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# Innovative Development of Entrepreneurship Learning Materials Based on Learning Management System at Politeknik Pelayaran Sumatera Barat

# Inovasi Pengembangan Bahan Ajar Kewirausahaan Berbasis *Learning Management System* di Politeknik Pelayaran Sumatera Barat

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***Abstract***

*This study aimed to develop an entrepreneurship teaching module utilizing a Learning Management System (LMS) to enhance the learning process at the Politeknik Pelayaran Sumatera Barat. The module was designed using the ADDIE model, encompassing analysis, design, development, implementation, and evaluation phases. The research involved 72 students from the Marine Transportation program in the odd semester of the 2024/2025 academic year. Material and media experts conducted validation using observation sheets and questionnaires. The findings indicated that the LMS-based module achieved excellent validity, with an average expert validation score of 91.2%.Furthermore, students' responses regarding usability, ease of use, and user satisfaction were categorized as "very good," with an average score of 89.7%. The module enhanced learning flexibility and student engagement through interactive and relevant content like e-business planning and business feasibility studies. This module is expected to improve the quality of entrepreneurship education and better prepare students to face the challenges of the business world. Future research could explore integrating AI and AR technologies to enrich the learning experience and conduct longitudinal evaluations to assess its impact on learning outcomes and skill development.*

***Keywords:*** *Entrepreneurship education, learning management system, ADDIE model, module development, student engagement.*

**Abstrak**

Penelitian ini bertujuan mengembangkan modul bahan ajar kewirausahaan berbasis *Learning Management System* (LMS) untuk mendukung pembelajaran di Politeknik Pelayaran Sumatera Barat. Modul dirancang menggunakan model ADDIE yang terdiri dari tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Subjek penelitian adalah 72 mahasiswa program studi Transportasi Laut semester ganjil 2024/2025. Validasi dilakukan oleh ahli materi dan media menggunakan lembar observasi dan kuesioner. Hasil penelitian menunjukkan bahwa modul berbasis LMS memiliki validitas sangat baik, dengan skor rata-rata validasi ahli sebesar 91,2%. Selain itu, respons mahasiswa terhadap kegunaan, kemudahan, dan kepuasan pengguna menunjukkan kategori "sangat baik," dengan skor rata-rata 89,7%. Modul ini meningkatkan fleksibilitas pembelajaran dan keterlibatan mahasiswa melalui materi yang interaktif dan relevan, seperti *e-business plan* dan studi kelayakan usaha. Modul ini diharapkan dapat meningkatkan kualitas pendidikan kewirausahaan dan mempersiapkan mahasiswa menghadapi tantangan dunia usaha. Penelitian lanjutan dapat mencakup pengembangan teknologi AI dan AR untuk memperkaya pengalaman belajar, serta evaluasi jangka panjang terhadap dampaknya pada hasil belajar dan pengembangan keterampilan mahasiswa.

**Kata Kunci:** Pendidikan kewirausahaan, sistem manajemen pembelajaran, model ADDIE, pengembangan modul, keterlibatan mahasiswa.

## 1. Introduction

Entrepreneurship education plays a pivotal role in equipping students with the skills necessary to address the challenges of the business world and contribute to national economic growth (Cekule et al., 2023; Mahmudin, 2023; Zhou et al., 2024). Data from Indonesia's Central Statistics Agency (BPS) in 2022 indicate that MSMEs (Micro, Small, and Medium Enterprises) contributed 61.07% to Indonesia's GDP, underscoring the critical role of entrepreneurship in job creation and economic development (Soumena et al., 2024). Therefore, enhancing the quality of entrepreneurship education in higher education institutions is essential, enabling students to acquire theoretical knowledge and practical skills applicable to the workforce.

The utilization of Learning Management Systems (LMS) has emerged as an effective solution to support the learning process in the current digital era (Bugis et al., 2023; Dwikoranto et al., 2023. LMS platforms facilitate structured instructional content delivery and dynamic interactions between instructors and students, fostering motivation and collaborative learning (Rini et al., 2024; Turnbull et al., 2020). At Politeknik Pelayaran Sumatera Barat, LMS utilization can be optimized to develop entrepreneurship teaching materials tailored to industry needs, particularly considering the maritime focus of its students (Hasnur et al., 2024; Nazarwin et al., 2024).

With technological advancements, LMS-based teaching materials for the Entrepreneurship course at Politeknik Pelayaran Sumatera Barat offer a flexible and engaging learning experience. Since students no longer reside on campus, they can conveniently access the LMS via personal devices (Agormedah et al., 2020; Bell et al., 2022; Feliz et al., 2022). Consequently, This research aims to develop LMS-based entrepreneurship teaching materials that facilitate understanding topics such as e-business planning, feasibility studies, and business planning through interactive and practical methods.

The novelty and primary contribution of this research lie in developing LMS-based entrepreneurship teaching materials that will be incorporated into the e-learning system of Politeknik Pelayaran Sumatera Barat. This initiative aligns with the demands of the digitalization era and Industry 4.0 by leveraging technology to enhance entrepreneurship education. With these electronic modules, students can access course materials anytime and anywhere, offering flexibility in the learning process. Moreover, the teaching materials are expected to improve the quality of entrepreneurship education at Politeknik Pelayaran Sumatera Barat and better prepare students to face the challenges of the business world competently and professionally.

## 2. Literature Review

A previous study titled *"Development of Learning Materials for Entrepreneurship Education Based on Cultural Conservation"* highlights the implementation of entrepreneurship education in higher education as a gradual and sustainable process. This study outlines a development model consisting of five stages: needs analysis, designing learning materials, material development, testing, and implementation. The research integrates cultural conservation principles to enrich entrepreneurship education, emphasizing the importance of preserving local wisdom while fostering creativity and innovation. The study concludes that culturally enriched learning materials play a strategic role in shaping entrepreneurial competencies among students (Arsih, 2019).

The study by (Suebsing et al., 2024) focuses on the development of an innovative learning management model for early childhood teachers. This research emphasizes that innovation in learning management significantly impacts teachers' learning management behaviors, with a strong direct effect on teaching effectiveness. The model integrates six stages, ranging from


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analyzing learning challenges to evaluating the implemented innovations. The study highlights the importance of teachers' professional competence in managing learning aligned with 21st-century demands, including critical thinking, creativity, and digital literacy.

Both studies support the relevance of innovation in learning systems and educational management, which aligns with the focus of this research: "Innovative Development of Entrepreneurship Learning Materials Based on Learning Management System at Politeknik Pelayaran Sumatera Barat". By integrating innovative learning approaches and leveraging learning management systems, this study aims to contribute to improving the quality of entrepreneurship education.

## 3. Methodology

### 3.1. Type of Research

This research employs a research and development (R&D) approach to produce a teaching book for entrepreneurship learning (Fortuna et al., 2024; Muskhir et al., 2023; Waskito et al., 2024). The development model follows the ADDIE model by Robert Maribe Branch, consisting of five stages: Analyze, Design, Develop, Implement, and Evaluate (Branch, 2009). The researcher chose the ADDIE approach because it provides a systematic and structured framework for developing the textbook. Additionally, the flexibility of the ADDIE model allows adjustments at each stage based on findings or input during the development process, ensuring the resulting textbook is relevant, effective, and meets the needs of students and teachers. The ADDIE model is presented in full in Figure 1.


**Figure.1**. The ADDIE Model (Analysis, Design, Develop, Implement, and Evaluate)


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### 3.2. Research Subjects and Locations

The participants are seventh-cohort students from the Maritime Transportation Study Program enrolled in the Entrepreneurship course for the odd semester of the 2024/2025 academic year. The study is conducted in the Maritime Transportation Study Program at Politeknik Pelayaran Sumatera Barat. The research population details are outlined in Table 1.

**Table.1**. Research Population

| Class | Male | Female | Total |
|---|---|---|---|
| TL-7A | 10 | 6 | 16 |
| TL-7B | 12 | 6 | 18 |
| TL-7C | 12 | 6 | 18 |
| TL-7D | 14 | 6 | 20 |
| | **Total** | | **72** |

**Source:** Maritime Transportation Study Program

### 3.3. Research Procedures

The research procedure for developing entrepreneurship modules in the Maritime Transportation Study Program at the Politeknik Pelayaran Sumatera Barat is designed in several structured phases. The first phase involves initial information collection, including preliminary studies to gather data on needs analysis, literature reviews, classroom observations, and identification of existing learning issues (Dwivedi et al., 2021). A product design plan is developed in the planning phase, outlining objectives, benefits, target users, development location, and the product development process (Fung et al., 2021). The subsequent phase focuses on initial product development, during which a prototype is created based on identified needs and then submitted to validators for validation. Following this, an initial trial involves students and observing teachers' activities to collect feedback for product improvement (Zheng et al., 2020). Based on these trials, product revisions are made for refinement. The field trial phase involves a broader scale trial with three classes and 72 students. Finally, further revisions are conducted based on feedback from the field trials to ensure the final product is optimized and aligned with user needs.

### 3.4. Data Collection Techniques and Instruments

The data in this study was collected using various techniques and instruments tailored to each research stage. During the needs analysis phase, data was gathered through questionnaires (Anderson et al., 2022). For evaluating the needs analysis and design results, data was collected via observation using observation sheets (Mohzana et al., 2023). Validation by subject matter experts, media experts, and teachers was also conducted through observation using the same instrument. Five validators participated: two media experts, two subject matter experts (lecturers with 10–20 years of teaching experience), and one vocational high school teacher. Instrument validity was determined through face validity and content validity using expert judgment. Reliability was tested using Scott's reliability coefficient for the observation sheets used by experts and students. Collected data were analyzed descriptively. The instrument grid used to analyze needs in developing entrepreneurship teaching materials based on the Learning Management System (LMS) is presented in Table 2.

**Table.2**. Needs Analysis Instrument Outline

| No | Indicator | Question Numbers | Total Questions |
|---|---|---|---|
| 1 | Issues in Entrepreneurship Learning without LMS | 1 – 5 | 5 |
| 2 | Needs and Expectations for LMS | 6 – 10 | 5 |
| 3 | Needs for Collaboration and Interaction | 11 – 15 | 5 |
| 4 | Needs for Content and Learning Evaluation | 16 – 20 | 5 |
| 5 | Expectations for LMS Effectiveness | 21 – 25 | 5 |
| | **Total** | | **25** |

The instrument for material experts was prepared as a questionnaire specifically designed to evaluate the quality of the material in the learning media. Table 3 below presents the lattice of assessment instruments by material experts.

**Table.3**. Material Expert Instrument Outline

| No | Aspect | Indicator | Question Numbers | Total |
|---|---|---|---|---|
| 1 | Instructional Quality | Learning opportunities | 1–8 | 8 |
| | | Impact on teachers and their teaching practices | | |
| | | Facilitates teachers in delivering material to students | | |
| | | Enhances students' motivation to learn | | |
| | | Assists teachers in making lessons more creative | | |
| 2 | Material Quality | Clarity of learning objective indicators (SKKD) | 9–16 | 8 |
| | | Systematic presentation of material | | |
| | | Completeness of material content | | |
| | | Relevance of material to students | | |
| 3 | Language Quality | Clarity in question formulation | 17–24 | 8 |
| | | Alignment of material with learning objectives | | |
| | | Readability | | |
| | | Clarity of information | | |
| | | Ease of understanding material flow | | |
| | **Total Questions** | | | **24** |

The instrument for media experts is a questionnaire containing a series of questions used to assess the content in the learning media. Table 4 below presents the instrument grids for media experts.

**Table.4**. Media Expert Instrument Outline

| No | Aspect | Indicator | Question Numbers | Total |
|---|---|---|---|---|
| 1 | Appearance | Font size | 1–5 | 5 |
| | | Composition of text colour against the background | | |
| | | Appropriateness of font size | | |
| | | Clarity of image layout | | |
| | | Appropriateness of colour selection | | |


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| | | | | |
|---|---|---|---|---|
| 2 | Usability | Creativity and innovation of the media | 6–10 | 5 |
| | | Reusability (can be used repeatedly) | | |
| | | Ease of operating the media | | |
| | | Effectiveness and efficiency in usage | | |
| 3 | Interaction | Appropriateness of layout (navigation icons) | 11–15 | 5 |
| | | Proper placement of menus | | |
| | | Clarity of usage instructions | | |
| | | Appropriateness of button placement | | |
| **Total Questions** | | | | **15** |

The instrument used for users is a questionnaire filled out by respondents, namely students. This questionnaire contains an assessment related to aspects of usability, convenience, and level of satisfaction with the product that has been developed. The instrument utilizes usability testing using Lund's USE questionnaire package (Gao et al., 2018). Meanwhile, the instrument grids for users are presented in Table 5.

**Table.5**. User Response Instrument Outline

| Aspect | Indicator | Question Number | Number of Questions |
|---|---|---|---|
| Usability | Usefulness | 1 – 6 | 6 |
| | Ease of Use | 7 – 12 | 6 |
| | Satisfaction | 13 – 18 | 6 |
| Total Questions | | | 18 |

### 3.5. Data Analysis Technique

Data were analyzed descriptively to summarize the needs analysis, validity results, and user responses to the developed product (Hanif, 2020). The percentage formula was used to calculate needs analysis scores, and the scoring categories are classified based on obtained scores.

#### 3.5.1.Needs Analysis

In order to determine the results of the needs analysis, a percentage technique is used with the Needs Analysis Assessment Formula:

$$NA = \frac{S}{SM} \times 100\%$$

Explanation:
NA = Final Score
S = Obtained Score
SM = Maximum Score

The categories of requirements for Android-based Application Development can be seen in Table 6. This table identifies the aspects that must be considered in the app development process, including key features, user interface, and the technical performance required to ensure the app runs effectively and efficiently.

**Table.6**. Needs Analysis Scoring Levels

| Achievement Level | Category |
|---|---|
| 0 – 45 | Very Poor |
| 46 – 65 | Poor |
| 66 – 75 | Fair |
| 76 – 90 | Good |
| 91 – 100 | Very Good |

### 3.5.2.Validity Test Analysis

Validation data for developing LMS-based entrepreneurship teaching materials included needs analysis, validation, and user responses obtained systematically (Aziz et al., 2023; Rauch, 2020). Each validation item was scored using a 1 to 5 scale, with criteria presented in Table 7.

**Table.7**. Score of Each Validation Item and Achievement Level of Student Response

| Answer Alternatives | Question Score | Category | Criteria |
|---|---|---|---|
| Very Good (VG) | 5 | 0 – 45 | Not Good |
| Good (G) | 4 | 46 – 65 | Fairly Good |
| Satisfactory (S) | 3 | 66 – 75 | Good Enough |
| Poor (P) | 2 | 76 – 90 | Good |
| Very Poor (VP) | 1 | 91 – 100 | Very Good |

The first step in the analysis process is to add the scores each validator gives for each indicator. The formula for Aiken's V was used to determine validity:

$$V = \sum s / [\, n\,(c - 1)\,]$$

Explanation:

S : Difference between given score and lowest validity score
Lo : Lowest validity score (1)
C : Highest validity score (5)
R : Given score
N : Number of raters

Based on (Aiken, 1985), the range from 0 to 1.00, with 0.667 considered a sufficiently high coefficient indicating validity.

### 3.5.3.Student Response Analysis

User (student) response analysis assessed the practicality of LMS-based entrepreneurship teaching materials, evaluated by subject matter and media experts (Indah et al., 2020). Table 8 summarizes practicality levels based on expert opinions and average scores derived from each indicator. Practicality was calculated using the formula:

$$NA = (S / SM) \times 100\%$$

Explanation:

NA = Final Score
S = Obtained Score
SM = Maximum Score


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## 4. Results and Discussion

Research findings are presented in detail based on the development model adopted in this study, namely the ADDIE model. Each phase in the model—Analyze, Design, Develop, Implement, and Evaluate—is elaborated to provide a clear overview of the development process and outcomes. These interconnected phases form an iterative development cycle, ensuring that the resulting instructional media is aligned with learner needs and positively impacts the learning process.

### 4.1. Analyze

The analysis phase in developing entrepreneurship teaching materials using a Learning Management System (LMS) involved data collection through questionnaires completed by students. The questionnaire was designed to measure five key indicators: (1) challenges in entrepreneurship learning without LMS, (2) needs and expectations for LMS, (3) requirements for collaboration and interaction, (4) learning materials and assessment needs, and (5) expectations for LMS effectiveness. The needs analysis results are summarized in Table 8.

**Table.8**. Summary of Needs Analysis Results for Developing Entrepreneurship Teaching Materials Using LMS

| No | Indicator | N | % | Interpretation |
|---|---|---|---|---|
| 1 | Challenges in Entrepreneurship Learning Without LMS | 72 | 67.1 | Moderate |
| 2 | Needs and Expectations for LMS | 72 | 68.4 | Moderate |
| 3 | Collaboration and Interaction Needs | 72 | 64.4 | Low |
| 4 | Needs for Learning Materials and Evaluation | 72 | 66.9 | Moderate |
| 5 | Expectations for LMS Effectiveness | 72 | 62.4 | Low |
| | **Total Average** | 72 | **65.9** | **Moderate** |

The findings highlight critical aspects for developing LMS-based teaching materials in entrepreneurship courses at the Politeknik Pelayaran Sumatera Barat. A significant finding is the moderate challenge (67.1%) in conducting entrepreneurship education without an LMS, underscoring the importance of integrating technology-based teaching materials to enhance accessibility, flexibility, and interactivity. Furthermore, student expectations for LMS (68.4%) reveal a promising opportunity to design interactive and dynamic materials with features such as online modules and discussion forums. However, the relatively low need for collaboration and interaction (64.4%) suggests that collaborative elements, such as group discussions and joint projects, require enhancement.

The need for learning materials and evaluation (66.9%) emphasizes developing content that aligns with entrepreneurial principles while incorporating comprehensive evaluation systems. Moreover, the relatively low expectations for LMS effectiveness (62.4%) highlight the need to improve LMS features, including engaging content, user-friendly interfaces, and adequate technical support. The average score of 65.9% suggests that LMS development efforts should focus on improving material quality, collaboration, and interactivity while refining LMS features to meet students' needs optimally. Such measures aim to create a more effective, engaging, and relevant learning experience in entrepreneurship aligned with demands in the digital era.

### 4.2. Design

The entrepreneurship teaching materials developed for courses at the Politeknik Pelayaran Sumatera Barat LMS have been successfully transitioned from a printed textbook format to a digital one. Visual representations of this development are shown in Figures 2 and 3, illustrating the adaptation of the materials to support technology-based learning. This transformation aims to provide a more interactive, flexible, and accessible learning experience for students.


**Figure.2**. Cover and Back Page of the Entrepreneurship Textbook

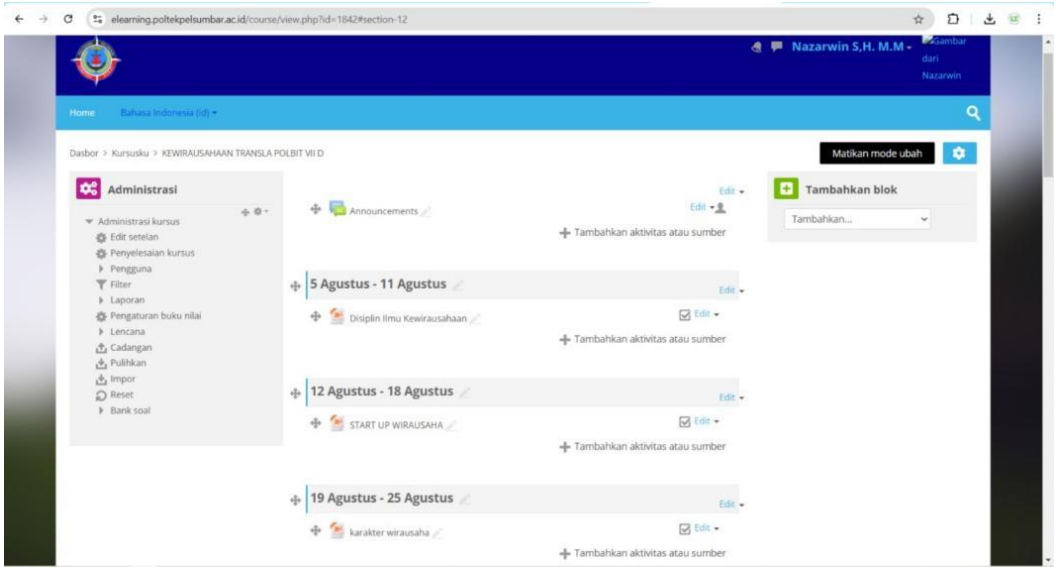


**Figure.3**. Learning Management System Display

The development process involved designing content tailored to the entrepreneurship curriculum, including instructional modules, interactive assignments, and evaluation features designed to maximize students' understanding of the material. The LMS interface was optimized to ensure intuitive navigation and an engaging learning experience. This integration transforms the LMS into more than just a content delivery platform; it serves as a collaborative tool supporting discussions, group work, and active interaction between students and lecturers. Moving forward,


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developing these teaching materials will undergo continuous evaluation to enhance their effectiveness and relevance to modern educational needs.

### 4.3. Develop

In the development phase, the instructional materials underwent revisions based on initial feedback before being validated by experts. The validation process assessed material and application aspects to ensure the quality of the teaching materials met educational standards and user requirements. Table 9 summarizes the validation results by five experts.

**Table.9**. Results of Validity Test Analysis on Material Experts

| No | Assessment Indicators | Aiken's V Score | Interpretation |
|---|---|---|---|
| 1 | Instructional Quality | 0.89 | Valid |
| 2 | Content Quality | 0.93 | Valid |
| 3 | Language Quality | 0.89 | Valid |
| | **Average** | 0.90 | **Valid** |

Based on the analysis results in Table 9, the LMS-based entrepreneurship teaching materials were rated valid by the validators in three main aspects: instructional quality, content quality, and language quality. This assessment indicates that the teaching materials have met the standards to support an effective learning process.

The results of the validity analysis of the LMS-based entrepreneurship teaching materials show that the materials have met high validity standards in various aspects. Instructional quality, with a V Aiken score of 0.89, shows that the preparation of the material has been done systematically, following the learning objectives, and can support the achievement of student competencies. The quality of the material obtained the highest score of 0.93, indicating its high relevance to the topic of entrepreneurship, its suitability to the curriculum, and its ability to help students understand concepts in depth. The quality of language, with a score of 0.89, was considered valid due to the use of clear and appropriate language at the student's ability level, thus ensuring that the message in the material can be well understood. Overall, the average validity score reached 0.90, indicating that these teaching materials are feasible to use as effective learning media. With these results, LMS-based teaching materials at the Politeknik Pelayaran Sumatera Barat can be relied upon to support the entrepreneurship learning process optimally. Further details regarding application validation can be seen in Table 10.

**Table.10**. Results of Validity Test Analysis on Media Experts

| No | Assessment Indicators | Aiken's V Score | Interpretation |
|---|---|---|---|
| 1 | App View | 0.83 | Valid |
| 2 | Application Benefits | 0.86 | Valid |
| 3 | In-App Interaction | 0.91 | Valid |
| | **Average** | 0.87 | Valid |

Based on the validity analysis, the LMS application is considered valid with an average score of 0.87, indicating suitability to support entrepreneurship learning at the Politeknik Pelayaran Sumatera Barat. The application's appearance scored 0.83, reflecting a reasonably good design, but it still requires improvement, particularly in aesthetics and navigation, to improve user comfort. The app's benefits, with a score of 0.86, indicate that the app has provided relevant

features for learning needs, such as material access and communication. The interaction aspect of the app achieved the highest score of 0.91, underlining the app's effectiveness in supporting collaboration between lecturers and students. Overall, this LMS application has met the validity standards and is considered feasible to support learning, although improvements to the appearance can be made to create a more optimal user experience.

### 4.4. Implement and Evaluation

At this stage, an evaluation was conducted to identify student responses to using products developed as entrepreneurship learning media. The assessment includes all students using the product, with the analysis results in Table 11.

**Table.11**. Research Results on Student Responses as Users

| No | Indicator | N | Percentage (%) | Interpretation |
|---|---|---|---|---|
| 1 | Usefulness | 72 | 84 | Good |
| 2 | Ease of Use | | 81 | Good |
| 3 | Satisfaction | | 83 | Good |
| | Average | | 82.5 | Good |

The assessment of student responses as users of the Learning Management System (LMS) revealed positive results across three primary indicators: usability, ease of use, and satisfaction. With an average score of 82.5 in the "Good" category, students found the LMS beneficial for learning, as evidenced by a usability score of 84, reflecting the effectiveness of its features in facilitating access to materials, assignments, and interactions. The ease-of-use indicator received a score of 81, indicating that the application's interface is pretty intuitive, although there remains room for improvement in simplifying navigation. Meanwhile, the satisfaction dimension achieved a score of 83, suggesting that most students were satisfied with their experience, particularly regarding functionality and features. Overall, the findings, with an average score of 82.5, demonstrate that the LMS has effectively supported entrepreneurship education at the Politeknik Pelayaran Sumatera Barat despite opportunities for further development to enhance user-friendliness and satisfaction.

## 5. Conclusion and Future Work

This study successfully designed and developed an entrepreneurship learning module based on a Learning Management System (LMS) tailored to support the educational process at the Politeknik Pelayaran Sumatera Barat. The module was developed using the ADDIE model and underwent comprehensive validation by subject matter and media experts and student testing. The analysis results indicated that the LMS facilitates easy access to learning materials, enabling students to study flexibly and independently. Validation by experts and user feedback yielded highly positive results, confirming that the module is relevant and feasible for implementation. The LMS-based module enhanced students' understanding of entrepreneurship and significantly boosted their motivation to learn. Consequently, this research presents an innovative approach to entrepreneurship education development that is aligned with industry needs, particularly in the maritime sector.


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For future development, the study plans to integrate artificial intelligence (AI) and augmented reality (AR) technologies to enrich the learning experience. Additionally, longitudinal evaluations will be conducted to measure the module's impact on learning outcomes and students' preparedness for the business world. The module will also be adapted for other courses to support digital learning in various educational institutions. Furthermore, collaborations with local and global business stakeholders will be pursued to align teaching materials with industry demands.

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