

Development of an Interactive English E-Module for Engineering Students at Malikussaleh University

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Abstract:

This study aimed to develop an interactive English e-module for Information Systems Engineering students. Research and Development (R&D) approach with the ADDIE models was implemented in this study which comprised five primary stage, namely analysis, design, development, implementation, and evaluation. In this study, the participants included experts of media and material, as well as 15 engineering students from the Information Systems program at Malikussaleh University as users. The final product was an interactive e-module containing technical English materials equipped with features such as lessons, exercises, quizzes, and evaluations. Initially, the product was designed and saved in Microsoft Word format. The file was then uploaded and edited using the Canva application. After the entire content was designed in Canva, the file was exported and uploaded to Heyzine Flipbook to produce an interactive flipbook format. Validation results indicated that the developed application received positive responses. The media and material expert provided a score of 92.3% and 87.5% (categorized as *feasible*), and the students gave a score of 86.75% (categorized as *practical*). In addition, the students' evaluation results reached an average score of 85 (categorized as *effective*). Based on these findings, the English for Engineering e-module was considered feasible, practical, and effective for use in learning activities.

Keywords: Development; E-Module; English; Interactive; Students

Introduction

In Indonesia, English has been introduced from elementary school to college, either formally or informally. The purpose of introducing English is to enable students to communicate effectively, access global information networks, and compete internationally. In addition, English learning supports better career opportunities and participation in international activities, particularly as English for Specific Purposes (ESP) becomes increasingly important in professional contexts (Brilianti & Rokhim, 2024; Jannah, 2022). However, despite the early introduction of English, many Indonesian learners still struggle to achieve fluency, as studies indicate persistent difficulties in communication even after years of instruction (Sadji Evenddy et al., 2024).

To address these challenges, integrating Information and Communication Technology (ICT) into language learning has been recognized as an effective strategy to enhance learning quality and accessibility. Technology-supported learning promotes a student-centred approach, encouraging active participation, critical thinking, and creativity (Astutik et al., 2023; Noviyanti et al., 2025). One of the ICT-based innovations that supports these goals is the electronic module (e-module), which offers interactive,

multimedia-based materials that facilitate independent learning and improve student engagement (Ratnawati et al., 2024; Trianingrum et al., 2024).

However, based on observations at the Faculty of Engineering, Malikussaleh University, students' learning experiences remain limited. They rely heavily on the internet for assignments, while most instructional materials are still conventional textbooks, PowerPoint slides, or printed papers with minimal interactivity and relevance to their specific field. This gap highlights the need for innovative learning resources **aligned with** students' academic and professional contexts. Therefore, it is necessary to develop an interactive English e-module that addresses the specific needs of engineering students and supports a more engaging and effective learning process.

Based on this description, the researcher is interested in conducting a study entitled "*Development of an Interactive English E-Module for Engineering Students at Malikussaleh University*." This study aims to evaluate the validity of the e-module in terms of its content and instructional media, as well as to determine its practicality and effectiveness of the developed e-module as a learning resource to enhance students' English competence.

Literature Review

As a reference for product development, this research draws upon several relevant previous studies, particularly those related to the development of English e-modules. The review of these studies is intended to strengthen the theoretical framework and support the background of this research. The study conducted by Ronas et al. (2020) focused on developing an English e-module for nursing students using the Schoology platform at STIK Muhammadiyah Pontianak. The validation results demonstrated that the product was highly feasible and received positive feedback from students, suggesting its effectiveness in supporting language learning in health-related contexts. While their study emphasized the integration of digital platforms for medical purposes, the present research focuses on designing an e-module for engineering students whose English needs are oriented toward technical and field-specific communication.

Similarly, Semarang et al. (2022) developed an English for Specific Purposes (ESP) e-module in the field of law to enhance law students' understanding of legal English. The results indicated that the developed ESP e-module was highly feasible, practical, and effective as a learning medium. In contrast to the legal context, the current study aims to address a different disciplinary demand engineering English which requires the integration of technical vocabulary, conceptual comprehension, and applied linguistic competence.

In addition, Purwanti et al. (2023) developed an e-module for the *Semantics* course. The findings showed that the implementation of the e-module in semantics learning effectively improved students' learning outcomes. The use of video materials enhanced comprehension and increased learners' motivation and engagement. Although the study demonstrated the pedagogical benefits of multimedia integration, it did not focus on discipline-specific English learning. The present research, therefore, extends this approach by integrating interactive and multimedia features into an English e-module tailored for engineering students.

The review of three previous studies indicates that e-modules contribute to more engaging, interactive, and students centered learning environments. However, most have been limited to non-technical disciplines. Addressing this gap, the present study aims to develop and validate an interactive English e-module specifically designed for students in the Faculty of Engineering at Malikussaleh University. This e-module is expected to enhance students' mastery of English terminology and discourse relevant to engineering, thereby strengthening their competence in both academic and professional contexts.

Research Method

In this study, the researcher employed the Research and Development (R&D) method, which is a research approach designed to develop a specific educational product and to assess its effectiveness (Sugiyono, 2019). The study was carried out with students from the Information Systems Engineering Program at Malikussaleh University. Through this research, English e-module was developed to be valid, practical, and effective for use by Information Systems Engineering students. ADDIE models comprise five primary stage, namely analysis, design, development, implementation, and evaluation (Branch, 2009). Figure 1 below is an illustration of the ADDIE model;

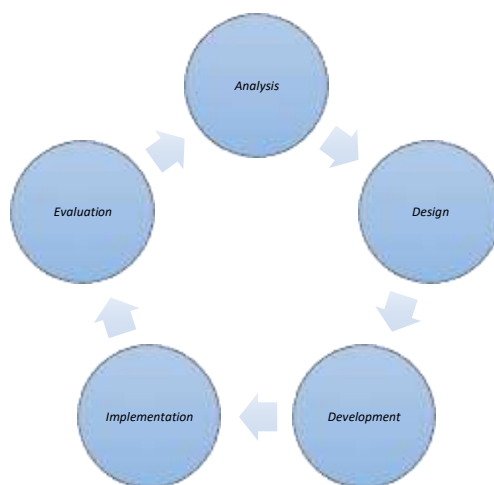


Figure 1. ADDIE Model

The first step is analysis, where the researcher conducts preliminary research activities, such as observations to gather preliminary data that will be used as a basis for the development of e-module. During this process, the researcher conducts a needs analysis at university Malikussaleh of students Engineering faculty, especially for information systems students. The data collected takes the form of a needs analysis questionnaire results and observation to the lecturer. Second step is design, the product design encompasses the content structure, material organization, interface design, and the development of interactive learning activities. Heyzine Flipbook application was selected as the primary medium. Development is the third step. The product development process involved validation by media experts and material experts to ensure that the content, language, and design of the e-module conformed to the established educational standards. The revised product, refined based on suggestions and feedback, was subsequently evaluated by experts using a feasibility assessment instrument. Implementation is the fourth step. E-module trial was conducted to the students of Information Systems study program. The students evaluated e-module by completing a student response questionnaire. The last step is evaluation. It was conducted to assess the effectiveness of the e-module in enhancing students' understanding of English. The evaluation included an analysis of learning outcomes and questionnaire.

Result

This research is done on the course English for Engineering Faculty students at Univeristy Malikussaleh. The focus of this development research is developing English E-module for information systems at sixth semester. In the development process of e-module the researcher explains the stages accordance with the name of the Model namely ADDIE: Analysis, Design, development, implementation and evaluation.

Analysis

The needs analysis was conducted through interviews with lecturers and questionnaires distributed to students of the Information Systems Study Program at Universitas of Malikussaleh. It was found that lecturers had already integrated technology into the teaching and learning process, such as by using PowerPoint presentations to deliver course materials. This strategy has proven effective in increasing students' motivation and interest in actively participating in classroom activities. Textbooks also remain a key teaching resource; however, these materials are not fully aligned with current technological developments. Lecturers tend to rely on existing textbooks or learning materials rather than developing new, technology integrated resources mainly due to limited technological proficiency and time constraints.

To analyze students' learning needs, the researcher distributed questionnaires using Google Forms. The questionnaires aimed to identify students' learning objectives, challenges, and preferences in learning English. Based on the responses, several key problems, needs, and potential solutions were identified and are summarized in table 1 below.

Table 1. Result of Students' Needs Analysis

Problems	Needs	Solutions
Students tend to prefer watching videos rather than reading texts	A visual-based learning medium that helps students grasp key explanations without reading all the material	Developing a learning medium that integrates video explanations and highlights key information within the material
Some course materials require practical application	A learning medium that provides video tutorials as a learning resource	Developing a medium that includes tutorial videos as learning resources
Students need practice exercises to improve understanding	Interactive quizzes to enhance comprehension	Developing interactive exercises using applications such as Quizizz

The results of the needs analysis indicate that students show a strong preference for **visual and interactive learning media**, which is consistent with the **principles of multimedia learning theory** (Mayer, 2009). According to this theory, learning becomes more effective when verbal information is combined with visual elements such as images, animations, and videos, as this helps reduce cognitive load and improves comprehension.

Design

The developed e-module encompasses three main components: framework design, instructional content design, and design implementation using Heyzine Flipbook. A comprehensive description of each component is presented in the following section.

1. Framework Design

The general content outline of the e-module includes the initial design of the material to be presented and the sequencing of topics. Based on the conducted analysis, the researcher designed the e-module by including a cover page, table of contents, five main chapters, and a bibliography. The detailed structure is described as follows:

- a. **E-Module Cover:** Designed to be visually appealing and interactive, featuring turquoise green as the dominant color and including the e-module title and the author's name.
- b. **Table of Contents:** Contains the titles and corresponding page numbers of each chapter and subchapter.
- c. **Content:** Consists of five chapters: Chapter 1: Computers and Its Role, Chapter 2: Computers Should Never Replace Textbooks and Tablets Should Replace Textbooks, Chapter 3: Word Processor, Chapter 4: Personal Computer, and Chapter 5: Programming Language, Networking, Software Copyright, and The Use of Networking.
- d. **Bibliography:** Contains all references and sources used in the development of this e-module.

2. Instructional Content Design

The instructional content of the e-module is designed into five main sections: *Reading Comprehension* to help students become familiar with academic reading materials, *Questions* which the formats used essay and true-or-false types, *Conversation* to develop speaking and listening skills in contexts associated with Information Systems, *Grammar Focus* to provide a clear understanding of sentence structures, and *Grammar Exercises* are presented in multiple-choice format and linked interactively by using Quizizz application.

3. Design Implementation Using Heyzine Flipbook

At this stage, the selection of appropriate tools for developing the e-module was conducted. After considering several available options that align with the analysis results and learning needs, the researcher chose Heyzine Flipbook as the main development tool. This selection was based on the need for an output format that is flexible and easily accessible to students. Initially, the e-module materials were prepared and saved in Microsoft Word format. The file was then uploaded and edited using Canva to create a more visually engaging and interactive layout, in accordance with modern instructional design principles. Once the design process in Canva was completed, the file was exported and uploaded to Heyzine Flipbook. The e-module design as displayed in Canva and Heyzine Flipbook can be seen in Figures 2 and 3.



Figure 2. The display of e-module using Canva

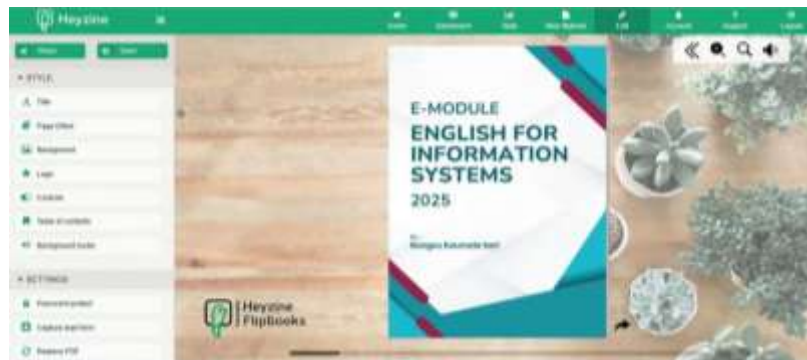


Figure 3. The display of e-module using Heyzine Flipbooks

Each section of the material contains text-based explanations and video resources obtained from YouTube. In addition, interactive exercises are provided to enhance students' understanding of the presented materials. These interactive exercises were developed using the Quizizz application. The complete version of the e-module can be accessed through the following link: <https://bit.ly/e-moduleenglishforinformationsystems>, and its visual display is presented in Figures 4–7.



Figure 4. The display of the e-module cover

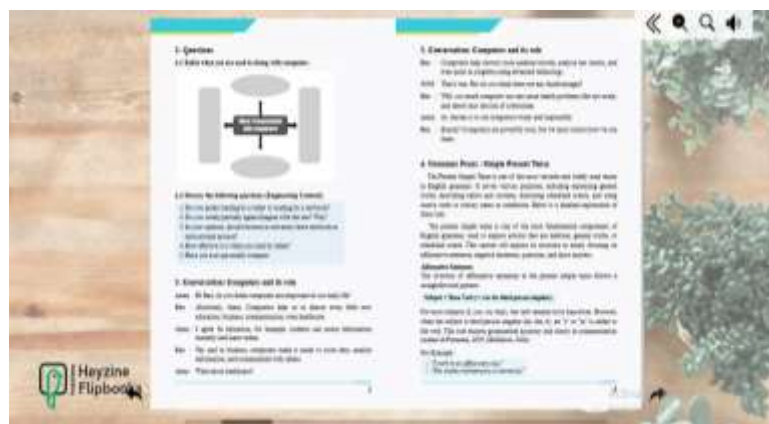


Figure 5. The display of material



Figure 6. The display of e-module video and exercise

Development

In development process, the designed e-module was evaluated and validated by both material experts and media experts. The assessment instrument was employed to measure the feasibility (validity) of the e-module. The media expert validation aimed to assess several aspects, including visual appearance, interactivity, ease of use, and technical quality of the developed e-module. The validation process was carried out by an instructional media expert with extensive experience in the development of digital-based learning materials. The media validation instrument consisted of four main aspects: visual design, navigation and interactivity, technical quality (audio, video, and animation), and user-friendliness. The results of the media expert validation are presented in table 2.

Table 2. Results of Media Expert Validation

No	Assessment Aspect	Maximum Score	Score Obtained	Percentage (%)	Category
1	Visual appearance (design, color, layout, consistency)	16	14	87.5%	Very Good
2	Navigation and interactivity (menus, buttons, system response)	12	11	91.6%	Very Good
3	Technical quality (text, image, audio, video, animation)	12	10	83.3%	Good
4	Ease of use (accessibility, clarity of instructions)	12	11	91.6%	Very Good
Total		52	48	92.3%	Highly Feasible

The media expert provided several suggestions for improvement, such as adding page transition effects to make the display more engaging and simplifying the main menu to enhance accessibility for new users. After revisions were made based on the media expert's feedback, the e-module was declared feasible for use without further modification.

The material validation was conducted by an English lecturer with extensive experience in teaching *English for Specific Purposes (ESP)*, particularly for engineering students. The evaluation focused on four aspects: content quality, language accuracy, presentation, and alignment with students' learning needs. The material validation instrument consisted of four main components: content/material feasibility, presentation

feasibility, language feasibility, and alignment with learning objectives. The results of the material expert validation are presented in table 3.

Table 3. Results of Material Expert Validation

No	Assessment Aspect	Maximum Score	Score Obtained	Percentage (%)	Category
1	Content/material feasibility (relevance, depth, accuracy)	16	14	87.5%	Very Good
2	Presentation feasibility (organization, clarity, illustration)	12	11	91.6%	Very Good
3	Language feasibility (structure, grammar, readability)	12	10	83.3%	Good
4	Alignment with learning objectives and students' needs	8	7	87.5%	Very Good
Total		48	42	87.5%	Highly Feasible

The material expert also provided several recommendations, including adding texts that reflect more specific technical contexts in the field of Information Systems and adjusting the level of exercise difficulty to match the proficiency level of first-year students. After revisions were made according to these suggestions, the e-module was declared highly feasible to be used as an interactive English learning medium for students of the Faculty of Engineering.

Based on the validation results from both experts (media and material), the average feasibility score was obtained as illustrated in figure 7.

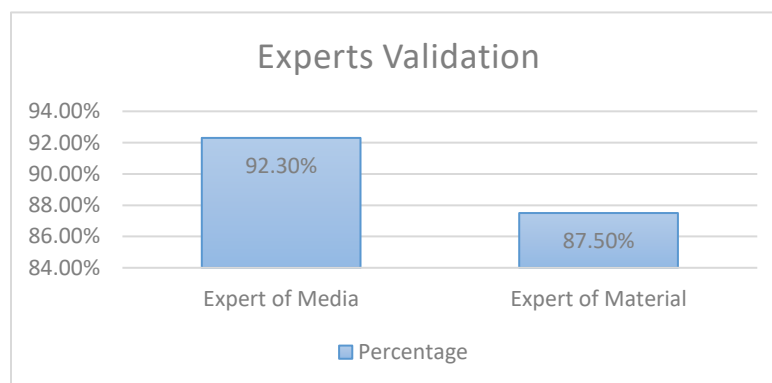


Figure 7. Expert Validation Results

The graph indicates that both aspects—media and material—received scores above 80%, which classifies the developed e-module as **“Highly Feasible”** for use in interactive English learning within the Faculty of Engineering.

Implementation

After the e-module was validated by experts and revised based on the feedback provided, the next stage was the trial and implementation phase. The trial was conducted with 15 students from the Information

Systems Study Program, representing three categories of academic ability: low, medium, and high. The developed e-module was designed in HTML format, making it accessible through web browsers and allowing users to engage in the learning process conveniently.

The purpose of the trial was to obtain empirical data regarding the effectiveness and feasibility of the e-module as a learning medium. Students, as respondents, provided their evaluations through a questionnaire that covered three main aspects: clarity of instruction, usefulness in the learning process, and overall feasibility of the e-module. The results of the students' responses are presented in Table 8 below:

Table 4. Results of Students' Responses to the E-Module

No	Variable	Achievement Level (%)	Category
1	Clarity Aspect	87.5%	Very Good
2	Usefulness Aspect	81.25%	Good
3	Feasibility Aspect	87.5%	Very Good
Average		85.41%	Very Good

Based on the results presented in the table above, the average achievement level reached 85.41%, which falls into the "Very Good" category. This finding indicates that the e-module demonstrates a high level of instructional clarity, provides a positive impact on students' learning processes, and is deemed feasible to be used as an instructional material to support the achievement of English learning objectives in the Information Systems Study Program.

Evaluation

At the evaluation stage, a limited trial was conducted with a small group of students to assess the practicality and effectiveness of the developed e-module. This trial was carried out with 40 students from Class A4 of the Information Systems Study Program, who were not part of the group involved in the previous implementation phase. The purpose of this stage was to obtain empirical insights into the usability (practicality) and effectiveness of the e-module in supporting the learning process. Meanwhile, the effectiveness of the e-module was evaluated based on students' learning activities throughout the instructional process and their learning outcomes after using the e-module.

Practicality of the E-Module

The practicality of the e-module was assessed through a questionnaire completed by 40 students who participated in the limited trial. Based on the analysis of the questionnaire data, the average achievement score was **86.75%**, which falls into the "**highly practical**" category. A detailed summary of the practicality assessment results is presented in table 5 below:

Table 5. Students' Practicality Assessment of the E-Module

No	Indicator	Practicality (%)	Category
1	Ease of Use	87.5%	Highly Practical
2	Usefulness	85%	Highly Practical
3	Time Efficiency	87.5%	Highly Practical
Average		86.75%	Highly Practical

Effectiveness of the E-Module

The effectiveness of e-module was measured based on two aspects: students' learning activities during the learning process and their learning outcomes after using the e-module. Observations of student activities showed increased engagement during lessons, with most students actively participating in discussions, completing interactive exercises, and utilizing the multimedia features provided in the e-module. In addition, the effectiveness aspect was also measured by comparing students' learning outcomes before and after using the e-module. The measurement was conducted using pre-test and post-test to determine the improvement in students' understanding of English materials.

Table 6. Comparison of Students' Test Scores

No	Type of Test	Average Score	Category
1	Pre-Test	60	Fair
2	Post-Test	85	Very Good

Based on the table above, the students' average score increased from 60 on the pre-test to 85 on the post-test, showing an improvement of 25 points. These results demonstrate that learning through the e-module is effective in enhancing students' understanding of the English language materials.

Discussion

This study successfully developed a teaching material product that enhances the effectiveness of the learning process for engineering students. The product development was based on the theory proposed by Lestari et al.(as cited in Khasanah et al., 2025), which emphasizes that instructional materials should be systematically structured and encompass all required competencies. The developed English e-module integrates several key components, including learning materials, exercises, instructional videos, and interactive quizzes. Its design adopts an interactive learning approach as the foundation of the instructional process. According to Prastowo (as cited in Latifah & Utami, 2019) interactive learning materials should actively engage learners through multiple media such as text, images, audio, and video. This principle is reflected in the e-module through the integration of videos, quizzes, and exercises that provide direct feedback, thereby promoting a dynamic, enjoyable, and student-centered learning experience.

Referring to Magdalena et al. (2020), teaching materials should be designed to enable students to explore the content independently while remaining aligned with the established curriculum. In accordance with this principle, the English e-module application was developed based on learning outcomes and learning objectives. The study by Ronas et al. (2020) and Semarang et al. 2022) demonstrated that English e-modules developed for nursing and law students were valid, practical, and feasible for use in learning activities. Extending these findings, the English e-module for engineering developed in this study offers high contextual relevance to the academic and professional needs of engineering students, providing flexible access and supporting independent learning beyond classroom boundaries.

The findings of this study have several practical implications for English language teaching in higher education. For lecturers, the e-module serves as a complementary digital resource that can be integrated into classroom instruction or online learning, allowing more efficient time management and diversification of teaching strategies. It also helps lecturers provide individualized feedback and track students' learning progress more effectively. For students, the interactive design fosters autonomous learning, critical thinking, and digital literacy skills essential in the context of Industry 4.0 and global communication.

However, several limitations should be acknowledged. First, the development and testing of the e-module were limited to a relatively small group of engineering students within a single institution, which may restrict the generalizability of the findings to broader academic contexts. Second, the implementation of the e-module relied on stable internet connectivity, which may pose accessibility challenges for students in areas with limited technological infrastructure. These limitations suggest that future research should involve a larger and more diverse participant base, incorporate communicative tasks and writing modules, and explore offline or hybrid versions of the e-module to ensure wider accessibility and pedagogical effectiveness.

Conclusion

The development of the Interactive English for Engineering module was carried out by referring to the ADDIE development models. Validation results indicated that the developed application received positive responses. The media and material expert provided a score of 92.3% and 87.5% (categorized as *feasible*), and the students gave a score of 86.75% (categorized as *practical*). In addition, the students' evaluation results reached an average score of 85 (categorized as *effective*). Based on these findings, the English for Engineering e-module was considered feasible, practical, and effective for use in learning activities. The results highlight several practical implications for English language educators in higher education. Lecturers can utilize the e-module as a digital supplement to enhance instructional delivery, encourage learner autonomy, and integrate authentic engineering contexts into English lessons. Its interactive features can also support differentiated instruction, allowing lecturers to monitor students' progress and provide individualized feedback more efficiently.

In addition, this study offers several recommendations for future development and research. First, future studies could explore the long-term impact of e-module use on students' learning outcomes, motivation, and digital literacy across various engineering disciplines. Second, the development of a mobile application-based or offline version of the e-module is recommended to improve flexibility and accessibility, particularly for students in regions with limited internet connectivity. Lastly, collaborative development involving lecturers and instructional designers could further enhance the pedagogical quality and sustainability of the e-module in broader educational settings.

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