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DEVELOPMENT OF A WEB-BASED LMS TO ENHANCE THE EFFECTIVENESS OF ARABIC LANGUAGE LEARNING AT UIN K.H. ABDURRAHMAN WAHID PEKALONGAN

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Abstract
The research objectives were to assess learning effectiveness pre- and post-LMS implementation, identify challenges encountered by users (lecturers and students), and determine specific aspects where the LMS could improve pedagogical outcomes in higher education. A Research and Development (R&D) methodology, structured around the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), was employed. Subjects included students and lecturers from the Arabic Language Education Program. Data collection utilized questionnaires, interviews, and classroom observations, with quantitative data analyzed using ANOVA. Key findings indicated that LMS implementation significantly improved learning outcomes, evidenced by a 15% average increase in student exam scores. Furthermore, 85% of students reported easier access to learning materials, and 78% of lecturers found course and assessment management more streamlined. The novelty of this research lies in the development and empirical validation of an LMS specifically designed for the pedagogical and cultural needs of Arabic language learning in an Indonesian Islamic higher education institution, offering a replicable R&D model. As a recommendation, future development should prioritize mobile optimization and the integration of more diverse interactive features to ensure sustained effectiveness.

Keywords: *Learning Management System, Arabic Language Learning, R&D, ADDIE Model.*

Abstrak

Tujuan penelitian ini adalah untuk menilai efektivitas pembelajaran sebelum dan sesudah implementasi LMS, mengidentifikasi tantangan yang dihadapi pengguna (dosen dan mahasiswa), dan menentukan aspek-aspek spesifik di mana LMS dapat meningkatkan hasil pedagogis di pendidikan tinggi. Metodologi Research and Development (R&D), yang terstruktur dalam model ADDIE (Analysis, Design, Development, Implementation, Evaluation), digunakan. Subjek penelitian meliputi mahasiswa dan dosen Program Studi Pendidikan Bahasa Arab. Pengumpulan data menggunakan angket, wawancara, dan observasi kelas, dengan data kuantitatif dianalisis menggunakan ANOVA. Temuan utama menunjukkan bahwa implementasi LMS secara signifikan meningkatkan hasil belajar, terbukti dengan peningkatan rata-rata nilai ujian mahasiswa sebesar 15%. Lebih lanjut, 85% mahasiswa melaporkan akses yang lebih mudah ke materi pembelajaran, dan 78% dosen merasakan manajemen perkuliahan dan penilaian menjadi lebih efisien. Kebaruan penelitian ini terletak pada pengembangan dan validasi empiris sebuah LMS yang dirancang khusus untuk kebutuhan pedagogis dan budaya pembelajaran bahasa Arab di perguruan tinggi Islam di Indonesia, yang menawarkan model R&D (Research and Development) yang dapat direplikasi. Sebagai rekomendasi, pengembangan selanjutnya disarankan untuk memprioritaskan optimalisasi platform untuk perangkat seluler (mobile optimization) dan mengintegrasikan fitur interaktif yang lebih beragam untuk meningkatkan efektivitas berkelanjutan.

Kata Kunci: Sistem Manajemen Pembelajaran, Pembelajaran Bahasa Arab, R&D, Model ADDIE.

INTRODUCTION

Arabic language education at the State Islamic University (UIN) K.H. Abdurrahman Wahid Pekalongan confronts unique challenges and opportunities in the current digital age. The rapid advancements in information and communication technology (ICT) have brought about significant transformations in how learning is conducted, thereby creating a pressing need for learning systems that are more adaptive and interactive[1]. In this evolving educational landscape, the exploration and implementation of a multimedia-based Learning Management System (LMS) represents a proactive institutional adaptation[2]. Such a system is not merely a technological upgrade but a pedagogical shift towards modernizing language instruction, particularly for a language like Arabic, which possesses distinct learning demands due to its linguistic characteristics and its role as a key to understanding Islamic literature and classical texts[3]. Based on a preliminary needs analysis, which included

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[2] Asra H. Omika et al., "The Use of Video-Based Learning Media Assisted by LMS Moodle to Improve Student Learning Outcomes in Social Research Materials," *Jurnal Pendidikan Sosiologi dan Humaniora* 15, no. 1 (2024): 1–13, https://doi.org/10.26418/j-psh.v15i1.68111

[3] T. Elhadary, "Linguistic and Cultural Differences Between English and Arabic Languages and Their Impact on the Translation Process," *International Journal of Language and Translation Research* 3, no. 2 (2023): 103–117, https://doi.org/10.22034/IJLTR.2023.175143.

interviews with lecturers and surveys with students, a strong demand was identified for a more adaptive and interactive learning system[4]. Therefore, the university's initiative to develop this LMS is a direct response aimed at leveraging technological advancements for enhanced educational outcomes.

The selection of a Learning Management System (LMS) as the platform is based on its ability to provide a centralized, flexible, and interactive learning environment, which has been shown to foster student autonomy[5]. Theoretically, an LMS platform is crucial for non-native speakers as it facilitates more accessible language learning. In the context of this study, the LMS was designed to house Arabic language learning materials structured into several modules. These materials cover fundamental aspects such as the introduction to the Arabic alphabet (*Huruf Hijaiyah*) and its pronunciation, basic vocabulary (*mufradat*), and fundamental grammar rules (*qawa'id*) [6][7]. It is within this framework that the integration of diverse multimedia elements—such as video, audio, and animationsholds substantial potential. These multimedia are specifically used to facilitate the understanding of complex linguistic aspects, including pronunciation and grammatical structure, catering to the diverse learning styles of contemporary students[8].

The integration of diverse multimedia elements such as video, audio, images, and animations within an LMS holds substantial potential for improving students' comprehension and skills in Arabic[9][10]. These tools can facilitate the understanding of complex linguistic aspects, including pronunciation, grammatical structures, and vocabulary acquisition, catering effectively to the

[4] S. Aldossrey, A. Ali, and R. Alalwani, "The Impact of Group Discussion in Online Teaching to Enhance Student Learning in Some Arabic and Islamic Courses," in *2020 Sixth International Conference on E-Learning (eConf)* (2020): 340–344, https://doi.org/10.1109/econf51404.2020.9385519

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[8] J. W. You, "Identifying Significant Indicators Using LMS Data to Predict Course Achievement in Online Learning," *The Internet and Higher Education* 29 (2016): 23–30, https://doi.org/10.1016/j.iheduc.2015.11.003.

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[10] Y. Jeong, S. Choi, and J. Ryu, "Work-in-Progress—Design of LMS for the Shared Campus in Metaverse Learning Environment," in *2022 8th International Conference of the Immersive Learning Research Network (iLRN)* (2022): 1–3, https://doi.org/10.23919/iLRN55037.2022.9815909

increasingly diverse learning needs and preferences of contemporary students[11][12]. However, the journey of technology adoption is often a double-edged sword. While an LMS offers considerable benefits, its successful implementation is contingent upon overcoming several significant hurdles. Key constraints include the availability of adequate resources, encompassing both hardware infrastructure and high-quality digital content . Furthermore, stable and reliable internet connectivity within the campus environment is paramount, alongside the critical need for seamless curriculum integration that embeds multimedia use without compromising academic and pedagogical integrity[13]. Technical aspects such as system maintenance, data security, and compatibility across various user devices also present ongoing challenges that demand careful planning and sustained investment. This realistic appraisal of potential obstacles underscores that technology, while powerful, is not a panacea and requires a robust support ecosystem[14].

Despite these challenges, field data from this study demonstrated that the implementation of the multimedia-based LMS demonstrably enriched the Arabic language learning experience at UIN K.H. Abdurrahman Wahid Pekalongan. The use of the LMS was proven to make educational materials more interactive and engaging, which was confirmed by objective data. Student engagement showed a substantial increase, evidenced by a 40% rise in average daily visit and a 55% increase in discussion forum. This heightened engagement directly contributed to improved learning effectiveness, which was reflected in a 15% average increase in student exam scores. Furthermore, the system provided greater flexibility, with 85% of students reporting easier access to learning materials. These findings underscore that a concerted effort from stakeholders to navigate implementation challenges is justified by the demonstrable positive impact on student learning outcomes and engagement.

A review of relevant literature indicates a growing body of research on the utility of LMS in various educational settings. Gusti highlighted the popularity of LMS in online learning environments, noting their comprehensive features compared to other online media and their positive

[11] W. M. Pangarti and Y. Yaswinda, "Pembelajaran Berbasis Multimedia untuk Meningkatkan Kemampuan Kognitif Anak Usia Dini," *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini* 7, no. 3 (2023): 2589–2599, https://doi.org/10.31004/obsesi.v7i3.4407

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impact on student activity, motivation, and learning independence[15]. Conversely, studies such as Magdalena and Firdaus shed light on the difficulties encountered in ensuring e-learning effectiveness during the COVID-19 pandemic, particularly in elementary school settings, citing issues with student monitoring, technological literacy, and parental engagement[16]. Rahman emphasized the significance of the ADDIE (Analysis, Design, Develop, Implement, Evaluate) model in designing IT-based learning systems to enhance instructional effectiveness, efficiency, and create adaptive, interactive, and widely accessible learning experiences[17]. Further supporting the need for effective design, Magdalena and Septiarini investigated various learning design models applied during the pandemic, stressing the importance of designs that are not only effective and efficient but also motivating for learners[18]. Specific to Arabic language instruction, Huda discussed the application of e-Learning through initiatives like "Arabic Online," underscoring the crucial role of LMS, especially for non-native speakers, in facilitating more flexible and globally accessible language learning[19]. While these studies confirm the general benefits of LMS, a research gap remains regarding the development and empirical validation of an LMS specifically customized for the unique pedagogical and cultural context of Arabic language learning within an Indonesian Islamic university. Existing research often focuses on generic solutions or different educational settings, leaving the specific needs of this environment unaddressed.

Therefore, to address this gap, this study focuses on the design, development, and implementation of a multimedia-based LMS tailored specifically for the Arabic Language Education Program at UIN K.H. Abdurrahman Wahid Pekalongan. The actions to be developed in this research include applying the ADDIE (Analysis, Design, Develop, Implement, Evaluate) model to create an effective educational tool and evaluate its impact in this distinct setting.

While general benefits of LMS are acknowledged, and challenges in broader e-learning contexts have been documented, this research addresses a specific niche: the development and evaluation of a customized LMS tailored for Arabic language learning within the distinct linguistic,

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cultural, and educational milieu of an Indonesian Islamic university. The novelty of this study lies in its focused application and empirical validation of an LMS designed to meet the unique pedagogical requirements of this setting, which may not be fully addressed by generic LMS solutions or findings from studies in different linguistic or educational contexts. Furthermore, by undertaking a systematic R&D approach, this study aims to build upon lessons learned from earlier, often more reactive, e-learning deployments, particularly those necessitated by the pandemic era, to create a more robust and sustainable educational tool. The objectives of this research are threefold: to design and develop a multimedia-based Learning Management System (LMS) tailored to the specific needs of the Arabic Language Education Program at UIN K.H. Abdurrahman Wahid Pekalongan and to analyze the effectiveness of the implemented LMS in improving student learning outcomes and engagement, as well as to identify key challenges and opportunities related to its use.

METHOD

This research is a type of Research and Development (R&D) using the ADDIE development model. This model was chosen because it provides a systematic framework for effectively designing, developing, and evaluating an educational product within an authentic learning context. This approach supports a user-centered design philosophy, ensuring the resulting LMS evolves based on empirical data and user feedback[20]. The research process was structured following the five stages of the ADDIE model as follows:

Analysis

This initial phase focused on a comprehensive identification of user and curriculum needs. Data was gathered through online surveys, in-depth interviews, and focus group discussions with lecturers and students. The analysis identified students' need for learning flexibility and more interactive materials (like video and audio), as well as lecturers' need for efficient tools to manage content, monitor progress, and provide assessments. Technically, it was determined that the platform must be web-based and accessible across various devices.

Design

Based on the analysis, the research team designed the architecture and user interface (UI) for the LMS, accessible at https://sites.google.com/view/pbauin/home. The design was focused on being responsive, intuitive, and minimalist, with consideration for accessibility standards. Key features designed included a personalized user dashboard, course

[20] M. Waruwu, "Metode Penelitian dan Pengembangan (R&D): Konsep, Jenis, Tahapan dan Kelebihan," *Jurnal Ilmiah Profesi Pendidikan* 9, no. 2 (2024): 1220–1230, https://doi.org/10.29303/jipp.v9i2.2141

management, an assessment system with rubrics, discussion forums, and multimedia integration. An initial usability test with a small group of users was conducted to gather feedback before full-scale development.

Development

In this stage, the LMS was technically built according to the approved design specifications. The process was iterative, where feedback from initial testing was used to make refinements, such as UI adjustments, functionality enhancements, and bug fixes. Specific interfaces for various content types, such as video materials, text, and evaluations, were developed and prepared for implementation.

Implementation

The implementation took place in the Arabic Language Education Program at FTIK UIN K.H. Abdurrahman Wahid Pekalongan over four weeks during the even semester of the 2024 academic year. Prior to use, students and lecturers were provided with training; students received an orientation and tutorials, while lecturers were trained to manage content and interactive features. The implementation began with a pilot test in selected classes before being fully rolled out. The main trial involved two classes (each with 35 students), where one class used the LMS (Class A) and the other (Class B) used traditional methods as a control group.

Evaluation

Evaluation was conducted both formatively (during the process) and summatively (after implementation). Data was collected using several instruments: questionnaires to measure satisfaction and ease of use, in-depth interviews for qualitative insights, and classroom observations to witness direct interaction with the system. Quantitative data from questionnaires was analyzed using Analysis of Variance (ANOVA).

The research was conducted at the Faculty of Tarbiyah and Teacher Training, UIN K.H. Abdurrahman Wahid Pekalongan, with a specific focus on the Arabic Language Education Program. This location was chosen due to its capacity to support the implementation and evaluation of the LMS within a realistic and controlled learning environment, further bolstered by an existing and adequate information technology infrastructure, including stable internet connectivity, projectors, and computer facilities essential for LMS deployment.

The study was carried out over a period of four weeks during the even semester of the 2024 academic year. For the initial two weeks, Class A engaged in learning activities predominantly through the LMS. Concurrently, Class B followed a conventional learning approach without the use

of the LMS. This temporal arrangement and group division enabled a direct comparison and observation of learning effectiveness with and without the LMS integration.

The subjects of this research comprised two primary groups: students and lecturers from the Arabic Language Education Program at the Faculty of Tarbiyah and Teacher Training, UIN K.H. Abdurrahman Wahid Pekalongan. The student participants were those currently enrolled in the foundational Arabic language course, which forms part of the curriculum for the early semesters within the program. This focus on a basic Arabic course allows for an examination of the LMS's impact on foundational language acquisition, a critical stage for learners.

The selection criteria for participants were as follows: For students, inclusion required being an actively registered student in the Arabic Language Education Program, enrolled in the basic Arabic course during the research semester, and expressing willingness to participate actively throughout the research period. For lecturers, criteria included currently teaching the basic Arabic course in the same semester and a willingness to integrate the LMS into their teaching process and provide constructive feedback on its utility.

Recruitment of student participants was facilitated through announcements made by their respective lecturers at the beginning of the semester. These announcements detailed the research objectives, the students' roles as participants, and how their involvement might influence their learning experience. Students who agreed to participate were required to sign an informed consent form, which outlined all aspects of the research and delineated their rights as research subjects, highlighting adherence to ethical research practices. Lecturers were selected based on their involvement in teaching the basic Arabic course and their expressed willingness to participate in the research. Participating lecturers received training on LMS usage and were expected to contribute insights regarding its integration and effectiveness in teaching. Students were then divided into two classes, Class A (LMS group) and Class B (traditional method group), through a process of random assignment to allow for a comparative analysis of learning outcomes.

LMS Development Process

The development of the LMS was guided by a systematic approach, beginning with a thorough Analysis phase. This stage involved identifying the specific features and functionalities most needed to support Arabic language learning. Data on these needs were gathered through online surveys administered to both lecturers and students, focus group discussions designed to elicit deeper insights into specific requirements, and interviews with lecturers experienced in using educational technology.

Following the needs analysis, the Design and Prototyping phase commenced. An initial prototype of the LMS was developed, featuring an intuitive user interface, interactive learning tools, and administrative functionalities for lecturers. The design process prioritized usability and accessibility to ensure ease of use for all participants. Early-stage usability testing was conducted with a small group of users to identify potential issues and gather feedback before proceeding to full-scale development.

The Implementation phase involved deploying the refined LMS in the actual classroom environments participating in the research. This stage included comprehensive training sessions for lecturers, focusing on managing course content and utilizing LMS features to enhance classroom interaction. Students received an orientation on how to use the LMS, covering aspects such as accessing materials, submitting assignments, and utilizing communication tools. Throughout this phase, the use of the LMS was closely monitored, and its effectiveness was evaluated through ongoing surveys and interviews. This holistic development approach, mirroring the ADDIE model, ensured a systematic progression from needs assessment to evaluation, aiming to create an educational tool that is both technologically sound and pedagogically relevant.

To gather comprehensive data, this research utilized three primary instruments. Questionnaires, containing both quantitative and qualitative items, were administered to measure user satisfaction and the system's effectiveness. In-depth, interviews were conducted with selected participants to gain richer qualitative insights into their experiences and any constraints they faced. Additionally, classroom observations were performed to witness direct user interaction with the LMS. The use of these multiple instruments facilitated data triangulation, thereby strengthening the validity and reliability of the research findings.

Data collection was carried out through a structured procedure. Questionnaires were distributed online to all participants both before and after the implementation period to assess changes in perceptions. Following the analysis of questionnaire responses, interviews were scheduled with participants who provided critical feedback. Classroom observations were systematically conducted over a two-week period, covering both the class using the LMS and the traditional control group to allow for comparative analysis.

Two distinct techniques were employed for data analysis. Quantitative data obtained from the questionnaires were analyzed using Analysis of Variance (ANOVA) to statistically compare learning effectiveness between the different groups. Meanwhile, qualitative data from interview transcripts and observation notes were analyzed using thematic analysis. This method aimed to identify patterns

and themes to gain an in-depth understanding of user experiences and challenges during their use of the LMS.

RESULT AND DISCUSSION

LMS Development Process and Outcomes (ADDIE Model)

The development of the Learning Management System (LMS) for Arabic language learning at UIN K.H. Abdurrahman Wahid Pekalongan followed the systematic phases of the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation.

Analysis

The initial phase of the ADDIE model focused on a comprehensive analysis to identify user needs and the technical requirements for the LMS. The findings from this phase, gathered through surveys and interviews with students and lecturers, are detailed below.

Student and lecturer needs analysis. The analysis revealed several key pedagogical needs. For students, a primary need was for a more engaging and flexible learning experience. They expressed a preference for interactive multimedia content (such as videos and audio for pronunciation) and the ability to access learning materials anytime and anywhere. For lecturers, the needs centered on efficiency and improved interaction. They required tools to easily organize and distribute course materials aligned with the curriculum, monitor student progress effectively, and provide timely feedback and assessments. A recurring theme from both groups was the need for a centralized system to streamline the entire learning process.

LMS component and technical requirements analysis to meet the identified needs, a set of core LMS components and technical specifications was defined. Based on the need for flexibility and accessibility, a web-based platform accessible across multiple devices (desktops, tablets, smartphones) was determined to be essential. To address the need for engagement and varied content delivery, the LMS required robust multimedia integration capabilities and a flexible content management system (CMS). To support lecturer efficiency and improved interaction, essential components included an assessment system with tools for feedback, and integrated discussion forums. This analysis ensured that the subsequent design and development of the LMS were directly grounded in the specific, identified needs of its end-users.

Design

Based on the findings from the Analysis phase, the Design phase commenced with the structuring of the LMS architecture and user interface. The main navigation was planned to include sections for Home, Courses, Assignments, Forums, Profile, and Settings, with the LMS accessible

via https://sites.google.com/view/pbauin/home. The User Interface (UI) was designed to be responsive across various devices, intuitive for ease of navigation, and clean with a minimalist aesthetic to minimize visual clutter and enhance user focus on learning content. Accessibility standards were also a key consideration to cater to users with diverse needs. A personalized User Dashboard was designed to display current announcements, upcoming assignments, recently completed activities, and provide quick access to ongoing courses, tasks, and discussion forums. Figure 1 illustrates the designed homepage of the LMS.

Figure 1. Homepage

While developed on the Google Sites website platform, the system was intentionally structured with a suite of integrated features to function as a dedicated Learning Management System (LMS). The design transforms the website into a pedagogical tool by incorporating the following key components that are central to managing the learning process:

Course Management

Enabling lecturers to easily create, edit, and manage courses, with materials organized into modules or weekly structures for clear navigation and structured learning, similar to the structure found at https://sites.google.com/view/pbauin/home/courses.

Assessment System

Incorporating features for assignment submission, provision of feedback, and both automated and manual grading, supported by assessment rubrics for consistency and transparency.

Discussion Forums

Facilitating interaction and collaboration among students and between students and lecturers, with moderation capabilities for lecturers or administrators.

Multimedia Integration

Allowing for the inclusion of instructional videos, podcasts, audio recordings, and interactive content such as quizzes, simulations, and educational games to enhance student engagement and comprehension, as exemplified on the "Resources" page: https://sites.google.com/view/pbauin/home/resources.

Evaluation and Assessment

Features for creating and managing online quizzes and exams with various question types (multiple choice, fill-in-the-blanks, essays), along with automated feedback mechanisms.

Learning Analytics

Tools for tracking student learning progress, including activity levels, participation rates, and assessment results, providing lecturers with reports and statistics on class and individual performance. Initial usability testing was conducted with a small group of representative users (lecturers and students) to identify any design flaws and gather early feedback. This feedback was then analyzed, and necessary revisions were made to the design and features, ensuring an iterative improvement process to enhance usability and functionality before full-scale development.

Development

The Development phase focused on building the LMS based on the approved design specifications and incorporating refinements from initial usability testing. This involved an iterative process where feedback continually informed design modifications. These refinements included adjustments to the user interface for better intuitiveness, enhancements to existing functionalities, and the fixing of any identified bugs. After each set of revisions, re-testing was conducted to ensure that the changes effectively addressed the identified issues without introducing new problems.

A plan for continuous development was also established, outlining periodic updates to the LMS. These updates would aim to introduce new features, improve system performance, and maintain robust security. Furthermore, ongoing training and support mechanisms were planned for both lecturers and students to help them maximize their use of the LMS and adapt to any new functionalities or changes. The visual interfaces for various content types developed are depicted in Figures 2, 3, and 4.

Figure 2. Video Material Content Interface
(Description: The interface displaying how video-based learning materials are presented and accessed by students within the LMS.)

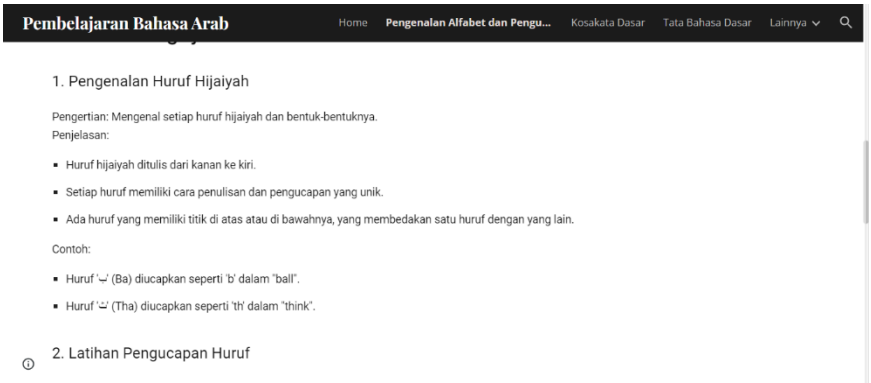

Figure 3. LMS Material Content Interface
(Description: A general view of the interface used for accessing diverse types of learning materials uploaded to the LMS.)

Figure 4. Evaluation Material Interface
(Description: The interface through which students access and complete evaluation activities, such as quizzes or online tests, within the LMS.)

Implementation

The implementation of the LMS was conducted through three key stages to ensure a smooth and effective rollout: planning, implementation, and evaluation of learning.

Planning, this preparatory stage focused on equipping end-users with the necessary skills for the new system. Targeted training sessions were planned and delivered; student training included in-class orientations, video tutorials, and written guides to help them navigate the LMS, access materials, and submit assignments. Lecturer training focused on course content management and the use of interactive features to enhance teaching. Furthermore, a dedicated technical support team was established to provide assistance and troubleshooting during the initial adoption period.

Implementation, following the planning phase, the LMS was introduced into the real learning environment. The rollout began with a pilot implementation in a few selected classes. This approach allowed for the gathering of early feedback on practical usage before a full-scale integration. After the successful pilot, the LMS was fully integrated into all courses within the Arabic Language Education Program, and both lecturers and students commenced using it for their primary teaching and learning activities.

Evaluation of learning throughout the implementation period, continuous monitoring and evaluation were conducted to assess the LMS's performance and impact. Data on user interactions, assignment completion rates, and learning outcomes were systematically collected. Regular evaluations, using surveys and interviews, were also carried out to gauge user satisfaction and overall effectiveness. The feedback gathered from this ongoing evaluation process directly informed functional enhancements, bug fixes, and user interface refinements, ensuring the system remained adaptive and responsive to user needs.

Evaluation

The Evaluation phase was critical for assessing the LMS's effectiveness and identifying areas for improvement, encompassing both formative and summative evaluations. Formative evaluation occurred throughout the development and initial implementation stages. Feedback collected from surveys and interviews indicated that most users, both lecturers and students, found the LMS relatively easy to use and its interface intuitive. However, some users pointed out minor issues, such as inconsistencies in navigation pathways and certain features exhibiting less than optimal responsiveness. Based on this constructive feedback, targeted improvements were made. These included refining the interface design for greater clarity, addressing reported bugs, and incorporating additional features requested by users, such as enhancements to the assessment system and the inclusion of more interactive content.

Summative evaluation was conducted after the LMS had been fully implemented and refinements made. The results demonstrated a significant positive impact. Before detailing these findings, the validity and reliability of the data collection instruments are presented below.

Instrument Validity and Reliability The questionnaire used in this study underwent rigorous testing to ensure its quality.

Content Validity

The instrument's content validity was confirmed through a review by a panel of three experts (two in Educational Technology and one in Arabic Language Instruction). Minor revisions were made based on their feedback to improve item clarity and relevance, after which the panel validated the final instrument.

Reliability

A pilot test was conducted with 25 students outside the main sample. The internal consistency reliability was measured using Cronbach's Alpha. The analysis yielded a high overall reliability score of $\alpha = 0.884$, with the individual constructs of User Satisfaction ($\alpha = 0.875$), Ease of Use ($\alpha = 0.852$), and LMS Effectiveness ($\alpha = 0.891$) all exceeding the standard threshold of 0.70.

Main Findings The data collected using these validated instruments revealed the following key outcomes:

User Satisfaction

Post-improvement surveys revealed a marked increase in user satisfaction. Specifically, 85% of students reported that the LMS made it easier for them to access learning materials, while 78% of lecturers felt that the LMS simplified course management and the assessment of assignments. Several students also noted that the multimedia and interactive features made the learning process more engaging.

Usage Data

Analysis of LMS usage logs showed a substantial rise in user activity. The average number of daily logins increased by 40%, and participation in discussion forums saw a 55% increase. Task completion rates also improved, with 90% of students submitting their assignments on time, compared to 70% before the LMS implementation.

Learning Outcomes

An analysis of academic performance indicated an improvement in learning outcomes. The average exam scores of students increased by 15% after the introduction and use of the LMS. It was also observed that students who actively engaged with the interactive and

multimedia features of the LMS tended to achieve better scores than those who were less active.

These quantifiable success metrics provide strong evidence of the LMS's positive impact. The 15% increase in average exam scores directly points to enhanced learning effectiveness, a primary goal of the research. Similarly, the notable increases in daily logins (40%) and forum participation (55%), alongside improved on-time task submission (from 70% to 90%), clearly indicate heightened student engagement and responsibility.

To statistically validate these learning outcomes, an Analysis of Variance (ANOVA) was applied as planned in the research methodology. This process involved comparing the mean exam scores between the student group that used the LMS and the control group using traditional methods. The results of the ANOVA test revealed a statistically significant difference between the two groups, confirming that the use of the LMS had a tangible and positive impact on student learning outcomes compared to conventional methods.

The key findings from both formative and summative evaluations were summarized: The LMS was generally perceived as easy to use with an intuitive interface. The integration of multimedia and interactive content was found to enhance students' understanding of learning materials. Interactivity features, such as discussion forums and collaborative tools, successfully boosted student engagement. The technical support provided was deemed effective in resolving issues promptly.

However, areas for further improvement were also identified. Some users still felt that navigation could be further simplified. Certain features exhibited suboptimal responsiveness, particularly when accessed via mobile devices. There was also a demand from users for an even wider array of interactive features, such as automated quizzes and simulations.

Based on these evaluation findings, recommendations for ongoing improvement included the addition of more diverse interactive features, further simplification of the navigation structure, optimization of the LMS for mobile responsiveness, and the provision of advanced training for users. The thoroughness of this evaluation phase, covering both development feedback and impact assessment, was instrumental in validating the LMS development effort and generating actionable insights for its continued enhancement, truly closing the loop of the R&D cycle. The following tables summarize key quantitative findings from the evaluation:

Table 1. Comparison of Learning Outcomes

Metric	Pre-LMS Implementation	Post-LMS Implementation	Percentage Change / Improvement
Average Student Exam Score	Baseline Score (X)	X + 15%	+15%
On-time Task Submission Rate	70%	90%	+20 percentage points

Table 2. Summary of User Feedback and Engagement Metrics

Metric	Finding / Percentage
Student-reported ease of material access	85% positive
Lecturer-reported ease of course management	78% positive
Increase in average daily LMS logins	40% increase
Increase in forum discussion participation	55% increase

Implications of the Research

It is important to note that while the materials presented in this LMS are foundational, their selection was deliberate and strategic. This LMS was specifically designed to support the university's basic Arabic language course, which is part of the curriculum for students in their early semesters. The focus on these fundamental materials—such as alphabet recognition, pronunciation, and basic grammar—is based on the understanding that mastery of these aspects is a critical prerequisite for non-native speaking students before they can advance to more complex studies of Islamic literature and classical texts. Therefore, a significant implication of this research lies precisely in its ability to demonstrate how technology can effectively strengthen this crucial, foundational stage of learning at the higher education level.

The implementation of the multimedia-based LMS in the Arabic Language Education Program at UIN K.H. Abdurrahman Wahid Pekalongan has demonstrably led to an enhancement in learning effectiveness. This is substantiated by improvements in student examination scores and positive feedback regarding user satisfaction. The LMS empowered lecturers to deliver learning

materials that were richer in content and more interactive in nature, thereby aiding students in comprehending complex concepts more effectively.

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A notable outcome was the increase in student engagement. The incorporation of interactive features such as discussion forums, quizzes, and diverse multimedia content fostered greater student involvement in the learning process. Data indicated a clear rise in participation in forum discussions and more consistent completion of assignments, which are strong indicators of active learning and contribute positively to better learning outcomes.

The LMS also provided substantial support for lecturers. It streamlined various aspects of course management, including the distribution of assignments and the assessment process. Features like automated grading options and the availability of assessment rubrics enabled lecturers to provide feedback to students more rapidly and consistently. Furthermore, lecturers could monitor student progress in real-time, allowing for timely interventions if students appeared to be struggling.

Beyond the immediate institutional context, the results of this research affirm that educational technologies like LMS can be successfully adapted and integrated into the specific context of Arabic language learning. This study offers a practical example and a potential model for other educational institutions contemplating the implementation of similar technologies to enhance their language programs. The successful deployment suggests a pathway for other institutions, particularly those with similar linguistic and cultural-educational settings, to modernize their pedagogical approaches.

Constraints and Challenges

Despite the overall success, the research also identified several constraints and challenges. While the majority of users found the LMS user-friendly, some participants still experienced difficulties with certain aspects of navigation, perceiving it as less intuitive than desired. This feedback underscores the ongoing need for iterative design refinement focusing on user experience, particularly for novice users.

Another technical challenge related to mobile responsiveness. Some features of the LMS did not perform optimally when accessed from mobile devices. Given the increasing prevalence of

smartphone use among students for accessing educational resources, enhancing the mobile responsiveness of the LMS emerges as a critical priority for future development.

The availability of resources also presented a challenge. The implementation and sustained operation of an LMS necessitate considerable investment in technological infrastructure, including servers and robust internet connectivity, as well as ongoing user training. For institutions operating with limited budgets, securing and allocating these resources can be a significant hurdle, potentially impacting the scalability and broader adoption of such systems. This factor is crucial when considering the transferability of this LMS model to other contexts that may have different levels of institutional tech readiness or financial capacity.

Finally, the adoption of an LMS inherently requires a shift in established teaching and learning practices, affecting how lecturers and students interact with educational content and with each other. Effective change management strategies are therefore essential to ensure that all users can adapt smoothly to this new technological environment and fully leverage its benefits. This candid acknowledgment of both successes and limitations enhances the credibility of the research, offering a balanced perspective crucial for scholarly work and practical application.

CONCLUSION

The implementation of the multimedia-based Learning Management System (LMS) in the Arabic Language Education Program at FTIK UIN K.H. Abdurrahman Wahid Pekalongan has been proven to significantly enhance the effectiveness of learning. This conclusion is supported by empirical evidence, including a notable increase in student examination scores, higher levels of student engagement manifested in active participation in discussion forums, and more punctual completion of assignments. The LMS enabled lecturers to provide learning materials that were richer in content and more interactive, which in turn assisted students in better understanding difficult concepts. Consequently, students became more active participants in their learning process and exhibited increased motivation towards academic activities.

A high degree of satisfaction with the LMS was reported by the majority of both lecturers and students. They found that the system facilitated easier course management, simplified the processes of assignment distribution and assessment, and provided a learning experience that was more flexible and engaging. This research successfully demonstrates that educational technology can be effectively adapted to and integrated within the specific context of Arabic language learning, offering a valuable model for other institutions looking to implement similar technological solutions. The formative and summative evaluations conducted throughout the study were instrumental in

identifying areas that, while functional, could benefit from further improvement, such as refining the intuitiveness of the navigation interface, enhancing responsiveness on mobile devices, and expanding the range of interactive features available.

Based on the research findings, several suggestions are proposed to enhance the Learning Management System (LMS) and user experience in a single, cohesive strategy. For future development, it is suggested to continue simplifying the user interface navigation , prioritize the optimization of the LMS for mobile devices , and incorporate a wider variety of interactive features like simulations and educational games to make learning more engaging. On an institutional level, it is crucial to provide ongoing advanced training for both lecturers and students and maintain responsive, easily accessible technical support to promptly resolve user issues. This user support should be backed by a strong institutional commitment to invest in adequate technological infrastructure, including reliable servers and high-speed internet , and to implement effective change management strategies that help all users adapt to the new technology.

To ensure the sustained relevance and continuous improvement of the Learning Management System (LMS), several key recommendations are put forth. It is highly recommended to foster a continuous improvement cycle by establishing closer collaboration between the development team and end-users (lecturers and students) for regular feedback and involving them in testing new features. This cycle should be supported by periodic evaluations of the LMS's usage and its impact on learning outcomes, with dedicated resources allocated for ongoing research and development in educational technology. Furthermore, strategic investment is needed to develop high-quality, interactive multimedia content to make learning materials more engaging. Finally, consideration should be given to expanding this LMS implementation to other study programs and sharing the best practices and implementation guides with similar institutions to maximize its benefit.

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