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VALIDITY AND PRACICALITY OF ANGIOSPERM E-MODULE WITH PROJECT BASED LEARNING MODEL CONTAINING RIAU MALAY TRADITIONAL HEALING ETHNOSCIENCE

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ABSTRACT

The preparation of learning media that contains a learning model and local content that is relevant to the material is one of the strategic efforts in creating meaningful and contextual learning. This study aims to test the Validity and Practicality of the Angiospermae E-Module with the Project Based Learning model containing Ethnoscience of Riau Malay Healing Traditions. This study uses the 4D development model (Define, Design, Develop, Disseminate), which is limited to the Develop stage. The data collection instrument in the form of a questionnaire consisting of a validity questionnaire given to material experts, media experts, and language experts and a practicality questionnaire given to lecturers and students. Average validity result by material experts of 91%, media experts 90% and language experts 95%. The three validation aspects are included in the "Very Valid" category. The practicality results of the E-Module by lecturers were 92% and students 88%. The results from both respondents were in the "Very Practical" category.Based on the results of the study, it can be concluded that the Angiospermae E-Module with a Project Based Learning Model containing Riau Malay Traditional Medicine Ethnoscience is feasible and practical to use in learning Angiospermae material.

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INTRODUCTION

Digital transformation in education has brought significant changes to learning strategies. The shift from conventional learning to technology-based learning encourages the development of digital learning media such as interactive and flexible e-modules. E-modules become an important need in supporting learning outcomes because they offer flexibility, attractive visualization, and pedagogical approaches that can be adapted to the context of student learning. Universities in Indonesia have begun to develop and adopt e-modules as part of digital learning transformation, which has been proven to increase student interest and participation (Susanti & Saputro, 2025).

E-modules do not only function as a medium for delivering material, but also must contain learning models that encourage student activeness and contextual values from social and cultural environments. Therefore, the preparation of e-modules needs to be based on active learning in order to improve student participation and understanding (Herianingtyas, 2022).

One learning model that is relevant in higher education is Project Based Learning (PjBL), which emphasizes student involvement in designing, implementing, and evaluating scientific projects. PjBL has been proven to improve students' analytical skills, problem-solving abilities, and collaborative skills. In addition, this model also supports 21st century skills and allows students to learn more contextually through phenomena in their surrounding environment.

Local content is also very important to be implemented in e-modules so that students are more active in learning and can apply the material directly in real life. One relevant local content is ethnoscience of Malay Riau traditional medicine, which is local knowledge that still exists in society but is starting to be eroded by modernization. Therefore, the integration of ethnoscience in e-modules is not only an effort to preserve culture, but also helps students understand the material in a more meaningful and contextual way.

Angiosperm material is closely related to daily life, but learning still uses conventional e-modules that have not integrated PjBL and ethnoscience and have not accommodated the diversity of student learning styles. This causes learning to be less interesting and less effective. In fact, students have diverse learning styles, so more varied media such as multimedia are needed to make learning easier to understand.

Based on these conditions, it is necessary to develop an Angiosperm e-module that contains Project Based Learning, ethnoscience of Malay Riau traditional medicine, and multimedia features. This study aims to develop the e-module and test its validity and practicality so that it can be effectively used in learning.

METHODS

Research Design

This study uses the Research and Development (R&D) method with the 4D development model (Define, Design, Develop, Disseminate) developed by Thiagarajan et al (1974). In this study, the research phase is limited to the Develop stage, with a focus on testing the validity and practicality of the e-module. In this study, the research phase is limited to the Develop stage, with a focus on testing the validity and practicality of the e-module.

The 4D stages implemented include: Define: Conducting needs analysis through interviews with lecturers, questionnaires to students, analysis of Angiospermae material, and analysis of learning outcomes, Design: Developing an e-module framework, designing visual displays, ethnoscience-based materials, as well as validation instruments (material, media,

language experts) and practical instruments, and Develop: Creating an e-module product that is combined with the Project Based Learning (PjBL) and ethnoscience models, followed by validation by experts and product revisions according to input. Practicality tests are carried out on lecturers and students.

Population and Samples

The population of this study was all students of the Biology Education Study Program at Lancang Kuning University who were taking the Advanced Botany course in the even semester of the 2024/2025 academic year. The research sample was determined using a purposive sampling technique, considering student involvement in learning Angiosperms. The practicality test sample consisted of 15 students selected from two classes that had received basic Angiosperms material.

In addition to students, this study also involved 1 lecturer who teaches to assess the ease of use of the e-module in lectures. For the validity test, 3 expert validators were used, consisting of: Material experts, namely lecturers or botany experts who are experienced in teaching and researching Angiospermae topics. Media experts, namely digital learning media development experts who understand the design aspects of interactive e-modules, Language experts, namely Indonesian language lecturers who assess readability, language clarity, and suitability of writing rules, The involvement of these various parties aims to make the e-module assessment more objective and cover aspects of content, appearance, and language.

Instrument

The research instrument used aims to test the validity and practicality aspects of the Angiospermae e-module. To assess validity, an expert validation sheet is used which is divided into three categories: material validation, media validation, and language validation. Material validation focuses on the suitability of the content with basic competencies, the completeness and depth of the Angiospermae material, the accuracy of scientific concepts, integration with the Project Based Learning (PjBL) model, and integration with the ethnoscience of Riau Malay healing traditions. Media validation assesses the e-module interface design, layout attractiveness, color consistency, illustration quality, use of multimedia (images, videos, animations), and ease of navigation. Meanwhile, language validation assesses aspects of readability, sentence clarity, grammar and spelling appropriateness, and simplicity of terms to suit the level of student understanding.

To assess practicality, a practicality questionnaire was used, completed by the course lecturer and students. This questionnaire was compiled using a Likert scale of 1-4 with categories from "strongly disagree" to "strongly agree" to assess the e-module's ease of use, attractiveness of the display, relevance of the content to learning, and usefulness of the module in supporting understanding of the material. In addition, an open-ended response column was provided for providing suggestions, criticisms, and comments regarding the e-module's strengths and weaknesses. This input was used as the basis for product revisions to optimize development results. Before use, the instrument was validated by the supervising lecturer and learning media experts to ensure the suitability of the indicators to the research objectives.

Procedure

This research procedure follows the 4D model development stages (Define, Design, Develop, Disseminate) adapted from Thiagarajan et al (1974). The Define stage begins with a needs analysis, which identifies problems in learning Angiosperm material through interviews with lecturers and distributing questionnaires to students. A curriculum analysis is also conducted to align the e-module content with the established learning outcomes. In addition, material analysis is conducted related to the characteristics and structure of Angiosperm plants, including their use as medicinal plants based on Riau Malay healing traditions. This analysis aims to integrate local knowledge with scientific concepts to make the material more contextual and relevant.

The Design stage begins with preparing the initial draft of the e-module, which includes the content structure, storyboard, and display design. The module content is structured based on the Project Based Learning (PjBL) model with learning steps that require students to explore, collect data, and present projects related to Angiosperm plants. Riau Malay ethnoscience material is included as case studies and field projects, for example, identifying medicinal plants around the student's environment.

After the design stage, it continues with Develop, namely the creation of an initial version of the e-module, validation by material, media, and language experts, and product revisions based on validator input. A practicality test was conducted involving the teaching faculty and 15 students, who were asked to assess the e-module's ease of use, appearance, and usefulness in supporting learning. The dissemination phase was not conducted in this study because the focus was solely on validity and practicality testing.

RESULTS AND DISCUSSION

The development of the Angiospermae E-Module with the Project Based Learning (PjBL) model containing Riau Malay traditional healing ethnoscience resulted in a product that was validated by three experts: material, media, and language. The validation results indicated a high level of validity, with material experts scoring the e-module at 91%, media experts also at 90%, and language experts at 95%, all of which were categorized as "very valid." These results demonstrate that the content, structure, and linguistic aspects of the e-module are appropriate, scientifically accurate, and aligned with the curriculum. Suggestions from validators, such as improving layout, adding images, and adjusting font sizes, were implemented to enhance the clarity and attractiveness of the module. This validation phase ensured that the e-module meets pedagogical standards and is suitable for higher education learning contexts.

The practicality test involved 14 biology education students and one lecturer as respondents. The results showed that students rated the practicality of the e-module at 88%, while the lecturer rated it at 92%, both of which fall into the "very practical" category. Indicators such as attractiveness, time efficiency, usefulness of media, and ease of use received high scores from both students and lecturers, with the highest rating being 100% for the "usefulness of media" aspect as evaluated by the lecturer. These findings indicate that the e-module is not only functional and user-friendly but also supports self-directed learning and project-based exploration, which are key components of the PjBL model.

The integration of ethnoscience elements in the module specifically traditional Riau Malay medicinal practices added contextual value and relevance to the learning material. Students reported that the examples of local medicinal plants included in the module made the learning process more meaningful and relatable. This finding is in line with Swastika (2020),

who reported that the inclusion of local cultural knowledge in science learning fosters increased engagement and understanding among students. Furthermore, the structure of the module, which follows the stages of PjBL (from problem orientation to project presentation), encouraged students to explore concepts independently while applying them to real-life contexts.

From a media perspective, the module's interactive design, combination of text, images, and audiovisual elements were positively evaluated by the media experts. The final version of the module addressed all suggestions from the initial review, resulting in a product that was both visually appealing and pedagogically effective. As stated by Sadiman et al. (2010), effective learning media should integrate visual and auditory elements in a way that facilitates comprehension and maintains user engagement. The results of this study confirmed that the Angiospermae E-Module achieved this balance, making it a suitable digital resource for modern learning environments.

Overall, the findings indicate that the Angiospermae E-Module developed in this study meets the standards of validity and practicality required for use in higher education. Its alignment with PjBL principles and integration of local ethnoscience make it a valuable learning tool for Angiospermae material. Moreover, the high levels of student engagement and positive feedback from lecturers suggest that the module can enhance students' active learning experiences. This research supports the argument of Apriansyah (2024) that systematically developed instructional materials, particularly those incorporating real-world contexts, tend to achieve greater educational impact. Thus, the module can be recommended as an alternative teaching material for Angiospermae with a cultural and project-based approach. The summary of validation and practicality results is presented in the following tables and graphs.

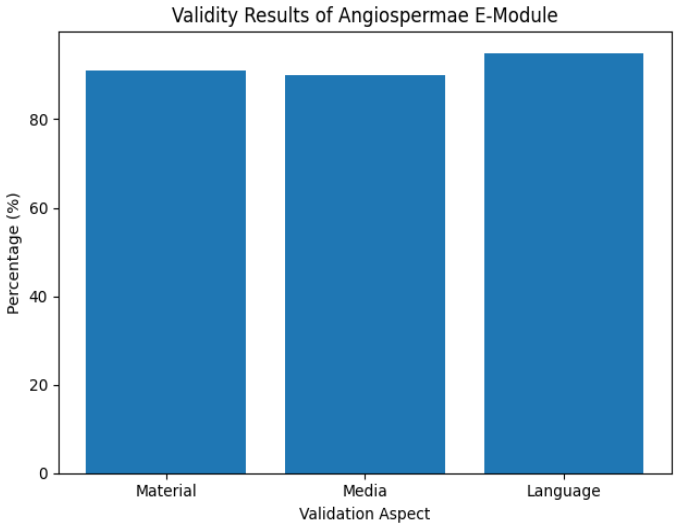
Table 1. Table of validity results

No	Validation Aspect	Validator 1 (%)	Validator 2 (%)	Average (%)	Category
1	Material	93	88	91	Very Valid
2	Media	92	88	90	Very Valid
3	Language	95	95	95	Very Valid
	Overall Average	93	90	92	Very Valid

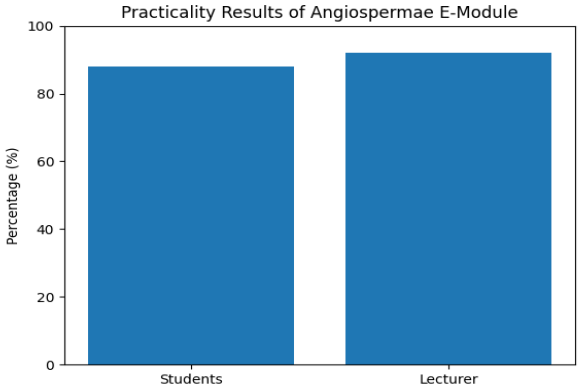
Table 2. Table of practicality results

No	Practicality Aspect	Students (%)	Lecturer (%)	Average (%)	Category
1	Engagement / Interest	87	92	89	Very Practical
2	Time Efficiency	87	88	87	Very Practical
3	Media Usefulness	88	100	94	Very Practical
4	Ease of Use	91	88	89	Very Practical
	Overall Average	88.2	92.0	90	Very Practical

Test result graph



Picture 1. Validity test result graph E-Module



Picture 2. Practicality test results graph E-Module

Picture 3. Cover E-Module Angiosopermae.

CONCLUSION

This study concluded that the Angiospermae E-Module, developed using a Project Based Learning model integrated with Riau Malay traditional healing ethnoscience, is both valid and practical for use in higher-level botany learning. The validation results from material experts (91%), media experts (90%), and language experts (95%) indicate that the module meets the criteria of "very valid," while practicality tests with lecturers (93%) and students (88%) categorize it as "very practical." These findings suggest that the developed e-module is not only feasible and effective as a teaching material but also provides a contextual and culturally relevant learning experience, making it a recommended alternative for botany courses focusing on Angiospermae.

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