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Development of Interactive E-Module to Foster EFL Students' Critical Thinking in Essay Writing

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Abstract: This study aims to develop an interactive E-Module to enhance creative thinking among EFL students in academic writing, specifically essay writing. This study used research and development (R&D) with the ADDIE model, which encompasses five stages: Analysis, Design, Development, Implementation, and Evaluation. The subject of this study involved 23 students of the English Language Education Study Program from a state university in Gresik, Indonesia. The research instruments included questionnaires and interviews in the need analysis stage, validation forms in the development stage to obtain review and recommendations from the expert validators, and evaluation questionnaires to discover students' responses towards the implementation of the E-Module. Data were analyzed using mixed methods of descriptive qualitative and quantitative. The results showed that experts validated E-Module's high quality, with minor revisions. In addition, students' responses indicated strong effectiveness, with 83% reporting improved understanding and motivation. Furthermore, experts and students confirmed that the E-Module demonstrated practicality through ease of use and structured progression. Overall, experts and students perceive the interactive E-Modul developed in this study as a valuable tool for fostering critical thinking and independent learning.

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Introduction

Educational improvement is closely linked with technological advancement, which leads to multiple innovations. The ongoing evolution of technology drives efforts to enhance the utilization of technological resources in the educational process (Maharcika et al., 2021). This transformation has shifted traditional classrooms into modern, dynamic, and interactive environments, moving away from monotonous teaching methods that can diminish students' enthusiasm. Therefore, there is a pressing need for innovative approaches to integrate technology into education to boost students' engagement in learning activities (A. P. Islami et al., 2021). Furthermore, learning activities now extend beyond merely preparing lessons and implementing face-to-face teaching procedures (Fahrurrozi et al., 2023).

Technology has also revolutionized how English is taught and learned in today's digital age. Technological devices are now integral to the classrooms, offering students a contented environment for learning English. They promote interactive learning and provide authentic materials for students to practice their language skills (Alakrash & Razak, 2021; Altun & Hasan, 2021; Anggeraini, 2020). In addition, integrating technology into EFL classrooms positively affects language acquisition, as students tend to be more motivated when working with modern devices than with traditional textbooks (Nagy, 2021; Solikhah,

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2023). This advancement provides a valuable foundation for reforming and exploring new English teaching models in the modern era.

Despite the benefits of technology, many EFL students in Indonesia, particularly at the tertiary level, still need to foster their critical thinking skills in academic writing. Writing is inherently complex and demanding, requiring considerable effort, time, and patience (Maru et al., 2020; Rao, 2017; Wardani, 2011). Students must process information, develop ideas, and articulate them into coherent sentences while adhering to grammatical rules to ensure clarity for their readers (Mayekti et al., 2022; Nunan, 2003; Sa'adah, 2020). Additionally, effective writing necessitates the ability to convey knowledge clearly and concisely (Sari et al., 2024) and express personal perspectives with logical reasoning (Novia et al., 2024). Writing skills are often used to assess student progress and indicate academic success (Ramadhanti & Yanda, 2021). Consequently, writing activities demand a structured process and dedicated effort to communicate messages effectively. Beyond grammar, students must also possess critical thinking skills to convey information and present their opinions.

Traditional teaching methods frequently emphasize repetitive memorization rather than analytical thinking, which leaves students unprepared to formulate coherent arguments or critically engage with texts. Although there is a growing emphasis on developing critical thinking skills in Indonesian education, students' overall critical thinking ability still needs improvement (Fadhilah & Thahir, 2023; Sarwanto et al., 2021). Primary and secondary education students usually focus primarily on recall rather than analytical reasoning (Wibowo et al., 2018). Furthermore, commonly applied learning strategies have yet to support the enhancement of critical thinking skills due to their conventional nature and lack of technological integration (Supriyatno et al., 2020). The tedious and unengaging teacher-centered approach further hinders the cultivation of critical thinking skills, resulting in poor learning outcomes and misunderstandings of key concepts (Fadhil et al., 2021). Therefore, developing critical thinking skills in schools early on is crucial, as these abilities are not innate but cultivated through targeted learning activities.

Critical thinking is a vital skill of the 21st-century skill that must be nurtured in higher education to prepare students to become thoughtful citizens (Susanti & Rachmajanti, 2023). Students need critical thinking skills to apply theoretical knowledge learned in class and to seek supporting opinions for that theory. Critical thinking skills help students learn, enhance cognitive growth, and boost competencies to make learning more effective and impactful (Nurdyansyah et al., 2024). Those with these skills can consistently verify information and derive conclusions (Jaenudin et al., 2020). Therefore, by developing these skills, students can better comprehend complex concepts and apply their knowledge effectively to achieve academic and personal goals. As higher-level learners, EFL university students should cultivate critical thinking abilities to address various challenges and propose solutions to issues they encounter.

Students' critical thinking skills can be effectively developed by using engaging teaching materials and resources that leverage technological advancements (Vaghela & Parsana, 2024). E-learning platforms are part of the technological advancements. These platforms can boost student motivation by providing accessible content that allows for effective engagement with learning resources (Syahrial et al., 2019). E-learning has gained popularity in recent years due to its flexibility, enabling teachers and students to interact despite challenges related to time and space (Wardani & Zakiah, 2021). Alongside E-learning, electronic modules (E-Modules) have emerged as valuable teaching tools designed to support Project-Based Learning initiatives (Sagita et al., 2021).

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E-Modules serve as alternative digital-based learning mediums aimed at helping students achieve desired learning outcomes. They promote student independence by offering interactive features such as animations or videos, easier navigation, and immediate feedback through tests or quizzes (Suarsana & Mahayukti, 2013). By utilizing E-Modules, teachers facilitate students with the learning approach through interactive modules that present not only text, but also sound, images, films, and videos (Mulyadi et al., 2020). While E-Modules share similarities with traditional printed modules, they are more engaging due to their dynamic presentation styles that facilitate independent learning. Consequently, E-Modules should be designed for easy access via personal computers, laptops, or mobile devices without limitations related to time or distance (Nisrina et al., 2021).

Interactive E-Module is a type of module that combines text and images in which the digital publishing process allows these modules to be accessed on electronic devices to enhance flexibility and interactivity in self-directed learning (Wijaya & Vidianti, 2020). Besides, interactive E-Modules are designed for self-paced learning and structured to meet specific learning goals by providing navigational links for accessing various activities, materials, assignments, images, videos, and project tasks to enhance student engagement (Manzil et al., 2022). Likewise, McNamara et al. cited in Nurhikmah et al. (2021) claimed that interactive E-Modules significantly enhance students' critical thinking skills while promoting greater autonomy in skill development. This approach empowers students to actively engage with learning materials independently.

Prior studies have highlighted some advantages of E-Modules in fostering a more effective and engaging learning environment. Suarsana and Mahayukti (2013) created an E-Module to enhance Mathematic students' critical thinking skills based on the Plomp model. The E-module was created using eXe software, a freeware program available for download at http://eXelearning.org. Their study revealed that the E-Module was of good quality to improve students' critical thinking skills to a high level, and students responded very positively to the developed E-Module.

Similarly, research by Fadhilah and Thahir (2023) focused on developing an E-Module to enhance the Biology students' critical thinking. The E-Module was designed using the Alessi & Trollip model and developed with Kvisoft Flipbook Maker. Their findings showed that the E-Module demonstrated strong validity and practicality, making it suitable for learning. Furthermore, the use of project-based learning E-Modules has the potential to improve students' critical thinking skills significantly.

Furthermore, prior studies have also explored the use of E-Modules in the EFL context. For instance, Susanti and Rachmajanti (2023) developed an E-Module to enhance students' critical thinking skills in a blended learning format for the English Language Teaching Methods course. The results indicated that E-Modules in a blended learning setting can significantly improve the critical thinking skills of English student-teachers, as it allows them to learn anytime and anywhere.

Given the numerous studies that have developed E-Modules for EFL and non-EFL university students, addressing the gaps in existing research is crucial. Focusing on EFL students' critical thinking in writing essays is essential for their language development. By promoting independent learning to foster EFL students' critical thinking in writing essays, the E-Module addresses the urgent need for innovative tools in writing instruction. This study introduces a novel approach by creating an E-Module to enhance students' critical thinking skills in essay writing. Unlike previous research, this E-Module will be designed by integrating two online applications, Canva and App Book Creator, rather than relying on a single platform. This integration aims to create a more dynamic and interactive learning

experience. Moreover, including interactive features from various platforms makes E-Modules more engaging in catering to different learning styles and broadening the educational experience (Ende et al., 2022). Considering prior research, the novelty of the present research is expected to empower students' critical thinking skills by providing a structured yet interactive learning environment that promotes engagement and effective writing practices.

Research Method

Research and Development (R&D) was employed as the method of this research. One type of development method in R&D is the ADDIE model proposed by Molenda (2003). ADDIE is the acronym for the development process, comprising five phases: 1) Analysis Phase, 2) Design Phase, 3) Development Phase, 4) Implementation Phase, and 5) Evaluation Phase (Ilmiah et al., 2024; Mayaneta et al., 2024). The ADDIE model is suitable and adaptable for developing effective media that can be applied to educational settings due to its effective approach to addressing real-world educational needs and enriching educational practices (Abuhassna et al., 2024; N. I. Islami et al., 2024). This synergy supports the integration of interactive E-Modules in EFL classrooms to optimize students' motivation and their learning outcomes. The ADDIE model's phases are represented in the figure below.

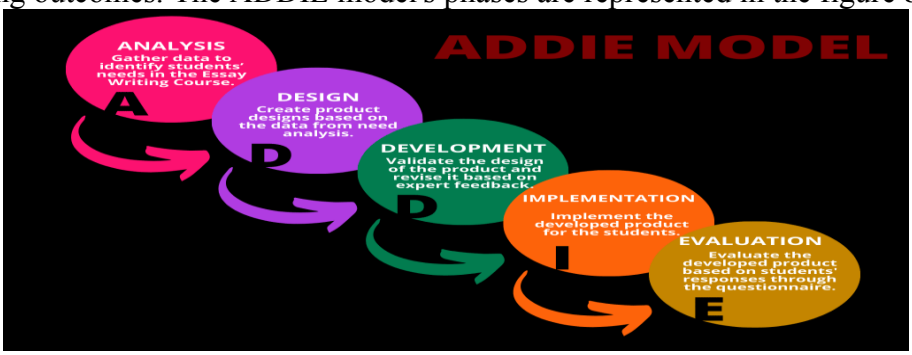


Figure 1. ADDIE Model Development Phases adopted from Molenda (2003)

This research was conducted with 23 EFLs from the English Language Education Program at Universitas Qomaruddin Gresik. Purposive sampling was used, and participants were selected based on their enrollment in an Academic Writing course and prior completion of an Essay Writing course. The research data gathered through need analysis questionnaires was used to guide designing the interactive E-module.

The data obtained from the expert validators was analyzed using validation forms to evaluate the quality of the E-Module. Quantitative data were derived from scores assigned by the experts, which were then converted into a quality scale to determine the validity of the module. The conversion followed a predetermined rubric that categorized the results into levels such as "Very Good," "Good," "Fair," or "Poor." This systematic approach objectively assessed the E-Module's quality based on expert feedback.

Table 1. Conversion of E-Module Quality

Value	Category
Below 50	Poor
50 – 69	Fair
70 - 89	Good
90 -100	Very Good

(Kemendiknas, 2010)

In addition to the data from expert validation, the data from student responses were collected during the implementation phase using questionnaires. The questionnaires used a Likert Scale

with four response options: Very Good, Good, Fair, and Poor. This structure aimed to simplify the decision-making process for students while accurately capturing their levels of support and perceptions of the interactive E-Module.

Results and Discussion

This section presents the development process of the interactive E-Module for enhancing EFL students' critical thinking in essay writing using the ADDIE model. Each stage phase is described in detail to demonstrate how the module was created to foster critical thinking skills.

Analysis Phase

The research began with preparing instruments for the analysis phase, including questionnaires and interviews. This phase aims to identify students' needs regarding the materials and the E-Module model to be developed. The needs analysis revealed that most students often face challenges in organizing ideas chronologically, finding appropriate words for their writing, making grammatical errors, and needing guidance on where to start. These challenges result in the students' struggling to express themselves effectively in written English (Khofifa et al., 2024). When working on writing assignments, students often initially compose in Indonesian and then translate their work into English. Therefore, in accomplishing their writing assignments, students frequently use AI tools such as ChatGPT, Google Translate, and DeepL for assistance (Zulfa, 2023).

When asked about their lecturer's resources, students noted the lecturer provided varied materials but expressed interest in customized learning resources developed by the lecturer as an E-Module or a combination of print and electronic modules. Only a few students preferred a purely printed module, as they mentioned that electronic devices, like mobile phones, often lead to distractions such as checking social media during study sessions. This statement aligns with the previous research by Elliot (2022), who highlighted the effect of using mobile phones for personal and academic purposes, which can narrow students' focus.

Design Phase

Wireframe design was structured as the guideline for designing the interactive E-Module during this second phase. A wireframe is a low-fidelity visual representation of a product's interface, outlining the layout and main elements to expedite the design process (Desi Kurniasih et al., 2024; Santoso, 2024). In designing an interactive E-Module, wireframing helps organize the structure, components, and content, providing a clear, foundational layout that guides further design stages. E-Module comprises several components: preface, overview, indicators, learning materials, learning instructions, exercises, and references (Lastri, 2023; Marto, 2021). The figure below provides the diagram of layout design elements within the interactive E-Module.

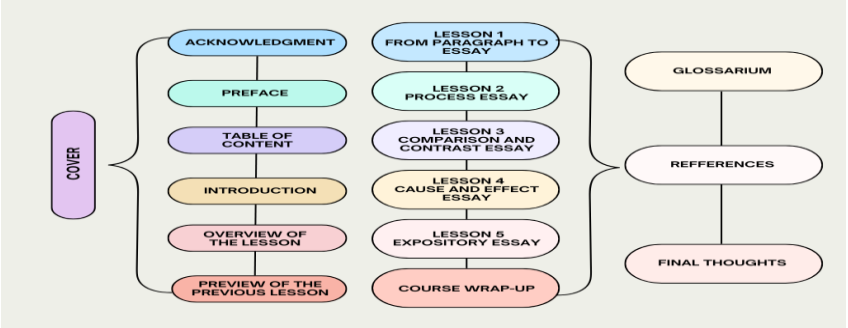


Figure 2: Wireframe of Interactive E-Module

After the wireframe design had been made, relevant materials were gathered to create content for each chapter. Those materials were carefully selected from various sources to ensure their appropriateness and relevance to the course objective. The materials in each lesson include explanations, model essays, and exercises, to assist students in comprehending the materials (Adawiyah & Anwar, 2021). Relevant images were also supplemented to enhance the visual presentation of the materials in each chapter.

As the last step of the design phase, the app-assisted tools were decided to support the development of an interactive E-Module. Canva and App Book Creator were employed to create the E-Module. Canva features interactive elements (Gultom et al., 2024). The App Book Creator is one platform that supports teachers and students in bookmaking. The online version of Book Creator was originally only available on iPads and launched in 2011 (Fitria, 2024). With this platform, teachers and students can creatively explore various author categories by producing books on diverse themes (Marques et al., 2023). The Book Creator app functions as a teaching aid and a learning resource. The platform enables teachers and students to create books enriched with various multimedia elements. In Book Creator, users can incorporate images, text, video, audio, music, and hyperlinks, enhancing interactivity and engagement (Brekke, 2020; Schäfer, 2023). The App Book Creator platform makes interactive E-Modules on electronic devices straightforward and efficient. This app can also be integrated with Canva to make the E-Module more attractive.

Development Phase

The planned product was transformed from the wireframe design into a functional interactive E-Module in the Development Phase. The stage includes inserting the content, such as materials, exercises, images, and videos. Exercises are integrated with Google Forms to allow submissions to be automatically recorded in the lecturer's Google Drive, complete with student identifiers. The images are made by integrating Canva with AppBook Creator.

After the product was developed, experts validated the developed product to obtain reviews. Expert validation is required before the product is implemented in the classroom. The purpose of product validation by several experts who are experienced in their fields is to evaluate the products developed so that the product has good quality by getting expert suggestions (Indriani & Astuti, 2023; N. I. Islami et al., 2024). Experts' recommendations and input were used to improve the quality of the product so the product is ready to be implemented.

The results of expert validation

The first validator was an IT expert who validated the design graphic aspects of the E-Module. Meanwhile, the second expert was an expert in English Language Teaching who assessed the materials' suitability and the language usage in the E-Module. The validation results from experts are depicted in Table 3 and Table 4 below.

Table 3. The Recapitulation of Design Graphic Validation Results

Aspects	Value	Category
Layout And Navigation	90	Very Good
User Interface Design	88	Good
Technology Compatibility	92	Very Good
Interactivity and User Engagement	83	Good
Access Speed and Performance	92	Very Good

The table above summarizes the design graphic validation results for the interactive E-Module, focusing on five main aspects. Altogether, the results highlight that the E-Module design is effective, particularly in layout, compatibility, and performance. In the comment section, the first validator noted some points. Firstly, the E-Module display is attractive and

colorful; the illustrations are clear and visible. The links on the page function well, and the content is packaged concisely and quickly. Moreover, navigation on computer devices works well using the arrow keys on the keyboard, left and right navigation in the browser, or by dragging with the mouse. Navigation on mobile devices also works well with swipe gestures functioning smoothly to open the next page. Overall, the first expert validator highlighted that the E-Module is excellent and ready to be implemented without further revisions.

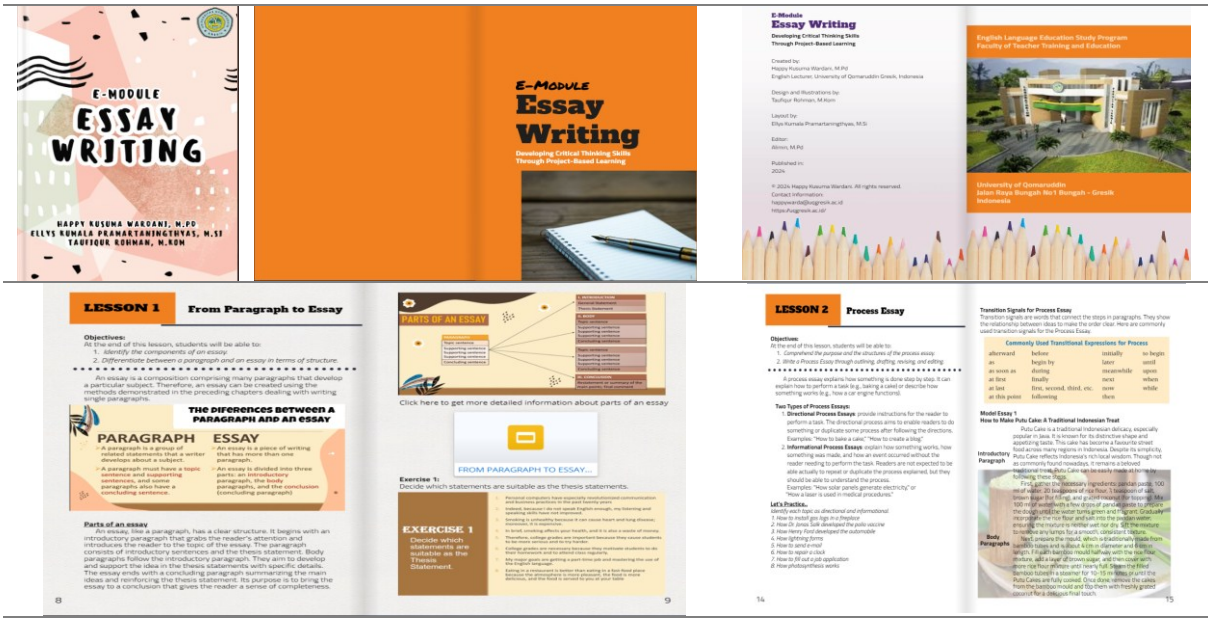
Table 4. The Recapitulation of Materials and Language Validation Results

	Aspects	Value	Category
Material	Suitability	83	Good
	Accuracy	80	Good
	Critical Thinking	88	Good
	Organization	80	Good
	Presentation	83	Good
Language	Straightforward	83	Good
	Communicative	88	Good
	Interactive	90	Very Good
	Compatibility with Grammatical Rules	92	Very Good
	Compatibility with students' Development	88	Good

Table 4 presents the validation results for the materials and language aspects of the E-Module which reflects that both materials and language aspects are well-aligned with educational standards. In the comment section, the second expert validator acknowledged that the interactive E-Module is suitable for classroom implementation, with minor revisions, including adding a half-title and title page after the cover, structuring content logically from simple to complex, and enhancing clarity with concise sentences to improve engagement. The expert also recommended incorporating assessments with immediate feedback to reinforce learning and help students understand concepts effectively.

After receiving expert feedback, the interactive E-Module went through several revisions based on the experts' suggestions to improve its usability. Once the production process was finalized, the developed product of the E-Module was prepared for classroom implementation. The final version, which integrates all adjustments and enhancements, is summarized in Table 5 below.

Table 5. The Final Product of Interactive E-Module



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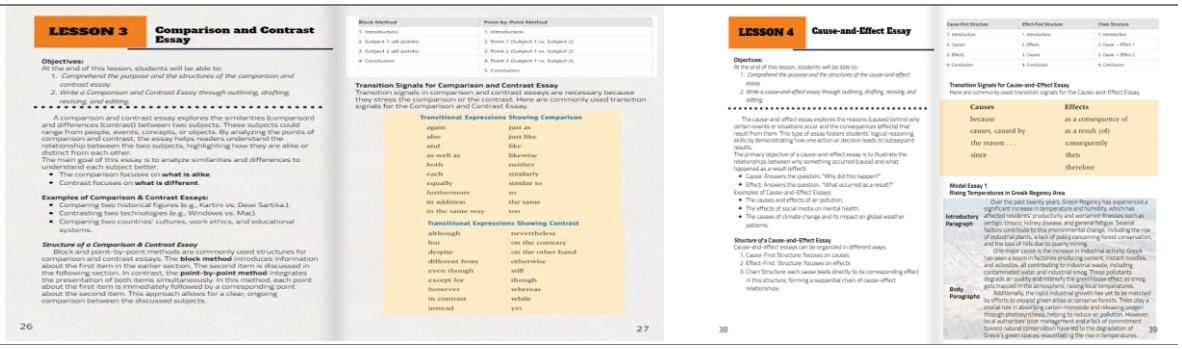

Table 5 showcases the revised interactive E-Module, refined based on expert feedback. The final E-Module consists of five main chapters—"From Paragraph to Essay," "Process Essay," "Comparison and Contrast Essay," "Cause-and-Effect Essay," and "Expository Essay." Each chapter includes comprehensive explanations, model essays, exercises with submission links, references, and glossaries. Additional sections such as a cover, title page, acknowledgment, preface, and table of contents are also provided, along with an introduction, lesson overview, and concluding thoughts. The interactive E-Module is now ready for classroom implementation and student evaluation.

Implementation Phase

The implementation phase, the fourth stage of the ADDIE model, involved applying the validated E-Module in an Academic Writing course with 23 students with prior experience in essay writing. These participants were guided to explore the interactive E-Module. They demonstrated active engagement and enthusiasm during the discussions on the materials. During the implementation phase of the interactive E-Module, the students were also asked to respond through questionnaires. The questions cover four key aspects: the application's quality, the module's visual design (display), the materials' relevance and presentation, and the benefits of using the E-Module in the Essay Writing course. The results of the students' responses are discussed in the evaluation phase, which is the last phase of the ADDIE model.

Evaluation Phase

In the last stage, the data gathered from students' responses in the previous stage were evaluated. The results of students' responses shown in Table 6, provide insights into the students' views on the module's quality, display, materials, and benefits.

Table 6. Students' Responses on the E-Module Development

Aspect	Criteria	VG	G	F	P
Quality of the application	Content completeness	87%	13%	-	-
	Effectiveness	74%	26%	-	-
	Flexibility of the usage	78%	22%	-	-
	Ease of use	65%	31%	4%	-
	Ease of accessing links included in the E-Module	70%	26%	4%	-
	Quality of audio narration in the E-Module	65%	17%	9%	9%
Display	Display consistency	74%	22%	4%	-
	Suitability of font type and size in the E-Module	30%	57%	13%	-
	Consistency in font usage	26%	74%	-	-
	Clarity of presented images	65%	35%	-	-
	Attractive images	70%	26%	4%	-
	Suitable background color	61%	22%	17%	-
	Ease of reading text	43%	43%	12%	-
	Suitable text color	48%	48%	4%	-

	Layout of text	52%	39%	9%	-
	Organization of the content	65%	26%	9%	-
Materials	Materials suitability	91%	9%	-	-
	Materials complexity	65%	26%	9%	-
	Essay model	70%	26%	4%	-
	Vocabulary used in the essay model	65%	35%	-	-
	Images or illustrations suitability	61%	30%	9%	-
	Materials are presented from simple to more complex activities	57%	43%	-	-
	Sentence and paragraph structure	78%	22%	-	-
Benefits	Improve student understanding	83%	17%	-	-
	Increase student interest in learning	70%	26%	4%	-
	Increase motivation in learning	83%	13%	4%	-
	Support independent learning	70%	26%	4%	-
	Encourage critical thinking	70%	30%	-	-

The data in Table 6 highlights strong student support for the interactive E-Module. Overall, the module is effective in fostering learning and engagement. The result strengthens the result of prior research that interactive E-Modules assist the students in comprehending the materials, motivate them in learning due to the attractive display, and foster independent learning (Wijaya & Vidianti, 2020). comprehension, creativity, and critical thinking, fulfilling its intended purpose.

The results of this study demonstrate that e-modules are practical tools for improving student learning engagement, comprehension, and motivation, contributing to better academic outcomes. Integrating multimedia and interactive features aligns with research emphasizing their role in fostering critical thinking and independent learning (Mahendri et al., 2023; Sidiq & Suhendro, 2021). The findings show the module's potential to address EFL students' challenges with essay writing, offering flexible, personalized learning. These results have practical implications for educators and curriculum developers, highlighting the importance of tailored digital tools in advancing academic writing and critical thinking skills.

Conclusion

The developed product of the interactive e-module effectively meets the objectives of fostering critical thinking and enhancing essay-writing skills among EFL students. The module aligns closely with the research goals by integrating engaging materials, logical content progression, and interactive features. Positive validation from experts and student feedback underscores its usability, effectiveness, and ability to boost motivation and promote independent learning. The findings demonstrate that the module significantly enhances comprehension, creativity, and critical thinking, fulfilling its intended purpose.

Recommendation

There is significant potential for further enhancement related to the present research. Future research could refine the interactive e-module by incorporating additional multimedia resources and interactive features to boost its effectiveness. Integrating gamification elements and real-time collaborative writing tools could enhance student engagement and promote creative thinking. Meanwhile, other lecturers can adapt this e-module in their teaching practices and explore its application to support students' independent learning and improve critical thinking, especially in essay writing tasks.

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