-student interaction, learning efficiency, and a more uniform learning experience (Afandi, 2022; Kusum et al., 2023; Nasution, 2023). The benefits of using media include improved information presentation, increased student engagement, overcoming sensory and spatial limitations, and offering

direct experiences through activities like visits to museums or zoos.

## Method

The module development model used in this study adopts the IDI (Instructional Development Institute) approach. The IDI model applies systematic approach principles, consisting of three stages: define, develop, and evaluate (Grabowski & Branch, 2003). In the define stage, the researcher conducted a background analysis and problem identification to understand the needs of the learning process. This included analyzing student characteristics, identifying specific learning challenges, and considering the facilities. The develop stage involved designing an initial prototype of the Android-based E-Module. This prototype was then validated by a material expert (a teacher from SMA N 8 Padang) and two media experts (engineering lecturers from UNP) to ensure its validity in terms of content and technical aspects. Finally, the evaluate stage consisted of testing the E-Module in two classes (X Hospitality.1 and X Hospitality.2) and analyzing the results to assess its practicality and effectiveness.

This systematic approach ensures that the development process aligns with the educational needs and conditions of the students. The validation and testing phases allowed for iterative improvements to the E-Module, ensuring that it meets the criteria of being valid, practical, and effective. By focusing on these stages, the study aimed to create a learning medium capable of enhancing student outcomes, engagement, and motivation in Informatics subjects.

## Result and Discussion

### Results

For the login display, we will be asked to enter the username and password that have been set. For admins, you can use the one that has been previously set in the database. For teachers, you can use a username in the form of an email and a password in the form of a NIP or similar identity number.



Figure 1. Canva homepage.

For the admin display, there are several menus or features, including setting Master data (class data, department data, semester data, subject data, evaluation data), User data (Teachers and students), application settings (school logo, school name, principal name), Admin Data, and the exit button.

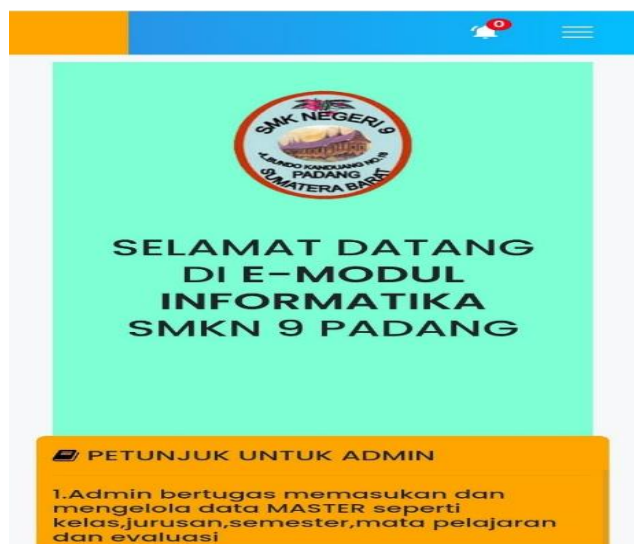


Figure 2. Admin home page view

For this teacher page, you can manage things like the subjects taught, add materials, and enter evaluations in the form of multiple choice questions, and set the evaluation schedule.

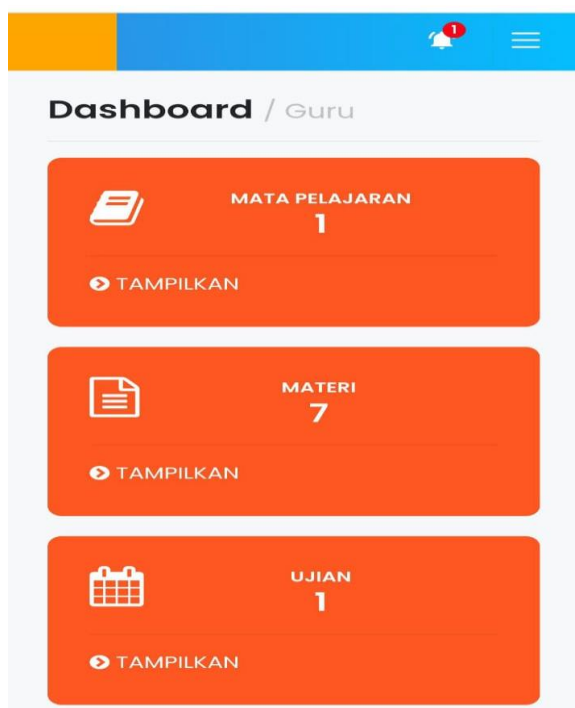


Figure 3. teacher page view

On the student page, students can see the existing material that has been shared by the teacher, as well as work on exercises or evaluations that have been arranged by the subject teacher.

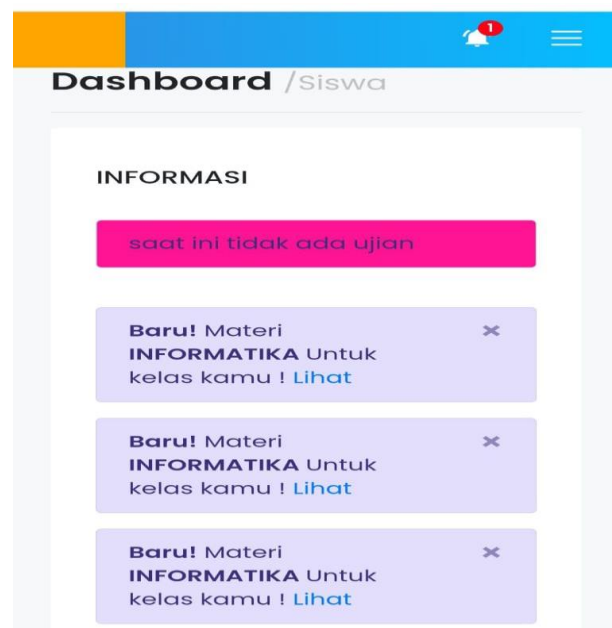


Figure 4. Student page view

Determining the validity of interactive data as a learning medium is by using a questionnaire. In this case the researcher gives a questionnaire to the validator who validates the media being developed. one validator first validates and assesses the content (material) by the Informatics teacher. Meanwhile, two media validators, lecturers at the Faculty of Engineering, UNP, assessed aspects of the media design being developed. The results of the assessment for each indicator aspect provided by the validator are added up and the percentage of the assessment according to the aspects that have been made is calculated. Media validation is a validation of the product design results produced.

Table 1. Results of Interactive Media Material Validation

Validators	Average	validation value	Categories
Validators 1	4.76	0.94	Valid

Table 2. Interactive Media Validation Results

Validators Name	Average	validation value	Categories
Validators 1	4.57	0.89	Valid
Validators 2	5.00	1.00	Valid

The overall average validation of the E-Module can be taken as 0.94, so it can be concluded that the media falls into the valid category.

Practicality is related to the ease of use of the interactive developed. Practicality data was obtained through a questionnaire filled out by Informatics teachers, from the questionnaire, the practicality of the media can be seen Table 3.

**Table 3.** Teacher Response Practicality Results Data

Evaluation Aspect	Score	Description
Technical Aspect	93.33	Very Practical
Time Efficiency	80.00	Practical
Media	90.00	Very Practical
Effectiveness		
Media Design	85.00	Very Practical
Media	93.33	Very Practical
Implementation		
Average	88.33	Very Practical

For the practicality of the media also requires input in the form of responses from students. This data is obtained after learning is carried out, through a questionnaire given to students.

**Table 4.** Student Response Practicality Results Data

Evaluation Aspect	Score	Description
Ease of Use of Media	93.06	Very Practical
Media appearance and appeal	93.70	Very Practical
Time Efficiency	93.89	Very Practical
Average	93.55	Very Practical

The effectiveness testing of learning media is done by comparing student learning outcomes with the Minimum Completion Criteria (KKM). KKM for Informatics subjects is 75. Based on the post-test results data from 36 students, the percentage of students who achieved the KKM was 83.3%, so it can be concluded that using E-Modules in Informatics subjects is very effective in achieving completeness of student learning outcomes.

### Discussion

E-Modules are designed to improve student learning outcomes, where students are given directions to be able to use E-Modules so that students can carry out learning independently (Dini et al., 2023; Febriana & Kartijono, 2023). E-Modules are developed in accordance with the material in the Informatics subject taught to class X semester I students. The development of this E-Modules is carried out using the IDI development model. Based on the overall validation results carried out by the validator regarding the content, interest, media and language aspects of the E-Module, it can be seen that the E-Module has fulfilled the material aspect with a validity value of 0.94, and the media aspect with a validity value of 0.89, both aspects if the validity value scores obtained from each validator are added up, the average validity value obtained is 0.91, the value obtained is in the valid validity level category.

The results of the practicality test of the E-Module by teachers and students were carried out through teacher and student response questionnaires. The practicality test of the E-Module by teacher responses showed a level of practicality with a percentage of 88.33% in the very practical category, while the practicality test of the E-Module by student responses showed a level of practicality with a percentage of 93.55% in the very practical category. So that the average reaches 90.94% or very practical. Practical E-Module means making it easier for students to understand Basic Computer and Network learning that the good and bad of learning is supported by the user of learning media. interactive learning media can make the learning atmosphere fun, because students are more motivated to complete learning (Wahab et al., 2021).

The effectiveness of E-Modules in this study is seen from the ability of E-Modules to activate students in learning and make it easier to understand learning materials (Delita et al., 2022; Priantini & Widiastuti, 2021). The use of teaching materials will greatly help the effectiveness of the learning process and the delivery of messages at that time". In addition to increasing the effectiveness of the learning process, teaching materials can also help students improve their understanding. In this study, the effectiveness test was carried out by looking at the percentage of student learning completion classically, from the posttest scores followed by 36 students, there were 30 students with scores above KKM and 6 students with scores below KKM. Thus, the percentage of students who achieved KKM was 83.33%, this is in a good range in terms of the level of achievement of learning outcomes. So it can be concluded that interactive learning media in KJD subjects is effective

### Conclusion

This study successfully developed an Android-based E-Module for Informatics, using the IDI model's define, develop, and evaluate stages. The findings show that the E-Module is highly valid in terms of material and media, practical based on teacher and student feedback, and effective in improving student learning outcomes. With increased student interest, motivation, and understanding, the E-Module proves to be a valuable tool for enhancing competence and aligning learning with educational goals.

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### Authors Contribution

The main author P.R contributed to product development, research design, research implementation, data collection, and writing research articles. E. the second author, was a supervisor in research activities ranging from article writing, reviewing, to editing. Meanwhile, the third D.I and fourth authors R.E.W played a role in reviewing the initial manuscript and providing input.

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### Conflicts of Interest

The researchers declare there is no conflict of interest.

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