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Developing a Multimodal Electronic Module for English Structure Learning at Higher Education

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ABSTRACT

The increasing demand for technology-enhanced learning in higher education has prompted the development of multimodal electronic modules aimed at improving students' understanding of English structure in higher education. This study focuses on the design and the validation process of a multimodal e-module designed for English Structure Learning, involving both material and media experts. In terms of the design, the e-module covers five topics of the structure lesson: Conditional Sentences, Gerunds, Infinitives, Complex Sentences, and Relative Pronouns. Each lesson contains multi-modal texts such as written description, video explanation, images, and interactive quizzes. The validation covered three key aspects for the material (content, linguistics, presentation) and five aspects for media (screen design, ease of use, consistency, functionality, and graphics). Based on expert feedback, the material aspects received an average score of 3.97, indicating a "very valid" interpretation, while the media aspects achieved a score of 3.44, also categorized as "very valid." Key strengths of the module include its content presentation and ease of use, with high scores for clear instructions and the effective design of interactive multimedia elements. However, minor revisions were suggested to improve the consistency of font usage and layout. Overall, the results demonstrate the e-module's potential to significantly enhance students' engagement and understanding of complex English grammatical structures. The integration of multiple media types, including text, video, and interactive quizzes, has proven effective in catering to diverse learning styles and facilitating independent learning. This study highlights the value of multimodal approaches in higher education, offering insights into the development of similar educational tools that could be adapted for various language learning contexts.

Keywords: *multimodal learning, electronic module, English structure, higher education, e-learning, validation*

1. Introduction

The rapid advancement of technology undoubtedly impacts the education sector. To stay aligned with evolving demands, educators must adjust their instructional strategies, materials, assessment methods, and learning resources [1]–[3]. This shift aligns with the growing importance of flexible learning models in modern

education. The integration of combining classroom face-to-face and online learning experiences into blended learning has become the new normal in higher education [4].

In the higher education level in Indonesia, blended learning was encouraged even before the pandemic happened. It was promoted as part of implementing the Merdeka Belajar and Kampus Merdeka (MBKM) program that allows students to gain knowledge or skills inside and outside the classroom freely. Through the use of technology, blended learning accommodates diverse learning styles and needs, engages students, and supports learning purposes [5]. It also offers efficiency in providing flexible, timely, and continuous learning opportunities [6].

Blended learning that integrates face-to-face and online modes significantly enhances learning effectiveness, delivering many positive outcomes [7]. Previous studies have shown that blended learning increases learning achievement, motivation, and interest in learning [8], [9]. It is also proven to strengthen student independence in the learning process known as learner's autonomy [10], [11]. In the area of English language teaching and learning, blended learning enhances critical thinking, student engagement, and the development of language skills [11]. It enhances the student's ability to learn English [12]. Another study found that blended learning improves students' understanding and interest in learning English grammar [13].

Successful implementation of blended learning requires dedicated efforts, the right mindset, a substantial budget, and highly motivated educators and students [14]. Not less importantly, it needed a reliable online learning infrastructure, such as platforms and digital learning resources that are aligned with the technology development [15], [16]. However, there is a limited number of learning resources that are developed by the lecturers in the English study program at the Universitas Riau to support blended learning, including the Structure course [7].

Structure is a study of how language is constructed by following the rules that apply to English grammar. The course is important as it builds accuracy in communication skills, both spoken and written [17]. However, understanding structure or grammar often presents a significant challenge for the learners [18], [19]. To overcome this difficulty, research has shown that applying blended learning in teaching English grammar or structure positively impacts students' understanding and interest [13], [17], [20]. Thus, there is a need to develop a digital-based learning resource for the Structure course in Universitas Riau that is engaging and effectively supports students' blended learning to fill this gap.

The research aims to develop a digital-based learning source in the form of a multimodal-based e-module for the Structure courses, specifically for the post-intermediate level. E-module is the electronic version of the module that can be accessed through electronic devices such as computers or gadgets [21]. In an e-module that uses multimodal text, students are provided with not only verbal text but also pictures and videos to support the learning experience [22]. In language classes, multimodal text is improving students' reading comprehension [23], [24], vocabulary [25], speaking [26] and listening [27]. Previous studies have also shown that multimodal has been used to teach grammar and is proven to be effective [28], [29].

This research and development (R&D) of the multimodal-based e-module for structure course uses the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. The multimodal-based e-module consists of text, pictures, animation videos, and interactive quizzes that are developed for the post-intermediate structure course. This paper focused on the validation result of the e-module in the Develop stage. Validation aims to determine the feasibility of the product that has been developed, in this research the e-module. The validation result is collected from experts to be analyzed. The result is important to ensure that the e-module can effectively improve students' knowledge and understanding of the topics [30].

2. Methods

2.1. Design and Development of the E-Module

This research and development (R&D) activity is planned for 2 years. The first year focused on developing teaching materials for the Intermediate Structure course, while the second year is on the Post-Intermediate Structure course. The development of this research product is in the form of an interactive electronic module based on multimodal text containing text in the form of images, audio, animated videos, and interactive quizzes.

In more detail, the development of this electronic module uses the ADDIE model developed by Rusdi [31]. In the 1st year, product development was carried out for the Intermediate Structure course, then in the second year for the Post-Intermediate Structure course. Both activities use the same stages, namely the ADDIE model, which consists of five stages: analyze, design, develop, implement, and evaluate. This study is the second year phase of the project.

1. Analyze

At this stage, a needs assessment was carried out to identify the challenges faced by students in the Post-Intermediate Structure class. The results show that there is a lack of digital learning resources that students can use for independent learning, so it is necessary to develop teaching materials in the form of e-modules.

2. Design

At this stage, the design of interactive e-module began by selecting 5 key topics contained in the Post-Intermediate English Structure course curriculum which include Conditional Sentences, Gerunds, Infinitives, Complex Sentences, and Relative Pronouns.

3. Develop

In this third stage, interactive e-modules were created using various available websites, such as Canva for creating videos and e-books, Quizizz for creating interactive quizzes, and Publuu for publishing e-modules. The complete e-module was then validated by two experts: material and media validation.

4. Implement

After the e-module was validated, the next process is implementation. It was then tested on students who were taking the Post-Intermediate Structure course. Each student was asked to use the e-module as a learning resource and provide feedback based on their experience using the e-module.

5. Evaluate

To evaluate the use of the e-module, student feedback data was collected through a questionnaire designed to assess the aspects of attractiveness and convenience.

This article is particularly focusing on the design and the outcomes of expert validation, as conducted during the second and third stages: Design and Develop. The validation results from both the material and media aspects are elaborated upon.

2.2. Expert Validation Process

The expert validation process was conducted before the e-module was implemented for the students in the Post-Intermediate Structure class. This process was to ensure the quality and effectiveness of both the material and media of the e-module. Two experts were chosen to be the validator, one for the material validation and one for the media validation.

The validator assesses multiple aspects of the evaluation using a 4-point scale, where a score of 1 denotes very poor or inappropriate, 2 reflects fairly good, 3 represents good or satisfactory, and 4 indicates excellent. The research results are displayed in a table and analyzed descriptively. The validity criteria follow the framework proposed by Sugiyono [32], as shown in the table below.

Table 1: Validity Criteria

No	Interval Mean Score	Validity Category
1	$3.25 \leq x < 4$	Very valid
2	$2.5 \leq x < 3.25$	Valid
3	$1.75 \leq x < 2.5$	Not Valid
4	$1 \leq x < 1.75$	Invalid

This process is crucial as it will confirm whether or not the e-module can be used for the further stage of the research: the Implement stage.

3. Results and Discussion

3.1. E-Module Design

The design of the module started in the Analyze phase of the ADDIE model research. It was then designed and developed to match the needs of the students in the Post-Intermediate Structure class. The module covers five topics of English structure: Conditional Sentences, Gerunds, Infinitives, Complex Sentences and Relative Pronouns. Each topic contains the learning objectives, explanation in both text and video form, and exercise in the form of interactive quiz.

The module was designed using Canva, an online graphic design tool. The video explanation was also designed using the same tool, Canva, and was uploaded to Youtube. While the interactive quiz was created using Quizizz which is an online learning platform that allows educators to create and share interactive quizzes and lessons. In this platform, the researchers created five quizzes from scratch to help learners assess their own learning.



Figure 1. E-module published in Publuu

All the multimodal components were combined together to make the final form of the e-module. It was then published in Publuu (<https://publuu.com/flip-book/54667/1464720>), a platform for managing and converting pdf files into interactive flipbooks. This platform was chosen as it offers easiness for access so that students do not have difficulty accessing the e-module.

3.2. Experts Validation Result

Upon completion of the e-module, expert validation is conducted to assess two aspects: material and media. Two experienced lecturers were selected as validators for this evaluation, with one specializing in material expertise and the other in media. Their evaluations were conducted using a 4-point scale, where a score of 1 represents poor or inappropriate, and a score of 4 denotes excellent or appropriate.

3.2.1. Material Validation

The material validation process aims to assess the clarity and relevance of the e-module content to the current curriculum and the learning needs of students. In this research, the material must align with the requirement of the Post-Intermediate Structure class. It should also be beneficial for the target learners in their learning process. There were 30 indicators used to evaluate three key aspects: content (15 indicators), linguistics (6 indicators), and presentation (9 indicators).

The result of the validation by the expert is shown in Figure 1.

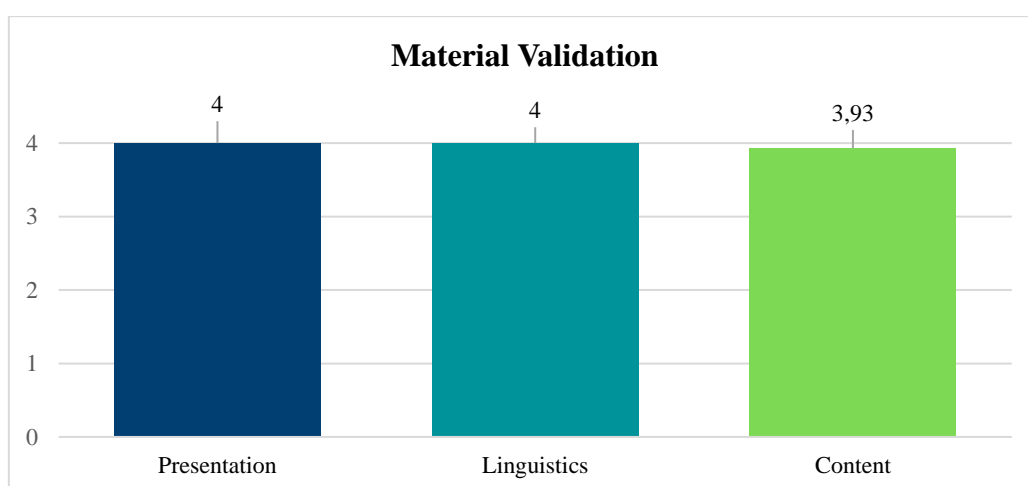


Figure 2. Material Validation

The first aspect, Presentation, received a score of 4, classified as Very Valid. This assessment was covered by 9 indicators, all aimed to ensure that the e-module developed is not only visually engaging but also well structured. The indicators focused on evaluating the logical flow and coherence of the material, clarity in instruction, the quality of learning activities to support student autonomy, and comprehensive presentation of learning activities which include the summary, videos, narratives, assignments, and quizzes. The high score for this aspect indicates that the presentation quality meets the standards expected for effective educational resources.

The second aspect which is the Linguistics aspect also received a perfect score of 4 and is classified as Very Valid. This aspect was assessed by 6 indicators. The validators focused on the readability of the text, the terminology used, the clarity of information delivery, adherence to correct English grammar, avoidance of ambiguous language, and the use of communicative language. The high score affirms that the linguistic elements of the e-module fulfill the highest standards for clarity and effectiveness of language use.

The third aspect of material validation is content. The validation score for this aspect is 3.93 or classified as Very Valid. This assessment covered some key indicators that include alignment with the current curriculum in post-intermediate structure class, clarity of learning objectives, comprehensibility, relevance to

student needs, and the accuracy of concepts. It also focused on the adequacy of examples, illustrations, and the consistency of video and narration with the learning material. This score indicates a strong alignment with the curriculum and educational standards.

Overall, the material validation scored an average of 3.97 which is categorized as Very Valid. This result shows that the e-module can be considered an effective educational resource based on the material aspect. It shows that the e-module has high standards in presentation, linguistic clarity, and content relevance.

3.2.2. Media Validation

Media validation is conducted to ensure the quality of multimedia elements used in the multimodal-based e-module. Furthermore, it is used to assess the usability and consistency of the media components, evaluate the alignment of media with learning objectives, and ensure the media in the e-module supports and engages students in the learning process. Five aspects of media validation are covered by 30 indicators: screen design (8 indicators), ease of use (7 indicators), consistency (3 indicators), functionality (6 indicators), and graphics (7 indicators). The validation result is shown in figure 2.

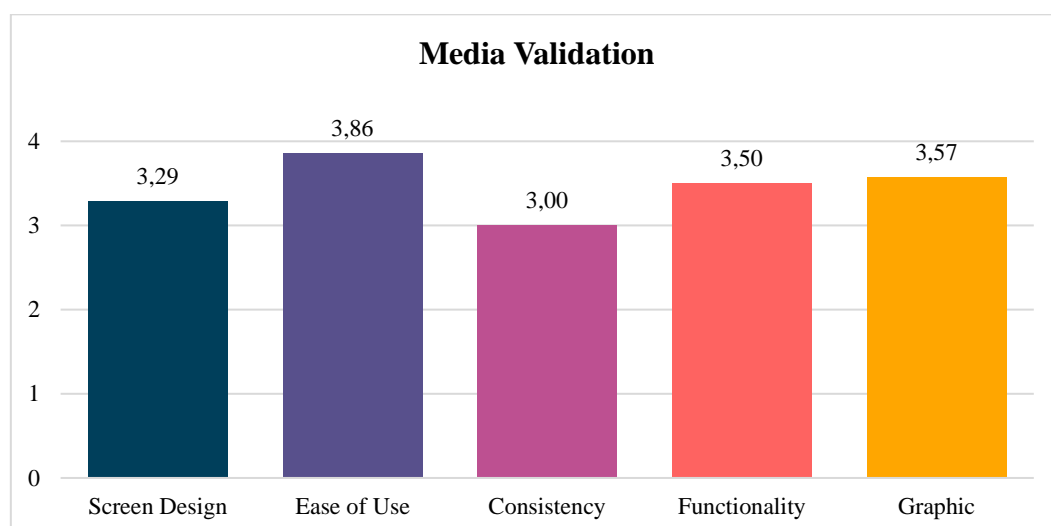


Figure 3. Media Validation

The first aspect is screen design, which received a validation score of 3.29, classifying it as very valid. The validation process assessed color composition, the attractiveness, and layout of the cover, the accuracy of layout for each section of the module, synchronization among graphic, visual, and verbal illustrations, the clarity of the e-module title, the overall appeal of the design that includes the color, images, illustrations, typography used, and also the sequence of presentation within the e-module. The score for this aspect suggests that the design elements of the e-module aligned strongly with best practices in screen design.

The next aspect assessed is ease of use. The validation focused on the order of presentation, ease of operation on PC/laptop, multimedia content operation, page navigation, clarity of usage instructions, functionality of tutorial video buttons, and quiz navigation buttons. This aspect scored 3.86 which is the highest among the five aspects of media. It indicates that the e-module developed is user-friendly and accessible. It allows efficient navigation and operation which can help learners to easily use it to support their independent learning.

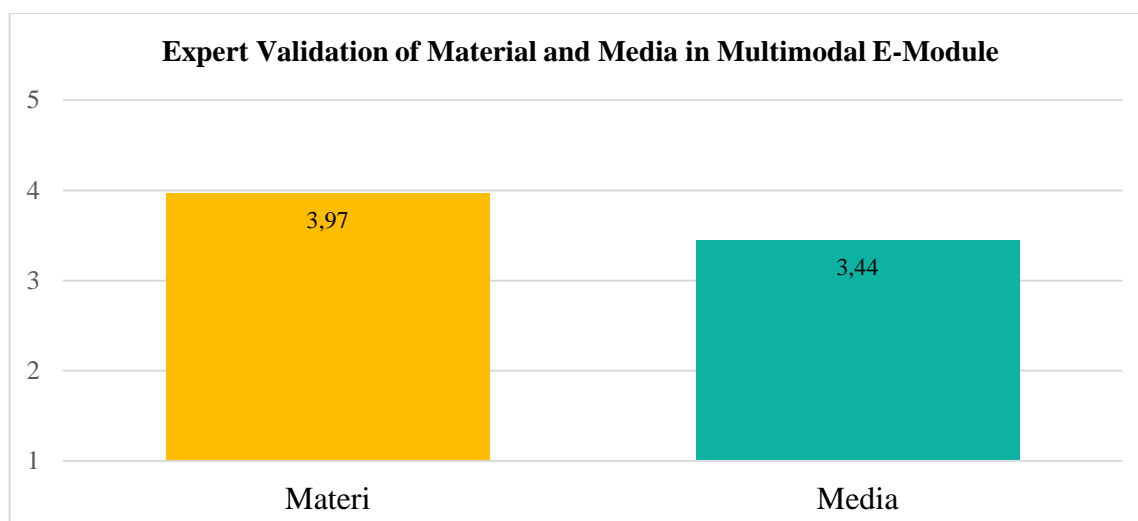
The third aspect is consistency. While it is the lowest among the five other aspects in the media validation result, the consistency aspect still got the valid category with a score of 3.00. The assessment of this aspect focused on the consistency of terminology and phrasing, font and style, and also layout design. The validator gave a score of 2 for the consistency of font style, further stated that there are many variations in font type and size in the module, and asked for consistency that can help make the e-module display more comfortable to read. Overall, the results in this aspect indicate that the e-module effectively maintains consistency in language, formatting, and layout.

The fourth aspect is functionality. The validator gave a score of 3.5 which is classified as very valid. The validation process assesses the clarity of explanations, the simplicity of the learning steps, effectiveness in assisting educators during the teaching process, the quality of engaging students on the learning material, and the ease of interaction for educators and students with the e-module. The validation result shows that the e-module is designed well to provide a smooth and engaging learning experience, not only for the students but also for the educators.

The last aspect is graphics. The result of the validation is 3.57 or very valid. This aspect evaluates several key indicators that include the appropriateness of color in the e-module, clarity of font size and type used, quality of illustrations, clarity of instructional videos, and the comprehensibility of video narration. The result suggests that the graphic aspect of the e-module is highly effective in enhancing the learning experience.

3.2.3. Overall Validation

The combination result of material and media validation from both experts is displayed in Figure 3.



The result of the validation showed that the material aspect scored 3.97 which is classified as very valid and the media aspect got 3.44 which is also declared very valid. The average score from both validation scores is 3.71 or very valid. In the material aspects, the presentation and linguistics got a perfect score of 4, indicating that the presentation of the e-module is interesting and well-structured. This is important to facilitate students' understanding of the whole e-module. The linguistics result indicates that the text can be easily read and the language used is communicative which can help students understand the instruction and content of the e-module. It may help student's independent learning easier [33].

In the aspect of media, the highest score in ease of use suggests that e-module can be easily operated and navigated by users. This is an important indicator because ease of use can help and support students in their autonomous learning. The other strength of this e-module in the media aspect is seen from the graphic elements. The score from validators shows that the visual elements such as illustration and video are high quality. Interactive multimedia content alongside the use of trendy creative graphic design has been proven to impact students' learning efficiency positively [34].

The overall result suggests that the multimodal-based e-module developed in this research excels in both the quality of its content and media elements. Therefore, the e-module can be considered suitable to be used as a learning resource for the Post-Intermediate Structure class in the implementation stage with a minor revision based on the experts' notes in the validation process

4. Conclusion

Based on the validation result, this multimodal-based e-module has a big potential to support effective and engaging learning in the Structure course, specifically for the post-intermediate level. The next process of the research is the implementation of an e-module in the class to find out the impact it has on student's learning. Evaluation will also be conducted as the last stage of this ADDIE model research to gather feedback from the

students who use the e-module. The evaluation will serve as a basis for improving the development of future modules.

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