

The Development of a Project-Based E-Module to Support Teaching Aids Course among Pre-Service English Teachers

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ABSTRACT

The rapid development of digital technology demands continuous innovation in higher education learning, including in English teacher education programs. In the English Education Study Program, the Teaching Aids course plays a key role in preparing prospective teachers to design and develop creative and contextual English instructional media. However, current learning practices remain dominated by conventional materials and have not fully supported active engagement, independent learning, and practical skill development. To address this issue, this study developed a project-based e-module for the Teaching Aids course and examined its validity, practicality, and effectiveness. This study employed a Research and Development (R&D) design using the ADDIE model, consisting of analysis, design, development, implementation, and evaluation stages. The result successfully developed e-module integrates structured learning materials, multimedia elements, project-based activities, and assessment components to support students in understanding and applying instructional media development concepts. The validation results showed that the e-module obtained 82.62% from media experts (very valid category) and 80.93% from material experts (valid category). Furthermore, the practicality evaluation from 30 pre-service English teachers achieved an average score of 86.50% (very practical category). These findings indicate that the developed project-based e-module is a feasible digital learning resource that supports meaningful learning experiences and enhances the implementation of Teaching Aids instruction.

Keywords: *E-Module; Educational Technology; Pre-Service Teachers; Project-Based Learning; Teaching Aids.*

INTRODUCTION

The advancement of digital technology has transformed various aspects of education, particularly the teaching and learning processes in higher education institutions. In response to these changes, students are required to develop not only a

strong understanding of theoretical concepts but also practical competencies, creativity, and technological literacy to support effective learning (Azzahra, 2023). Within the English Language Education Study Program at the Faculty of Teacher Training and Education (FKIP), Nahdlatul Ulama Lampung University, the Teaching Aids course plays a crucial role in preparing pre-service English teachers. This course is designed to enhance students' abilities to design, develop, and implement instructional media for English language learning in creative, innovative, and effective ways (Aufa et al., 2021).

Despite the increasing integration of digital technology in higher education, the instructional materials employed in the Teaching Aids course remain predominantly conventional in nature and have yet to fully incorporate technology-based learning principles (Yusupova et al., 2025). This condition limits opportunities for students to engage in meaningful learning experiences that foster autonomy, active participation, critical thinking, and creativity (Jamil, 2024). Moreover, the existing learning process has not adequately facilitated students in developing authentic and contextually relevant instructional media products through hands-on practice and collaborative inquiry (Asim & Ahmad, 2025). Consequently, students often encounter challenges in bridging the gap between theoretical understanding and practical implementation, particularly in designing, developing, and utilizing teaching aids that effectively address the pedagogical needs of English language learning.

In response to the aforementioned challenges, the development of an innovative instructional medium in the form of a project-based electronic module (e-module) is deemed imperative (Agustina et al., 2025). The e-module provides an accessible and engaging learning experience, enabling students to understand the material more effectively and retain information more readily (Purwanti, 2023). E-modules offer a flexible and self-directed learning environment that enables students to access learning resources independently, thereby supporting the development of lifelong learning skills and digital literacy (Agustina & Efendi, 2021). Furthermore, the Project-Based Learning (PjBL) approach emphasizes student-centered learning through engagement in authentic, inquiry-driven, and product-oriented projects that facilitate the meaningful application of theoretical knowledge in practical contexts (Muzri S et al., 2024).

The integration of project-based learning principles into an e-module is expected to provide a more structured and interactive learning experience while fostering higher-order thinking skills, creativity, collaboration, and problem-solving abilities (Yuliani & Lengkanawati, 2017). Within the context of the Teaching Aids course, such an instructional innovation is anticipated to strengthen the professional competencies of pre-service English teachers in designing, developing, and evaluating instructional media that are pedagogically sound, technologically relevant, and responsive to the needs of contemporary English language education (Dewi et al., 2024). Accordingly, this study is directed toward the development of a project-based e-module for the Teaching Aids course to support the implementation of technology-enhanced, student-centered learning and to better prepare future English teachers for the demands of 21st-century education.

Project-Based Learning (PjBL) is a student-centered pedagogical approach that emphasizes learners' active involvement in meaningful, authentic, and real-world projects (Yusupova et al., 2025). An innovative PjBL instructional model that demonstrates considerable potential for scalability and replication in comparable educational settings, thereby supporting the continuous and sustainable improvement of English language teaching and learning practices (Bria et al., 2026). The implementation of PjBL is widely recognized as an effective means of cultivating critical competencies, including collaboration, communication, creativity, and problem-solving, which are fundamental to students' future success (Handayani et al., 2026). Despite the growing adoption of technology-enhanced Project-Based Learning, further empirical research is needed to examine the extent to which such integration contributes to students' mastery of learning materials and motivation to learn (Yani et al., 2024).

Findings from earlier studies suggest that the implementation of PjBL can effectively foster critical thinking skills among learners. Consequently, PjBL is widely considered a crucial instructional strategy for improving educational outcomes (Eshun et al., 2026). The project-based e-module integrates digital instructional materials with the procedural stages of Project-Based Learning, providing a structured framework for student-centered learning (Syakur et al., 2020). By linking theoretical knowledge to authentic professional experiences, PjBL provides a pedagogical framework that effectively narrows the gap between acquired competencies and their implementation in practice (Li, 2026).

The implementation of PjBL provides an effective pedagogical framework for embedding principles into EFL instruction, enabling students to participate in meaningful learning activities that are grounded in real-world contexts (View, n.d.). PjBL has emerged as an effective pedagogical approach for enhancing speaking proficiency in EFL higher education settings, with important implications for curriculum development, teacher training, and language education policies (Liswanto & Akbar, 2026). Evidence suggests that Project-Based Learning (PBL) enhances students' language skills while simultaneously fostering the psychological dispositions necessary for effective oral communication (Wulandari, 2022). As a result, embedding project-based experiences within speaking instruction is recommended to facilitate learner-centered engagement and improve communication outcomes (Liswanto & Akbar, 2026).

The effectiveness of technology-enhanced learning is strongly influenced by students' digital literacy levels; therefore, future studies should explore digital learning strategies that are aligned with learners' technological literacy readiness (Purwanto et al., 2025). E-modules facilitate structured and self-regulated learning experiences (Dewi et al., 2024). Existing research has shown that the use of e-modules can significantly improve students' conceptual understanding, promote independent learning, and increase learning motivation (Rahman et al., 2021).

Based on the foregoing discussion, this study focuses on the development of a project-based e-module for the Teaching Aids course. The study is intended to (1) describe the development process of the project-based e-module, (2) evaluate the

feasibility of the developed product from the perspectives of content, media, and instructional design experts, and (3) investigate students' responses toward the implementation of the project-based e-module in the English Language Education Study Program, Faculty of Teacher Training and Education, Nahdlatul Ulama Lampung University.

METHOD

This study employed a Research and Development (R&D) approach using the ADDIE instructional design model developed by Branch, which consists of five phases: Analysis, Design, Development, Implementation, and Evaluation. The study aimed to develop a project-based e-module for the Teaching Aids course and to examine its validity and practicality for use among pre-service English teacher (Branch & Varank, 2009).

The research was conducted in the English Education Study Program at Nahdlatul Ulama Lampung University. The participants consisted of two experts in English language education, two instructional media experts, one lecturer teaching the Teaching Aids course, and 30 pre-service English teachers enrolled in the course. The experts were purposively selected based on their expertise in English language teaching and instructional media development, while the students participated in the limited field trial of the developed e-module.



Figure 1. ADDIE model R&D research steps (Branch & Varank, 2009)

The development process followed the five phases of the ADDIE model as follow:

Analysis

During the analysis phase, learners' needs, curriculum requirements, and instructional challenges were identified through classroom observations, interviews with the course lecturer, and student questionnaires. Based on the findings, the design phase focused on developing the instructional framework, learning materials, project-based learning activities, assessments, and interface of the e-module.

Table 1. Blueprint of the Needs Analysis Instrument

No.	Aspect	Indicators	Item Numbers
1	Learners' Characteristics	Students' prior knowledge and experience in the Teaching Aids course	1–2
		Students' digital literacy and learning preferences	3–4
2	Learning Needs	Difficulties encountered in designing teaching aids	5–6
		Expectations toward digital learning resources	7–8
3	Course Content	Relevance of the existing course materials to learning outcomes	9–10
		Need for authentic and project-based learning activities	11–12
4	Learning Resources	Availability and adequacy of existing instructional materials	13–14
		Need for an interactive e-module to support independent learning	15–16
5	Technology Integration	Accessibility and use of digital devices in learning	17–18
		Students' readiness to use an e-module in classroom learning	19–20

Design

The design phase focused on translating the results of the needs analysis into a comprehensive instructional blueprint. This process involved formulating learning outcomes, organizing course content, designing project-based learning activities, developing assessment tasks, and preparing the storyboard and interface layout of the e-module. The instructional design was aligned with the principles of Project-Based Learning to facilitate active, collaborative, and learner-centered learning experiences.

Table 2. Blueprint of the Media Expert Validation Instrument (Mayer, 2024)

No.	Assessment Aspect	Indicators	Item Numbers
1	Usability	Ease of use of the e-module as a learning resource	1–2
		Flexibility and accessibility of the e-module	3–4
2	Visual Design	Appropriateness of layout and page organization	5–6
		Readability and consistency of typography	7–8
		Attractiveness of the cover design	9–10

3	Technical and Functional Quality	Consistency of layout across pages	11–12
		Harmony of visual elements (text, images, colors, and spacing)	13–14
		Completeness of interface and layout components	15–16
		Layout supports learners' comprehension	17–18
		Simplicity and appropriateness of typography	19–20
		Legibility of text	21–22
		Clarity of information presentation	23–24
		Relevance and quality of illustrations and graphics	25–26

Development

In the development phase, the prototype was produced and validated by material and media experts. The product was subsequently revised according to the experts' recommendations before being implemented in a limited classroom trial.

Implementation.

The revised e-module was implemented through a limited field trial involving one lecturer and 30 pre-service English teachers enrolled in the Teaching Aids course. The implementation aimed to examine the practicality and usability of the developed e-module in supporting classroom instruction. At the end of the implementation, both the lecturer and students completed response questionnaires to provide feedback on the clarity, usability, and overall quality of the learning resource.

Evaluation.

Evaluation was conducted throughout the development process using formative evaluation to ensure continuous refinement of the product. Feedback obtained from expert validation, lecturer observations, and students' responses was systematically analyzed and incorporated into subsequent revisions. The final version of the e-module was produced after all revisions had been completed, resulting in a learning resource that met the expected standards of validity and practicality.

Table 3. Blueprint of the Material Expert Validation Instrument

No.	Assessment Aspect	Indicators	Item Numbers
1	Content Quality	Alignment of the learning materials with the Course Learning Outcomes (CLOs) and learning objectives	1–3
		Accuracy, relevance, and currency of the content	4–11

		Depth and comprehensiveness of the learning materials	12–17
		The extent to which the materials stimulate students' curiosity and critical thinking	18–20
2	Instructional Presentation	Organization and sequence of learning materials	21–22
		Adequacy of supporting learning components (examples, illustrations, exercises, and project activities)	23–30
		Appropriateness of learning activities for Project-Based Learning	31
		Completeness of instructional features (learning objectives, summaries, assessments, and references)	32–34
3	Language Quality	Clarity and conciseness of language	35–37
		Use of communicative and learner-friendly language	38–39
		Use of interactive and engaging language	40–41
		Appropriateness of language for pre-service English teachers' proficiency level	42–44

Data Analysis

The quantitative data obtained from the expert validation and users' responses were analyzed using descriptive statistics. The analysis aimed to determine the validity and practicality of the developed project-based e-module. The scores from the material experts, media experts, lecturer, and students were converted into percentage scores and interpreted according to predetermined assessment criteria. In addition, qualitative data obtained from experts' comments and participants' suggestions were analyzed descriptively and used as the basis for revising and improving the e-module throughout the development process.

The percentage score was calculated using the following formula:

$$PS = \frac{n}{N} \times 100\%$$

where *PS* denotes the percentage score, *n* represents the total score obtained, and *N* refers to the maximum possible score.

The percentage scores were interpreted using the criteria proposed as presented as follow:

Table 4. Interpretation of Percentage Scores

Percentage (%)	Interpretation
81–100	Very Valid
61–80	Valid
41–60	Fairly Valid
21–40	Less Valid
0–20	Invalid

FINDINGS AND DISCUSSION

Analysis

The needs analysis constituted the initial stage of the ADDIE development process and aimed to identify the instructional requirements for designing a project-based e-module for the Teaching Aids course. The data obtained from classroom observations, lecturer interviews, and student questionnaires revealed that the existing learning resources were not fully sufficient to facilitate students' engagement in designing and developing English teaching aids. The learning process primarily relied on conventional instructional materials, which provided limited opportunities for students to explore practical applications and independently construct learning experiences.

The findings indicated that pre-service English teachers required a digital learning resource that integrates theoretical explanations, practical examples, multimedia components, and structured project activities. Students particularly emphasized the importance of accessible learning materials that could guide them through the stages of planning, developing, and evaluating teaching aids. These findings confirm the assumption that instructional materials should be developed based on learners' needs, contextual requirements, and learning objectives (Tomlinson, 2023). Furthermore, (Branch & Varank, 2009) highlighted that needs analysis is a fundamental component of instructional design because it provides empirical evidence for determining appropriate learning strategies and product specifications.

Design

In the design phase, the instructional framework of the e-module was developed based on the results of the needs analysis. This phase involved specifying the learning objectives, selecting and organizing course content, designing project-based tasks, and preparing the storyboard and interface structure to guide the subsequent development process.



Picture 1. The cover design

TABLE OF CONTENT	
LESSON 1: INSTRUCTION AND LEARNING	1
LESSON 2: DEFINITION MEDIA, MESSAGE AND METHODS	6
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LESSON 6: VISUAL PRINCIPLES AND VISUALS IN INSTRUCTION	40
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LESSON 9: MEDIA FOR TEACHING READING, AND WRITING	84
LESSON 10: ASSURE MODEL	90
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Picture 2. Table of Content

Development

The media expert validation results showed that the developed project-based e-module achieved an overall validity score of 82.62%, which was categorized as very valid. The findings indicate that the e-module met the required criteria for digital instructional media in terms of usability, visual design, and technical functionality.

Table 5. Results of Media Expert Validation of the Project-Based E-Module

No.	Assessment Aspect	Indicators	Obtained Score	Percentage (%)	Category
1	Usability	Ease of use of the e-module as a learning resource	41	82.00%	Very Valid
		Flexibility and accessibility of the e-module	39	78.00%	Valid
2	Visual Design	Appropriateness of layout and page organization	40	80.00%	Valid
		Readability and consistency of typography	44	88.00%	Very Valid
		Attractiveness of the cover design	38	76.00%	Valid
3	Technical and Functional Quality	Consistency of layout across pages	42	84.00%	Very Valid
		Harmony of visual elements (text, images, colors, and spacing)	41	82.00%	Very Valid
		Completeness of interface and layout components	39	78.00%	Valid
		Layout supports learners' comprehension	43	86.00%	Very Valid
		Simplicity and appropriateness of typography	42	84.00%	Very Valid
		Legibility of text	45	90.00%	Very Valid
		Clarity of information presentation	43	86.00%	Very Valid
		Relevance and quality of illustrations and graphics	40	80.00%	Valid
		Overall Score	537	82.62%	Very Valid

Among the evaluated aspects, the highest score was obtained for text legibility (90.00%), indicating that the typography and readability of the e-module were considered appropriate for supporting learners' comprehension. Meanwhile, the lowest scores were found in cover design attractiveness (76.00%), flexibility and accessibility (78.00%), and completeness of interface components (78.00%), which were categorized as valid. These aspects were revised based on expert suggestions, particularly regarding visual enhancement, navigation improvement, and accessibility optimization.

The results confirm that the developed e-module has fulfilled the characteristics of effective multimedia learning materials. In line with Mayer's multimedia learning theory, digital learning resources should present information through well-organized visual and verbal elements to facilitate meaningful learning (Mayer, 2024). Therefore, the validation results indicate that the developed project-based e-module is appropriate for use as a learning resource in the Teaching Aids course.

Table 6. Results of Material Expert Validation of the Project-Based E-Module

No.	Assessment Aspect	Indicators	Obtained Score	Percentage (%)	Category
1	Content Quality	Alignment of the learning materials with the Course Learning Outcomes (CLOs) and learning objectives	41	82.00%	Very Valid
		Accuracy, relevance, and currency of the content	63	78.75%	Valid
		Depth and comprehensiveness of the learning materials	50	83.33%	Very Valid
		The extent to which the materials stimulate students' curiosity and critical thinking	39	78.00%	Valid
2	Instructional Presentation	Organization and sequence of learning materials	33	82.50%	Very Valid
		Adequacy of supporting learning components (examples, illustrations, exercises, and project activities)	62	77.50%	Valid
		Appropriateness of learning activities for Project-Based Learning	34	85.00%	Very Valid

		Completeness of instructional features (learning objectives, summaries, assessments, and references)	49	81.67%	Very Valid
3	Language Quality	Clarity and conciseness of language	40	80.00%	Valid
		Use of communicative and learner-friendly language	33	82.50%	Very Valid
		Use of interactive and engaging language	32	80.00%	Valid
		Appropriateness of language for pre-service English teachers' proficiency level	42	84.00%	Very Valid
	Total Score		518	80.93%	Valid

The material expert validation results indicated that the developed project-based e-module obtained an overall percentage score of 80.93%, which was categorized as valid. The findings demonstrate that the developed e-module fulfilled the essential criteria of a feasible instructional material for the Teaching Aids course, although several improvements were recommended by the experts.

The evaluation of content quality showed that the materials were appropriately aligned with the Course Learning Outcomes (CLOs) and learning objectives, obtaining a very valid category (82.00%). The experts confirmed that the content provided relevant theoretical foundations and practical guidance for developing teaching aids. However, the accuracy and currency of the content received a valid category (78.75%), suggesting the need for updating several examples and strengthening contextual references.

Regarding instructional presentation, the results indicated that the organization of learning materials and the integration of Project-Based Learning activities were appropriate. The highest score was obtained for the appropriateness of project-based activities (85.00%), categorized as very valid. This finding indicates that the developed activities were relevant to the objectives of the Teaching Aids course and encouraged students to produce authentic instructional media.

The language quality evaluation showed balanced results between valid and very valid categories. The experts considered the language generally clear, communicative, and appropriate for pre-service English teachers. Nevertheless, several revisions were suggested, including improving sentence effectiveness, maintaining terminology consistency, and adjusting some explanations to students' proficiency levels.

Overall, the material expert validation confirmed that the developed project-based e-module was valid and suitable for use after minor revisions. The feedback provided by the experts was incorporated into the revision stage to improve the quality of the final product before implementation.

Implementation

The implementation phase involved the validation, limited-scale trial, and refinement of the developed project-based e-module for the Teaching Aids course. Prior to implementation, the initial product was evaluated by material and media experts to examine its content quality, instructional presentation, usability, and technical aspects. The e-module was subsequently revised based on expert recommendations to improve the quality of the final product.

The revised e-module was then implemented in a limited-scale trial involving 30 pre-service English teachers from the English Education Study Program at Universitas Nahdlatul Ulama Lampung. The trial aimed to evaluate the practicality and usability of the e-module as a digital learning resource. The evaluation focused on the clarity of materials, ease of use, presentation quality, accessibility, and support for project-based learning activities.

The results of the implementation showed that the developed e-module obtained an average practicality score of 86,5%, categorized as very practical/practical. These findings indicate that the project-based e-module was feasible to support learning activities in the Teaching Aids course. Based on the users' feedback, minor revisions were conducted to enhance the organization of content, navigation features, and multimedia presentation.

Evaluation

The evaluation phase was conducted to examine the quality of the developed project-based e-module and to determine the extent to which the product fulfilled the criteria of a feasible instructional resource. Following the ADDIE framework, evaluation was implemented throughout the development process through expert validation, user responses, and product refinement. The findings from the material experts, media experts, and pre-service English teachers indicated that the e-module demonstrated satisfactory levels of validity and practicality for use in the Teaching Aids course.

The evaluation results provided valuable input for improving the final product, particularly regarding content organization, instructional clarity, interface design, and navigation features. The revisions ensured that the e-module was aligned with the Course Learning Outcomes (CLOs) and effectively supported the implementation of Project-Based Learning activities. Nevertheless, this study focused on the development and feasibility evaluation of the product; therefore, further research is recommended to investigate its effectiveness and broader implementation in different educational contexts.

This study developed a project-based e-module for the Teaching Aids course to support pre-service English teachers in designing and developing instructional media. The findings indicate that the developed e-module fulfilled the criteria of validity and practicality based on expert validation and students' responses. This suggests that the integration of digital learning resources and Project-Based Learning (PjBL) provides an

appropriate approach to connect theoretical understanding with practical experiences in instructional media development.

The development process was guided by the ADDIE instructional design model, which enabled systematic analysis, design, development, implementation, and evaluation. Branch and Varank stated that ADDIE provides an iterative framework for developing instructional products that are aligned with learners' needs and learning objectives (Branch & Varank, 2009). In this study, the ADDIE stages supported the development of an e-module that was relevant to the characteristics of pre-service English teachers and the objectives of the Teaching Aids course. This finding is in line with Agustina and Efendi, who reported that project-based e-modules can support meaningful learning through structured activities and practical tasks (Agustina & Efendi, 2021).

The quality of the developed e-module was supported by the principles of multimedia learning. The validation results indicate that the e-module successfully integrated content organization, visual elements, and technical features to support learning. This finding supports Mayer's cognitive theory of multimedia learning, which emphasizes the importance of organizing verbal and visual information to facilitate meaningful learning (Mayer, 2024). The use of clear explanations, illustrations, and digital features contributed to the development of an accessible and engaging learning resource.

Furthermore, the integration of PjBL provided opportunities for students to engage in authentic tasks, including designing and developing teaching aids. This finding supports Bell, who emphasized that project-based learning promotes creativity, problem-solving, and knowledge application (Bas, 2011). Previous studies also confirmed that PjBL can enhance learning experiences and learner autonomy in EFL contexts (Syakur et al., 2020).

The contribution of this study lies in developing a contextualized digital learning resource that combines ADDIE, multimedia learning principles, and PjBL approaches in English teacher education. The developed e-module supports pre-service English teachers in developing digital pedagogical competence through practical media design activities. However, this study was limited to product development, validation, and practicality evaluation; therefore, the findings represent the feasibility of the product rather than its effectiveness on learning outcomes.

CONCLUSION

This study successfully developed a project-based e-module for the Teaching Aids course among pre-service English teachers by employing the ADDIE instructional design model. The developed e-module integrates structured learning materials, multimedia elements, project-based activities, and assessment components designed to support students in understanding and applying the principles of instructional media development. The validation results from material and media experts, along with the practicality evaluation from students, indicate that the e-module meets the criteria of a

valid and practical instructional resource for implementation in the Teaching Aids course.

The contribution of this study lies in the development of a digital learning resource that bridges the gap between theoretical understanding and practical application in instructional media design. By integrating Project-Based Learning principles, the e-module facilitates meaningful learning experiences that encourage pre-service English teachers to construct knowledge, develop creativity, and produce contextual teaching aids. The developed product provides an innovative approach to supporting technology-enhanced teacher education and contributes to the improvement of digital pedagogical practices in English language teaching preparation programs.

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