"Developing a User Guide for the Learning Management System (LMS) to Support the Optimization of Online Learning Processes"

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ABSTRACT

This Online learning has become an essential part of higher education systems in the digital era. Learning Management Systems (LMS) have been widely used to support the learning process; however, their utilization has not yet reached its full potential due to the lack of systematic and user-oriented guidelines. This study aims to develop an LMS user guide that can enhance the effectiveness and efficiency of online learning. The research method employed is research and development (R&D) with a quantitative approach. Data were collected through questionnaires distributed to lecturers and students. The findings indicate that the LMS user guide can help improve users' understanding and skills in accessing LMS features optimally. The recommendations resulting from this study are expected to be utilized by institutions to improve the quality of online learning.

Keywords: *LMS, user guide, online learning, learning optimization.*

INTRODUCTION

In the era of digital transformation, the utilization of information technology in education has become a necessity. One of its key implementations is the use of a Learning Management System (LMS) as the main platform to support online learning processes. An LMS not only functions as a medium for distributing learning materials but also serves as a tool for interaction between lecturers and students, learning assessment, and academic administration management. The effectiveness of LMS utilization largely depends on the level of users' understanding and skills in operating it optimally.

However, in many higher education institutions, including the aviation politeknik of Surabaya, several challenges are still encountered in the use of LMS, both by lecturers and students. These challenges include limited understanding of LMS features, difficulties in navigating the interface, and the lack of practical references that can be used as guidance when facing technical problems. Such obstacles result in the suboptimal functioning of LMS as a learning medium, which ultimately affects participation, effectiveness, and the overall quality of online learning.

A strategic solution to overcome these challenges is the development of a systematic, user-friendly, and context-relevant LMS user guide tailored to the needs of the institution. This guide is expected to serve as an effective tool for both lecturers and students in comprehensively understanding LMS usage, ranging from initial access, uploading and downloading materials, conducting quizzes and assignments, to managing online discussion forums.

This research aims to develop an LMS user guide based on the Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). Through this approach, the resulting guide is not only theoretical but also empirically validated and user-tested. The availability of this guide is expected to significantly enhance the optimal utilization of LMS, thereby contributing positively to the quality and effectiveness of online learning within the institution.

LITERATURE REVIEW

In the development of information technology, significant transformations have occurred in the education system, particularly in the implementation of online learning(Syarifuddin et al., 2023). Within this context, the Learning Management System (LMS) has emerged as a digital solution that facilitates teaching and learning processes in a more flexible and structured manner. However, the implementation of LMS in higher education does not automatically guarantee the optimization of learning processes. Various technical

challenges and limitations in users' digital literacy remain major obstacles to maximizing the use of LMS.

1. Learning Management System (LMS)

A Learning Management System (LMS) is an information technology-based platform designed to manage, distribute, and monitor learning activities digitally. An LMS enables lecturers to provide learning materials, assignments, discussion forums, and assessments within a single integrated system (Pendidikan, 2023). In the context of online learning, the LMS has become a key component that bridges interaction between instructors and students.

2. Challenges in Using LMS

Although many institutions have adopted LMS, challenges in its use still frequently occur. Several studies indicate that limited digital literacy, complex interfaces, and a lack of technical training are the main obstacles to effective LMS utilization(Oktafiani et al., 2020). Both lecturers and students often face difficulties in operating LMS optimally, particularly when dealing with advanced features such as discussion forums, online quizzes, or automated grading systems.

To gain a more objective understanding of these issues, this research also applies a quantitative method by distributing questionnaires to lecturers and students as active LMS users. The research instrument was developed using a four-point Likert scale that measures several indicators, including the level of digital literacy, ease of interface use, understanding of key features, and perceived effectiveness of LMS in supporting online learning. The collected data were analyzed using descriptive statistics to identify response trends and were further tested for validity and reliability to ensure accuracy. This quantitative approach enables the identification of problems in a measurable way, so that the research findings can serve as a foundation for designing a user guide more relevant to real needs in the field.

3. The Role of User Guides in Digital Systems

A user guide is an essential instrument in digital systems, serving to provide step-by-step instructions for users to operate an application or system. In the educational context, a systematically structured, visually supported, and needs-based guide can enhance the effectiveness and efficiency of online learning (Fitrah et al., 2025). A user guide can also reduce dependency on direct technical assistance, thereby fostering user independence.

Moreover, a user guide acts as a bridge between technology and its users, especially when dealing with the complexity of LMS features(Muthahharah Thahir & Irvan Gunawan, 2024). A well-prepared guide not only provides operational instructions but also offers illustrations, case examples, and solutions to common user problems. Consequently, it can serve as a supplementary learning tool that enhances digital skills, improves technological literacy, and promotes a more independent and interactive learning experience.

In addition, a user guide serves as a consistent reference document that can be used repeatedly without time limitations. This is particularly important in higher education, where both lecturers and students require clear and standardized references to optimize LMS use. Therefore, a user guide designed through a systematic research approach—such as the Research and Development (R&D) model combined with quantitative methods—can result in a product that is not only informative but also tailored to the actual needs of users.

4. The ADDIE Model in Guide Development

The ADDIE model is an instructional development framework consisting of five stages: Analysis, Design, Development, Implementation, and Evaluation. This model is widely used in learning media development due to its systematic, flexible, and proven effectiveness (Andriyani, 2023). In the development of an LMS user guide, the ADDIE model allows researchers to identify user needs, design appropriate content, develop suitable media, and comprehensively evaluate its implementation.

Analysis

The analysis stage aims to identify user needs, problems, and characteristics. In the LMS context, this includes understanding lecturers' and students' levels of digital literacy, common difficulties, and the LMS features most in need of guidance (Hasanah et al., 2021). The findings from this stage serve as the foundation for the direction of guide development.

The analysis stage also involves evaluating the current state of LMS utilization within the institution. This is achieved by collecting empirical data through surveys, interviews, and direct observations of how students and lecturers interact with the system in their daily learning processes. The data collected help to reveal specific pain points, such as difficulties in accessing course materials, submitting assignments, or participating in online discussions. By mapping these challenges systematically, the analysis ensures that the guide being developed directly addresses the real and most pressing issues faced by users.

Furthermore, the analysis stage emphasizes the importance of aligning user needs with institutional objectives. In higher education, the effective use of LMS is not only about individual convenience but also about improving the overall quality of digital learning. Therefore, the guide should be designed not merely as a technical manual, but as a practical tool that fosters better engagement, supports independent learning, and enhances communication between lecturers and students. This ensures that the final product is not only user-centered but also contributes significantly to the broader goal of

Design

The design stage focuses on drafting the initial

concept of the user guide, including content structure, instructional flow, visual format, and choice of media. At this stage, it is also determined whether the guide will be presented as a manual book, a digital module, or a combination of both, along with strategies to ensure user-friendliness (Handayani et al., 2021).

The design stage also considers the pedagogical approach that underpins the user guide. Since the primary audience consists of both lecturers and students, the content is structured in a way that accommodates varying levels of digital proficiency. For beginners, the guide provides step-by-step explanations supported by screenshots and visual cues, while for advanced users, it highlights tips and shortcuts to maximize efficiency. This dual approach ensures inclusivity and enhances the guide's effectiveness as a comprehensive reference for diverse user groups.

In addition, the design process integrates principles of usability and accessibility. Visual elements such as icons, diagrams, and color coding are employed to simplify navigation and reduce cognitive load. The language style is deliberately kept clear, concise, and free of technical jargon to promote ease of understanding. Accessibility features—such as compatibility with screen readers and responsive formatting for different devices—are also incorporated, ensuring that the guide can be effectively used by all learners, regardless of their learning environment or device preference.

Development

At the development stage, the drafted design is converted into an actual product. This includes writing guide content, adding illustrations or screenshots from the LMS, and ensuring the instructions are sequential and clear (Iqbal Santosa & Ryan Adhitya Nugraha, 2022). The outcome of this stage is a draft guide ready for testing.

During the development stage, particular attention is also given to the accuracy and authenticity of the materials included in the guide. Screenshots, interface layouts, and system instructions are taken directly from the LMS platform used by the institution to ensure relevance and reliability. In addition, the content undergoes iterative reviews by subject matter experts and instructional designers to confirm that the explanations provided are pedagogically sound and aligned with the intended learning objectives. This process guarantees that the guide is not only visually representative but also academically valid.

Another critical aspect of this stage is the integration of multimedia elements to enhance user engagement. Besides static visuals, the guide may incorporate QR codes that link to short tutorial videos or interactive simulations to demonstrate complex LMS functions. This multimodal approach accommodates different learning preferences, whether textual, visual, or auditory, thereby increasing the usability and practicality of the guide. By the end of the development stage, the product evolves into a comprehensive resource that balances clarity, accessibility, and interactivity.

Implementation

Implementation involves applying the developed guide directly to users, both students and lecturers. At this stage, a trial is conducted in a real environment to evaluate how effectively the guide assists users in operating the LMS(Rokhadi et al., 2024).

During the trial, feedback is systematically collected through questionnaires, interviews, and observation to capture users' experiences and challenges while using the guide. This process not only highlights the strengths of the product but also identifies specific areas that require refinement, such as unclear instructions, ineffective visuals, or overlooked LMS features. By engaging both students and lecturers in this stage, the implementation provides a realistic picture of the guide's functionality in supporting the teaching and learning process.

Evaluation

The evaluation stage assesses the effectiveness of the implemented guide. Evaluation can be formative (conducted during the development process to improve weaknesses) or summative (conducted after implementation to measure the final outcomes)(Anggi Jatmiko et al., 2023). The results are then used to refine the guide so that it fully meets user needs.

Formative evaluation is carried out by gathering feedback during the guide's development and pilot use, allowing developers to identify weaknesses such as unclear language, inconsistent formatting, or insufficient explanation of LMS features. These findings are then addressed promptly to ensure the guide's content remains user-friendly and relevant. This continuous feedback loop helps maintain the quality of the guide before it is formally launched to a wider audience.

Summative evaluation, on the other hand, focuses on measuring the overall impact of the guide after its implementation. This includes analyzing how effectively students and lecturers can navigate and utilize the LMS compared to before the guide was introduced. Data from surveys, performance assessments, and usage analytics provide a comprehensive overview of the guide's effectiveness. Ultimately, these evaluations ensure that the product is not only functional but also contributes significantly to the optimization of online learning.

5. Optimizing Online Learning

The optimization of online learning depends not only on the existence of an LMS but also on supporting resources, user readiness, and the availability of complementary instruments such as user guides. Previous studies indicate that institutions providing comprehensive and accessible LMS usage guidelines experience significant improvements in student engagement and learning quality (Ohliati & Abbas, 2019).

A well-designed user guide can bridge the gap between users' technological capabilities and the complexity of LMS systems. The presence of a systematic, illustrative, and needs-based guide enables both students and lecturers to operate the LMS more confidently, thereby maximizing the use of online learning features such as discussion forums, online

quizzes, and automated grading systems. Furthermore, user guides can reduce technical barriers that may hinder learning interactions, while enhancing user independence in solving minor problems without constant technical support(WIRAGUNAWAN, 2022).

Additionally, the availability of a standardized user guide can promote consistency in the implementation of online learning across higher education institutions(AJIATMOJO, 2021). With a clear reference, learning processes become more structured, efficient, and aligned with digital education quality standards. Therefore, developing an LMS user guide is not merely a technical necessity but also a pedagogical strategy to ensure the achievement of optimal learning outcomes.

Based on the above literature review, it can be concluded that LMS is a vital tool in supporting online learning; however, its effectiveness is still constrained by users' limited understanding of the system (Agripina Shafa, 2024). Developing a user guide is a strategic step to address these challenges, as it can facilitate the adaptation process and enable independent use of the LMS. The ADDIE model has proven effective in developing systematic and user-centered guides. Therefore, the development of an ADDIE-based user guide can provide a significant contribution to optimizing online learning in higher education (Ramadhani, 2021).

In addition, the literature also highlights that the application of quantitative methods in LMS-related research provides more measurable data on users' needs, level of understanding, and perceptions of system effectiveness (Afif et al., 2023). By distributing questionnaires using a Likert scale, researchers are able to obtain valid empirical information regarding both the challenges and strengths of the LMS from the perspectives of students and lecturers. The results of this quantitative analysis serve as an important foundation for developing a user guide that aligns with real conditions, ensuring that the product is not only theoretically relevant but also practically tested.

Thus, the combination of the ADDIE model and quantitative methods can be regarded as a comprehensive approach to producing an effective, measurable, and contextually relevant LMS user guide.

CONCLUSION OF LITERATURE REVIEW

(2)

This study employed a Research and Development (R&D) approach to develop an educational product in the form of a user guide for the Learning Management System (LMS). The development process was carried out systematically to address the needs of users in accessing and utilizing LMS features effectively for online learning. To ensure a structured and measurable development process, the study adopted the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which is widely applied in instructional and learning media development (Sari & Aknuranda, 2021).

The ADDIE model was chosen because it provides a structured workflow, from needs analysis to final evaluation (Saputri & Kusuma, 2023). ensuring that the final product is aligned with the context and needs of users at the Surabaya Aviation Polytechnic. The stages of this research are described as follows.

The structured workflow begins with a systematic needs analysis, which ensures that the development process is based on empirical data and reflects the actual conditions experienced by both lecturers and students. By identifying challenges in LMS usage and mapping out the level of digital literacy among users, the research provides a solid foundation for designing a guide that is both practical and targeted. This stage guarantees that the guide does not merely serve as a general manual but is tailored specifically to the institutional environment of the Surabaya Aviation Polytechnic.

Subsequent stages involve the design, development, implementation, and evaluation of the guide in accordance with the ADDIE model. Each stage is carried out sequentially but also allows for iterative improvements when needed. The structured approach ensures that the guide is not only theoretically sound but also practically effective, fostering a cycle of continuous refinement. Through this workflow, the final product is expected to directly support the optimization of online learning processes, making the LMS more accessible and beneficial to its users.

Moreover, the structured workflow provides transparency and accountability in the research process, ensuring that every stage is properly documented and evaluated. This systematic approach also allows for replication in future studies or adaptation in different educational contexts. By adhering to this model, the research not only produces a user guide for the LMS at the Surabaya Aviation Polytechnic but also contributes to broader academic discourse on instructional design and the effective integration of technology in higher education.

1. Research Type and Approach

This research applied a **Research and Development (R&D)** approach aimed at developing an educational product, namely an LMS user guide. The development process followed the **ADDIE model**, which consists of five main stages: **Analysis, Design, Development, Implementation, and Evaluation**. This approach was selected for its systematic and structured nature, making it suitable for the development of learning media or supporting instruments such as user manuals (Fauzi et al., 2021). Research Subjects and Location.

The research subjects consisted of active students and lecturers at the Surabaya Aviation Polytechnic who regularly use the LMS as part of the online learning process. The selection of these subjects was based on their direct involvement with the LMS, ensuring that the feedback obtained was both relevant and practical. The research was carried out within the Surabaya Aviation Polytechnic environment, which provided a real and contextual setting for developing and testing the user guide.

The study was conducted at the Surabaya Aviation Polytechnic with research subjects consisting of:

Active students using the Poltekbang LMS.

These participants were students who routinely accessed the LMS in online courses (Dilaines et al., 2024). They were chosen because of their direct experience in accessing learning materials, submitting assignments, taking quizzes, and participating in discussion forums. Their role as end-users was essential to provide accurate feedback regarding the needs, challenges, and effectiveness of the user guide being developed.

Lecturers who utilized the LMS as a learning platform.

These were lecturers actively using the LMS to manage learning activities, including uploading materials, assigning tasks, grading, and communicating with students. Their participation was crucial to gain the educator's perspective on usability, efficiency, and support in achieving learning objectives.

The sample was determined using purposive sampling, considering active involvement in LMS usage (Rasyid et al., 2024). In total, approximately 30 students and 5 lecturers were involved in the needs analysis and user guide evaluation stages.

2. Development Stages (ADDIE Model)

a. Analysis Stage

This stage involved:

Needs analysis of LMS features.

The purpose was to identify the most relevant LMS features required by students and lecturers to support online learning activities. This ensured that the guide focused on frequently used activities, such as assignment submission, material access, discussion forums, and grade reporting. Data collection methods included questionnaires, interviews, and direct observation (Ramadhani, 2021).

Identification of problems faced by users.

This process aimed to explore both technical and non-technical challenges encountered by students and lecturers in using the LMS(Wulandari & Tohir, 2024). Technical issues included navigation difficulties, unclear instructions, or interface errors, while non-technical issues involved lack of digital literacy, insufficient training, or low motivation.

Triangulated data collection.

Data were gathered through direct observation of user activities, limited interviews to capture in-depth experiences, and preliminary questionnaires to obtain a general overview of needs and problems(Yodi & Purnajaya, 2021).

b. Design Stage

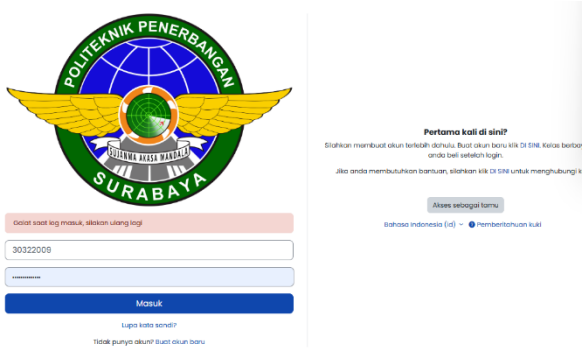

Figure 1 Page Login

At this stage, the structure and content of the guide were designed, covering:

- Determination of guide format (PDF module, infographic, etc.)
- Use of accessible language and simplified terminology
- Development of an LMS navigation scheme to visualize menus and workflows
- Visual layout design with step-by-step instructions supported by screenshots and icons

c. Development Stage

The development process included:

- Preparing the first draft of the guide based on needs analysis (Rahmawati et al., 2022).
- Adding visual elements such as screenshots, navigation icons, and illustrations
- Conducting expert validation (instructional media experts and information system experts)
- Revising the guide according to validator feedback (Arsyad & Lestari, 2020).

After conducting the needs analysis in the previous stage, the next step is to design or draft the user guide for the LMS. The purpose of this design stage is to determine the structure, content, display format, and the most effective way of delivering information to the users, namely lecturers and students. The guide is designed to be easily understood by users with varying levels of digital literacy. In addition, the content is tailored to the learning context and needs in the field of aviation vocational education, which typically requires structured, efficient, and competency-based learning processes.

This guide consists of three main chapters, each organized according to the functions of the users. Each chapter presents information sequentially and logically, beginning with a basic understanding of the LMS and continuing to the technical steps for using the key features of the online learning platform. The content is written with a practical and visual approach, where each instruction is accompanied by screenshots and real examples from the LMS interface used at Politeknik Penerbangan Surabaya. The following is a brief description of each chapter in the guide:

Chapter 1: Definition and Principles of LMS

This chapter serves as an introduction to provide a basic understanding of what a Learning Management System is. It explains the definition of LMS, its main benefits in supporting teaching and learning processes, and the principles of online learning such as flexibility, interactivity, and accessibility. The chapter also introduces the general structure of the LMS used at the institution, including components such as virtual classrooms, learning materials, discussion forums, and assessment features. This foundational knowledge is essential to build awareness and readiness before users begin operating the LMS.

Chapter 2: Guide for Lecturers

The second chapter is specifically designed to help lecturers manage their online classes. It includes steps to create a new class in the LMS, add students, upload materials (documents, videos, links), design and manage assessments, as well as create quizzes or exams using the automated system. In addition, the chapter explains how lecturers can use reporting features, provide feedback, and monitor student participation through LMS logs or analytics. This chapter is written as practically as possible, so lecturers can apply it directly without needing to understand complex technical terms.

Chapter 3: Guide for Students

The final chapter is intended for students as the primary users from the learner's perspective. It explains how to log in to the LMS, access available classes, view and download learning materials, participate in discussion forums, complete assignments and quizzes, and view grades and feedback from lecturers. The explanations in this chapter are supported by screenshots taken directly from the actual LMS interface used at the institution, enabling students to easily recognize the features described. This chapter also provides tips on solving simple technical problems, such as failed assignment uploads or forgotten passwords.

d. Implementation Stage

The guide was tested by users (students and lecturers) who performed activities such as:

- Uploading/downloading learning materials
- Completing quizzes or assignments
- Participating in discussion forums

Observations were conducted to evaluate the guide's effectiveness and usability in supporting these tasks.

Feedback from users was also collected through questionnaires and informal interviews to gain deeper insights into their experiences. This step provided valuable information on the clarity of instructions, the accessibility of the guide, and the extent to which it facilitated independent use of the LMS. The feedback served as a crucial basis for refining the guide to ensure it met user expectations and addressed practical challenges in real learning situations.

Figure 2 Implementation to Students

e. Evaluation Stage

Evaluation was conducted in two phases:

- Formative evaluation: during development, involving feedback from experts and early users
- Summative evaluation: using questionnaires to assess clarity, usability, completeness, and practicality

The collected data were analyzed both quantitatively (descriptive statistics) and qualitatively (open-ended responses and observations) (Leandros et al., 2024).

3. Research Instruments

The instruments used included:

- Needs analysis and product evaluation questionnaires
- Observation sheets for user engagement during trials
- Limited interviews for deeper user insights
- Expert validation sheets to assess content and design feasibility

4. Data Analysis Techniques

Data analysis methods included:

- **Quantitative descriptive analysis** (percentages and mean scores) to measure needs, satisfaction, and feasibility
- **Qualitative analysis** for open-ended responses and observational findings

Table 1 Score Interpretation Criteria

Presentase	categori
25%-43,75%	Very Low
43,76% - 62,5%	Low
62,6% - 81,25%	High
81,26% - 100%	Very High

- Expert validation using a **Likert scale (1–4)**, presented in categories (very good, good, fair, poor) for clearer interpretation

Table 2 Likert scale

Score	Answer Choices
4	Strongly Agree (SA)
3	Agree (A)
2	Disagree (D)
1	trongly Disagree (SD)

The data obtained were then processed by multiplying each respondent's answer point by the predetermined weight value based on the weighting table. This process produces the score calculation of each respondent's answer. An example of the calculation is as follows:

- Respondents who chose Agree (4) = 4 × n = n
- Respondents who chose Neutral (3) = 3 × n = n
- Respondents who chose Disagree (2) = 2 × n = n
- Respondents who chose Strongly Disagree (1) = 1 × n = n

Total Score = n

Note:

n = The score obtained from the respondents' answers. To determine the interpretation result, the highest score (X) and the lowest score (Y) for each assessment item must first be identified using the following formula:

X = Highest Likert score × number of respondents (highest value = 4)

Y = Lowest Likert score × number of respondents (lowest value = 1)

After determining the total score value, the next step is to determine the respondents' interpretation assessment using the percentage index formula:

Index % = Total Score X ×100 Index %= X Total Score ×100

Based on the obtained answers, the scoring criteria for each statement item are then arranged based on percentage. The steps for presenting the percentage are as follows:

1. The cumulative score is the value from each response given by 150 respondents.
2. The percentage is calculated by dividing the cumulative score of each item by its frequency, multiplied by 100%. The total number of respondents is 120.
3. Thus, the maximum cumulative score is: 120 × 4 = 480, and the minimum cumulative score is: 120 × 1 = 120. The minimum percentage value is calculated as (120 ÷ 480 × 100% = 25%). The score range is: 100% – 25% = 75%. When divided into four measurement scales, the interval percentage value is 18.75%.

ACKNOWLEDGMENTS

This research was conducted as part of a strategic effort cc and features provided within the system. Therefore, this study aimed to develop a systematic and user-friendly LMS guidebook that is relevant to the real needs of both lecturers and students.

Through the Research and Development (R&D) approach using the ADDIE model, the researcher designed and developed a product in the form of an LMS user guide that was validated by two experts, namely an instructional media expert and an information systems expert. The validation results showed that the user guide obtained an average score of 3.63 out of a 4-point Likert scale, categorized as "Very Good" across all assessment aspects, including content suitability, appearance, readability, language, and systematic structure. This indicates that the guidebook meets the feasibility standards of digital learning media (Dilaines et al., 2024).

Furthermore, a limited trial was conducted with a group of users consisting of 15 students and 3 lecturers, who were asked to utilize the guide in actual online learning activities (Zaenal, 2017). The evaluation results revealed an average score of 3.67, also categorized as "Very Good." These findings demonstrate that the LMS user guide significantly assisted users in understanding the system's workflow, maximizing its features, and saving time and effort in carrying out online teaching and learning activities (Candra Susanto et al., 2024). Moreover, based on observation and interviews, the majority of respondents reported that the time required to understand LMS features decreased by approximately 30%, and 92% stated that the guide was highly beneficial in their teaching and learning processes.

Considering all the data obtained, it can be concluded that the product developed in this study has met the criteria of being valid, practical, and effective (Hera & Elvandari, 2021).The LMS user guide is regarded as a solution to the challenges in optimizing online learning system utilization and contributes positively to improving the quality of learning processes at Politeknik Penerbangan Surabaya. Therefore, this product is feasible for broader implementation and may serve as a reference for developing similar user guides in online learning systems across other higher education institutions details(Moonlight et al., 2022).

Furthermore, the development of this LMS user guide not only addresses current needs but also opens opportunities for continuous improvement in digital learning practices. As technology evolves, the guide can be updated and adapted to align with new features, policies, and pedagogical approaches. This ensures that the product remains sustainable, relevant, and capable of supporting future innovations in online education at the Surabaya Aviation Polytechnic and beyond.

In addition, the guide has the potential to foster digital literacy among both students and lecturers by providing structured instructions and reducing the learning curve in

operating the LMS. This indirectly supports the creation of a more interactive, efficient, and student-centered online learning environment. With proper dissemination and training, the LMS user guide can become a strategic tool to enhance academic performance and institutional competitiveness in the digital era.

No	Pre-Test Statement	Σ(fxs)	Pre-Test Statement	Indeks (%)	Category
1	I find it difficult to operate the features of the Learning Management System (LMS).	450	120	93.75	Excellent
2	I have never received any written or digital guide regarding the use of LMS from the institution.	463	120	96.45833	Excellent
3	The absence of an LMS guide often makes me confused when using the platform.	460	120	95.83333	Excellent
4	I often learn to use the LMS independently or with the help of peers.	467	120	97.29167	Excellent
5	I need a clear and easy-to-understand LMS guide to support online learning activities.	467	120	97.29167	Excellent
6	Important LMS features such as task submission, discussion forums, and online exams are not yet fully understood by me.	464	120	96.66667	Excellent
7	I believe the efficiency of LMS usage will increase if an official guide is provided.	471	120	98.125	Excellent
8	I feel less confident when using the LMS because I do not know the function of each feature.	460	120	95.83333	Excellent
9	I feel less confident when using the LMS because I do not know the function of each feature.	463	120	96.45833	Excellent
10	The need for a clear LMS guide is very crucial for online learning.	467	120	97.29167	Excellent

Figur 2 Pre-Test Student

No	Post-Test Statement	Σ(fxs)	Number of Respondents	Indeks (%)	Category
1	The LMS guide provided helps me better understand how to use LMS features.	454	120	94.58333	Excellent
2	I feel more confident in using the LMS after reading the available guide.	468	120	97.5	Excellent
3	The current LMS user guide is sufficient in helping me operate the LMS.	462	120	96.25	Excellent
4	After following the guide, I no longer face difficulties in uploading assignments, taking quizzes, or accessing materials.	464	120	96.66667	Excellent
5	The LMS guide makes it easier for me to follow the online learning process.	468	120	97.5	Excellent
6	The LMS guide makes it easier for me to follow the online learning process.	462	120	96.25	Excellent
7	I no longer experience difficulties in accessing the LMS.	468	120	97.5	Excellent
8	I feel more independent in using the LMS without relying on others.	464	120	96.66667	Excellent
9	The time I need to complete tasks in the LMS has become more efficient after using the guide.	462	120	96.25	Excellent
10	The available LMS guide is already aligned with my needs and challenges in online learning.	468	120	97.5	Excellent

Figure 3 Post-test Student

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