Development of a Learning Strategies E-book for the P3FIS Course (Development of Physics Teaching Programs)

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Abstract. In the P3FIS (Development of Physics Teaching Programs) course, many students do not yet understand learning strategies. Therefore, a medium that can be used at any time to understand learning strategies is necessary. The medium to be developed is an E-book on learning strategies. The application used is AnyFlip. The learning strategies discussed in this e-book include teaching models, learning approaches, teaching methods, as well as techniques and tactics. In the independent curriculum, students are encouraged to seek knowledge independently. Hence, a learning strategy is needed to encourage active participation from students. This research aims to develop an e-book that is feasible and can be independently used by students. The study was conducted in the Physics Department at the University of Medan. This type of research uses the Research and Development (R&D) model, specifically the ADDIE model. The results of the research showed that (a) the percentage score for media feasibility by Learning Expert I was 94.21%, categorized as highly feasible, while Learning Expert II gave a score of 81.71%, also categorized as highly feasible; (b) the percentage for the independence of the e-book was 86.16%, categorized as very good.

Keywords: e-book, learning strategies, AnyFlip book.

1 Introduction

The rapid development of the times has brought significant impacts to the world of education, notably reflected in curriculum changes in Indonesia. Curriculum forms the core of the educational process in schools, directly influencing educational outcomes.[1] Presently, Indonesia follows the Merdeka Belajar curriculum, which, according to [2], continues to evolve akin to technological advancements. Technology serves as a viable solution in addressing educational challenges.[3] The Merdeka curriculum aims to equip teachers with technological proficiency and diverse, innovative teaching models.

Learning strategies significantly shape students' mindsets and future outcomes. Selecting appropriate learning strategies plays a crucial role in preparing students for the Industry 4.0 era.[4] Hence, educators must master various teaching strategies, encompassing models, approaches, methods, and techniques.[5] Unfortunately, many teachers struggle to

ICIESC 2024, September 17, Medan, Indonesia
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DOI 10.4108/eai.17-9-2024.2352854

differentiate between these components, as observed during Teacher Professional Education (PPG). Therefore, it's imperative for educators to understand and master these strategies, drawing from numerous educational resources such as books and journals.

This issue also extends to universities, where students in courses like P3FIS often lack understanding of learning strategies, including models, approaches, methods, and techniques. Observations reveal that many students cannot differentiate between these concepts, while interviews with faculty indicate frequent lapses in students' memory regarding learning strategies. This problem could escalate in the future despite abundant educational resources such as books, journals, papers, and other media.

To address these challenges, the development of E-books emerges as a solution. An E-book is a digital publication that includes text, images, or both, accessible via smartphones, computers, and other electronic devices.[6] Interactive E-books represent an innovation in technology-integrated learning media.[7] According to Saadiah cited in [8], E-books are electronic versions of traditional printed books, readable on personal computers or e-readers. E-books can engage students in reading and understanding materials effectively.[9] Applications like Microsoft Word, Canva, and AnyFlip are commonly used to create E-books.

2 Research Methods

This study was conducted in the Physics Department for the 2021 cohort. The research employed a Research and Development (R&D) approach, aimed at creating a specific product and assessing its validity. The development model used was the ADDIE model, which consists of the following stages: analysis, design, development, implementation, and evaluation.[9] The study utilized both quantitative and qualitative data analysis techniques. The development research began with an analysis or observation phase, followed by designing, developing, implementing, and evaluating a physics module. Data collection methods in this study included observations, interviews, and questionnaires: 1) Observations were conducted in the Physics Department at the University of Medan to gather information on the facilities and infrastructure supporting learning, as well as the conditions and needs of students, encompassing aspects of knowledge, attitudes, and skills, 2) Interviews were conducted with lecturers teaching the Microteaching course to gain insights into the course content and teaching methods, 3) Questionnaires were administered to: a) students to obtain feedback on the practicality of the videos, and b) expert validators in instructional design to assess the feasibility of the developed E-book on Learning Strategies.

Table 1. Feasibility Criteria

Interval (%)	Criteria
$81\% \leq x \leq 100\%$	Very Feasible
$61\% \leq x \leq 80\%$	Feasible
$41\% \leq x \leq 60\%$	Pretty Feasible
$21\% \leq x \leq 40\%$	Not Feasible
$0\% \leq x \leq 20\%$	Very Not Feasible

2.1 Data Analysis for Improving Independence

The data analysis for improving students' learning independence utilizes a Likert scale formula as follows:

$$P = \frac{f}{n} \times 100\%$$

Explanation:

P = percentage

f = frequency

n = total ideal score

After the scores are obtained, they are entered into a rating scale to determine the results of the questionnaire data, according to the criteria in the following table:

Table 2. Improvement of Independence Criteria

Criteria	Percentage
Very Good	81%<X<100%
Good	61%<X<80%
Pretty Good	41%<X<60%
Not Good	21%<X<40%
Very Not Good	0% <X<20%

3 Results and Discussions

This research produced a Learning Strategies E-book that is highly feasible and effective in promoting independence. The research was conducted through several stages following the ADDIE development procedure, which includes Analysis, Design, Development, Implementation, and Evaluation. The study used an R&D (Research and Development) approach with the ADDIE model, which encompasses five main phases: a) analysis, b) design, c) development, d) implementation, and e) evaluation.

3.1 Analysis Stage

The analysis phase is the first stage in developing the E-book. The E-book was created after assessing the students' needs. The student needs analysis was conducted to determine the types of E-books appropriate for students based on their needs and characteristics. Information for this stage was collected through interviews with several lecturers who taught the courses "Teaching and Learning Strategies" (SBM) and "Development of Physics Teaching Programs" (P3FIS). The interview findings revealed that students did not fully understand learning strategies and were unable to distinguish between learning models, strategies, approaches, methods, techniques, and tactics. These results aligned with the questionnaire responses, which showed that students could not explain learning models, strategies, and other related

concepts. During the analysis, the interviews with lecturers confirmed that students had difficulty distinguishing between teaching models, approaches, strategies, methods, and techniques. When asked to define a learning model, they often described a teaching method instead. Additionally, they lacked a clear understanding of the various types of teaching models and methods. Questionnaire observations with students produced results consistent with the lecturer interviews. Consequently, a learning strategies E-book was developed to ensure students could easily comprehend the material.

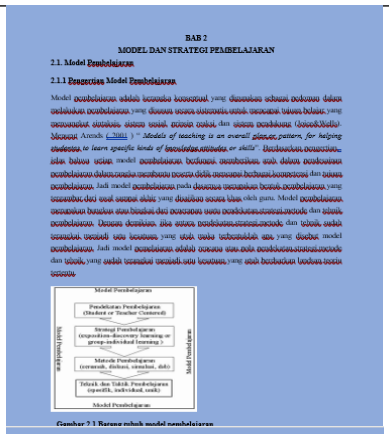
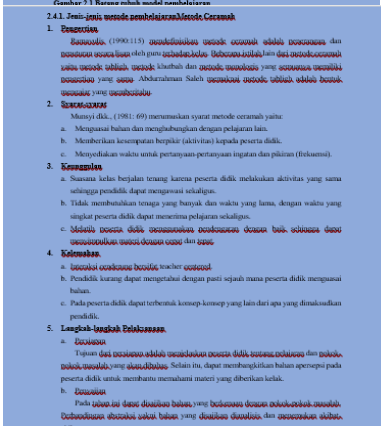
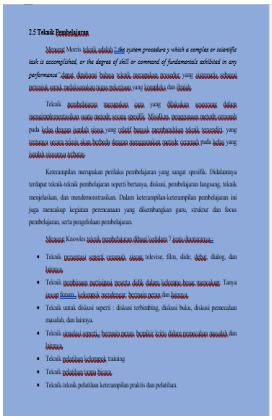
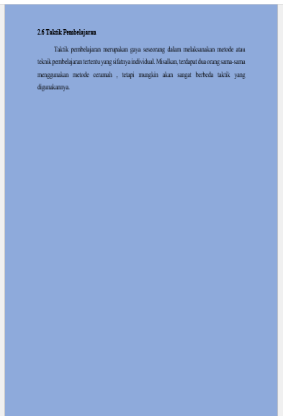
3.2 Design Stage

The design stage focuses on planning the media, content, language, and instruments for the E-book. The media design process started with creating the E-book's cover, organizing the content, and selecting appropriate images to be included. The E-book was designed to be visually appealing and engaging to support the teaching and learning experience for students. During the content planning, the materials included in the E-book cover topics such as learning strategies, learning models, learning approaches, teaching methods, techniques, and teaching tactics. The E-book was developed using the AnyFlip application, which was selected for its ease of use.[10] The design phase involved the development of the E-book through AnyFlip, a user-friendly platform. The content was compiled from various sources, including books and academic journals. The E-book discusses key topics such as learning strategies, teaching models, learning approaches, teaching methods, techniques, and instructional tactics. It also features images and links to instructional videos showcasing teaching simulations based on different learning models.

For the language design activities, the researcher created the module using language that is easy for both students and educators to understand, aligning with the language feasibility standards set by the National Education Standards Agency (BSNP) and the General Guidelines for Indonesian Language (PUEBI). The instrument design activities involved creating assessment tools to obtain information about the product developed by the researcher. The assessment instruments focused on the feasibility of the E-book and its effectiveness in fostering independence. The details of the learning strategies E-book are presented in the following table:

Table 3. The Details of Learning Strategies in E-book

No	E-book	Description
1		The E-book cover is titled "Learning Strategies in the Independent Curriculum for the P3FIS Course."

No	E-book	Description
2		The E-book discusses learning models and learning strategies, including their definitions, types, and components. It also includes a diagram illustrating the structure of a learning model.
3		The discussion then continues with learning approaches and types of approaches.
4	 	Following that, the E-book covers teaching methods, techniques, and tactics, including various types of methods.

No	E-book	Description
5	 https://www.youtube.com/watch?v=7DkiJlXQv2U	Additionally, the E-book provides links to instructional videos demonstrating the use of different learning models, approaches, methods, techniques, teaching media, and assessment strategies.

3.3 Development Stage

The next phase is the development stage, where the researcher validates the developed module product. This validation is performed by Learning Expert I and Learning Expert II. The E-book was created using Microsoft Word Office for the content design and Canva for the cover design, and then the AnyFlip Book application was used. The feasibility test aims to determine the criteria for feasibility and to obtain suggestions for improvement before implementation. The results of the feasibility test by Learning Expert I, with a score of 94.21% categorized as highly feasible, can be seen in Table 4.

Table 4. Feasibility Test Results of the Learning Strategies E-book for the P3FIS Course

No	Aspects	Frequency				Score	Item	Weight	Percentage (%)
		1	2	3	4				
1.	Display Feasibility Aspect	0	0	4	5	32	9	36	88,89
2.	Material Presentation Feasibility Aspect	0	0	1	3	15	4	16	93,75
3.	Language Feasibility Aspect	0	0	0	3	12	12	12	100
	Average								**94,21**

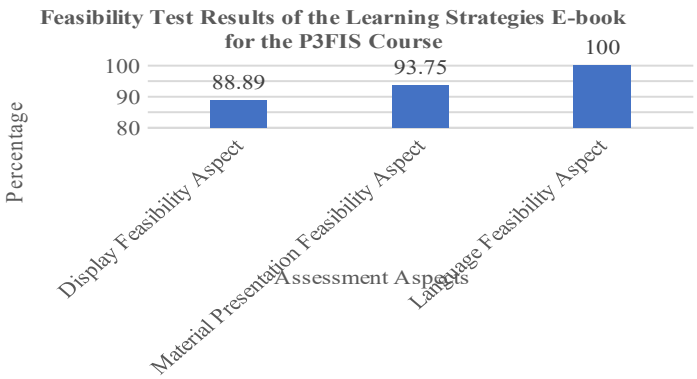


Fig. 1. Diagram of Learning Expert I Feasibility Test Results for the Learning Strategies E-book

In the development phase, the learning strategies E-book was provided to two lecturers from the Physics Department to assess its feasibility and provide feedback for improvements. Based on the feasibility test by the first instructional expert, the overall average score was 94.21%, categorized as very feasible. This included an 88.89% rating for the display feasibility aspect, a 93.75% rating for the material presentation feasibility, and a 100% rating for language feasibility. The overall average score from the feasibility test by the first instructional expert was 83.13%. The feedback provided by the first expert included: a) the spacing between subtopics should be more consistent on page 40, b) the page color should be softened to a super soft blue, c) some images need to be enlarged and labeled, d) some tables are missing titles, and e) there should be instructions for readers on navigating to specific pages of interest. Based on the feasibility test by the second instructional expert, the overall average score was 81.71%, also categorized as very feasible. This included an 80.55% rating for the display feasibility aspect, an 81.25% rating for material presentation feasibility, and an 83.33% rating for language feasibility. The overall average score from the feasibility test by the first instructional expert was 83.13%. Feedback from the second instructional expert suggested that the text should be enlarged for easier reading on digital devices, a more readable font such as Bookman Oldstyle should be used, the systematic use of pointers should be revised, and each image should be accompanied by a caption and title.

The feasibility test results by Learning Expert II, with a score of 81.71%, fall into the highly feasible category and can be seen in Table 5.

Table 5. Feasibility Test Results of the E-book by Learning Expert II

No	Aspects	Frequency				Score	Item	Weight	Percentage (%)
		1	2	3	4				
1.	Display Feasibility Aspect	0	0	7	2	29	9	36	80,55
2.	Material Presentation Feasibility Aspect	0	0	3	1	13	4	16	81,25
3.	Language Feasibility Aspect	0	0	2	1	10	3	12	83,33
	Average								**81,71**

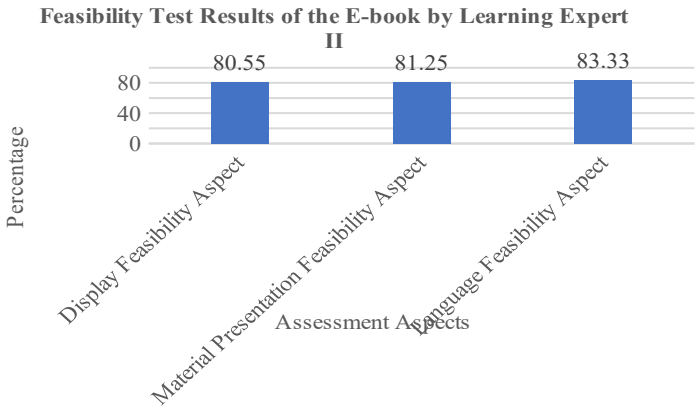


Fig. 2. Learning Expert II's Feasibility Test Results for the Learning Strategies E-book

3.4 Implementation Stage

During the implementation phase, the E-book was tested on students from the Physics Department, batch 2021, in classes A, B, C, and D, to evaluate its effectiveness in fostering independent learning. The E-book was distributed in the classroom through a WhatsApp group, where a link was provided, allowing students to easily access the E-book on their smartphones or laptops. This simple and accessible distribution method ensured that students could use the E-book independently without the need for any complex tools or additional resources. The implementation phase was crucial in verifying the practicality and ease of use of the E-book, both in the classroom setting and for remote learning. [11, 12, 13]

3.5 Evaluation Stage

The evaluation phase assessed the feasibility of the learning video, incorporating data analysis from learning experts as validators and an independence test for students. Validation results from two faculty members, serving as experts for the E-book, offered valuable insights.

The practicality test results revealed a score of 86.52%, which is categorized as "very good." This indicates that students were able to effectively navigate and utilize the E-book to review course material, either at home or in other locations. The ability to use the E-book independently makes it a valuable resource for self-study, allowing students to engage with the content at their own pace and convenience. The high practicality score demonstrates that the E-book is both user-friendly and adaptable to different learning environments, reinforcing its utility as a learning tool. [14]

In addition to the practicality test, the effectiveness of the E-book was assessed through a questionnaire, which resulted in an average score of 86.16%, also classified as "very good." This score reflects the E-book's ability to promote independent learning and provide clear, comprehensible content. The questionnaire revealed specific scores of 85.68% for fostering student independence and 86.16% for language clarity, highlighting the E-book's strengths in supporting both self-directed study and effective communication of complex learning strategies.

Overall, the implementation phase confirmed that the E-book is a highly practical and effective tool for promoting student independence. Its accessibility and ease of use make it an excellent resource for students to revisit learning material on their own, outside of formal classroom hours. By enabling independent study, the E-book serves as a flexible educational tool, helping students better understand and apply learning strategies. The positive results from both the practicality and effectiveness tests underscore the E-book's value as a reliable self-study resource that can significantly enhance the learning experience for students.

Table 6. Questionnaire Results on the Independence of Using the Learning Strategies E-book

No	Aspects	Frequency					Score	Item	Weight	Percentage
		1	2	3	4	5				
1.	Independence	0	0	33	277	169	2052	479	2395	85,68%
2.	Language	0	1	19	230	159	1772	409	2045	86,65%

No	Aspects	Frequency					Score	Item	Weight	Percentage
		1	2	3	4	5				
		Average								86,16%

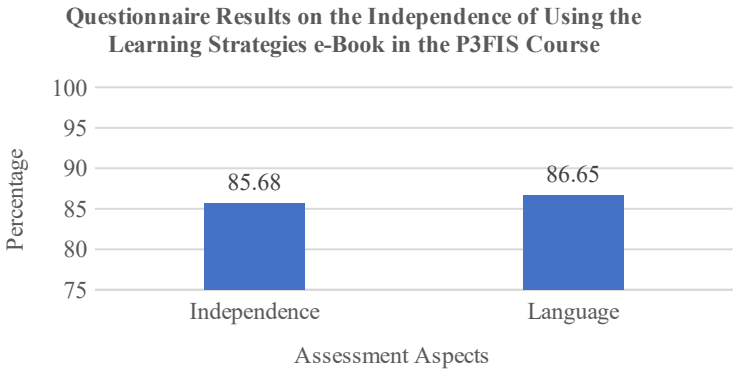


Fig. 3. Graph of the Independence Questionnaire Results for the Learning Strategies E-book

The independence test aimed to determine students' levels of independence in using the E-book. Overall, the evaluation phase collected data to enhance the developed product, indicating that the E-book is highly feasible and very effective in fostering student independence.

During the development of this E-book, challenges were encountered, particularly in selecting the design and organizing the content. The advantages of the Learning Strategies E-book are: a) it enables students to learn independently, b) it can be used for free without internet access, c) it is easy to carry and can be used anywhere.[15] However, the use of the E-book still requires motivation and encouragement to ensure students can fully utilize it. [16]

4 Conclusions

The Learning Strategies E-book can be used anytime and carried anywhere. It can also be accessed on any smartphone brand without cost, as it has already been downloaded. This E-book serves as a reference to support the learning process. Based on the research conducted, the developed Learning Strategies E-book is highly feasible, as reviewed by instructional expert I with a percentage of 94.21% and instructional expert II with a percentage of 81.71%. The effectiveness of the E-book in fostering student independence is very good, with a percentage of 86.16%. Therefore, it can be concluded that the E-book is highly feasible and highly effective for fostering student independence.

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