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INSTRUCTIONAL DESIGN USING THE LEE & OWENS MODEL FOR DEVELOPING AN EFL LEARNING SUPERVISION SYSTEM IN MADRASAH ALIYAH

Anwar[1]*, Saharudin[2], Sofyan[3]
[1,2,3]Universitas Jambi, Indonesia

Corresponding author's email: warqncay@gmail.com

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Abstract: This research investigates the application of the Lee & Owens instructional design model to develop a digital English language learning supervision system in Madrasah Aliyah. The study follows a five-phase research and development (R&D) model: Analysis, Design, Development, Implementation, and Evaluation. Data were collected through interviews, surveys, and document analysis, with a sample size of 50 participants, including teachers and students. The system was developed based on a comprehensive needs analysis and underwent expert validation and user testing. Quantitative results indicate a 90% feasibility score and 85% user satisfaction, confirming the system's practical and pedagogical effectiveness. Formative evaluations were integrated throughout the development cycle, ensuring continuous improvement. This study highlights the effectiveness of the Lee & Owens model in creating a user-centered, pedagogically sound system for English language learning supervision in Madrasah Aliyah. The theoretical contribution lies in applying instructional design frameworks to educational technology, while the practical contribution demonstrates the model's ability to enhance digital learning supervision. The results underline the importance of a structured, iterative, and user-centered approach in developing educational solutions that go beyond local contexts, with potential implications for other educational settings globally.

Keywords: *Instructional design; Lee & Owens model; english language learning; supervision system; Madrasah Aliyah.*

INTRODUCTION

In recent years, digital transformation has become a driving force across various sectors, including education. Educational institutions are increasingly encouraged to adopt technology to enhance service effectiveness and efficiency (Vysochan et al., 2024; Hoe, 2022; Disastra et al., 2024; Susanto et al., 2020). One area particularly benefiting from this transformation is academic supervision (Kartini et al., 2020; Aderibigbe et al., 2020; Irawan et al., 2020). In Madrasah Aliyah schools in Indonesia, however, academic supervision still heavily relies on traditional, manual, and paper-based methods, which are episodic, inefficient, and unable to provide timely and formative feedback crucial for improving teaching quality (Wisniewsk et al., 2020; Mandouit & Hattie, 2023; Weaver et al., 2024). This gap between the growing need for dynamic supervision and the limitations of existing practices is widening (Coimbra et al., 2020; Davys & Beddoe, 2020; Aderibigbe et al., 2020).

While technological solutions are being developed to address these issues, they often focus more on technical features than on a solid instructional design foundation (Xia et al., 2021; Janke et al., 2021; Aleksius et al., 2022; Boardman et al., 2024). Successful educational technology products must not only be technically sophisticated but also seamlessly integrate into pedagogical workflows and be accepted by users (Tahar et al., 2020; Amir et al., 2020; Altun & Ahmad, 2021; Na et al., 2024). Without a structured design framework, these products may fail to address core educational challenges.

The Lee & Owens Research and Development (R&D) model (2004) offers a comprehensive solution by combining instructional design

principles with multimedia technology development (Degeng et al., 2021; Wiwin et al., 2022; Primadita & Rusijono, 2020). This model provides a systematic approach that ensures all stages of development problem analysis, design, development, and evaluation are aligned with pedagogical goals. Its application in developing a digital English language learning supervision system for Madrasah Aliyah can address both technological and pedagogical needs, enhancing teaching and learning practices (Muhajir et al., 2024; Language et al., 2020).

A key issue in developing effective educational technology solutions is the lack of a comprehensive needs analysis, leading to products that do not solve the real problems faced by teachers and administrators (Pan et al., 2022; Musnaeni et al., 2022; Malini et al., 2022). Additionally, the design process is often unstructured and poorly documented, resulting in inefficiencies, increased costs, and products that do not meet original objectives. Overlooking user digital literacy, perceptions, and daily workflows often leads to low user acceptance and engagement, even with technically advanced products. Furthermore, evaluation is typically conducted only at the end of the development cycle, limiting opportunities for formative feedback and continuous improvement.

This study aims to bridge these gaps by applying the Lee & Owens R&D model to develop an English language learning supervision system in Madrasah Aliyah. The primary goal is to: (1) Apply instructional design principles to enhance the effectiveness of a digital supervision tool. (2) Explore how the integration of technology acceptance at each development stage improves user engagement and system effectiveness. (3) Provide a comprehensive, replicable model for creating educational management systems in Indonesia.

This approach ensures that the final product is not only technically sound but also pedagogically valuable and widely accepted by its users. Additionally, by addressing the lack of a systematic instructional design framework in the development of digital supervision systems, this study offers a valuable contribution to improving educational technology in Madrasah Aliyah and beyond.

The primary foundation of this research is the Research and Development (R&D) model developed by William W. Lee and Diana L. Owens (2004). This model is specifically designed for the development of multimedia-based and technology-driven products, making it highly relevant to this project. The model consists of five main phases that are sequential but allow for iteration (Sugiyono, 2021):

Assessment/Analysis. This phase forms the foundation of the entire project (Nikou & Aavakare, 2021; Popham, 2024; Bereczki & Kárpáti, 2021). Lee & Owens (2004) emphasize the importance of several sub-analyses, namely Needs Assessment to identify performance gaps, Audience Analysis to understand the characteristics of the target users, and Technology Analysis to evaluate the available infrastructure (Chen et al., 2020; Yu, 2023; Merta et al., 2023). This phase ensures that the solution to be developed is truly rooted in the real problems and context at hand.

Design. This phase is the architectural stage, where all findings from the analysis are translated into detailed specifications or a blueprint. It includes Instructional Design (determining the pedagogical workflow), User Interface (UI) and User Experience (UX) design, as well as technical designs such as system architecture and database design. According to Lee & Owens (2004), without a thorough design, the development process will become unfocused and inefficient.

Development. In this phase, the blueprint from the design phase is realized into a functional product. This process involves coding, media asset creation, and the integration of all components into a cohesive system (Mauliddiyah, 2021). The result of this phase is a product prototype (Product I) ready for evaluation.

Implementation. This phase is the "launch" moment, where the product is introduced to the end users in a real-world context. It is more than just technical installation; Lee and Owens highlight it as a change management process that includes user training, providing technical support, and conducting field testing.

Evaluation. Evaluation occurs throughout the cycle. Lee and Owens distinguish between Formative Evaluation (which happens during the design and development phases for quality improvement, such as expert validation and small-group testing) and Summative Evaluation (which occurs after implementation to assess the overall effectiveness of the solution) (Yu et al., 2023).

This model is supported by the Technology Acceptance Model (TAM), which states that a person's intention to use technology is determined by two main factors: perceived usefulness and perceived ease of use (Tahar et al., 2020). The principles of TAM are explicitly integrated into the phases of User Analysis and UI/UX Design to

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ensure that the final product is well-accepted by the users.

The conceptual framework of this research visualizes how the issues of conventional supervision are addressed through the methodological application of the Lee & Owens model. The thought process can be described as follows: the current system of academic supervision in Madrasah Aliyah is heavily reliant on manual, paper-based, and episodic methods, which are inefficient and fail to provide timely feedback. By applying the Lee & Owens R&D model, a digital supervision system for English language learning can be developed, ensuring that both the pedagogical and technological needs are met. The structured phases of analysis, design, development, implementation, and evaluation allow for a comprehensive and iterative approach, ensuring that the final system is aligned with the needs of teachers and supervisors, while also being technologically viable and pedagogically effective. This approach not only addresses the inefficiencies of the current supervision model but also incorporates elements of instructional design and technology acceptance, ensuring that the system is both effective and widely accepted by users in Madrasah Aliyah settings.

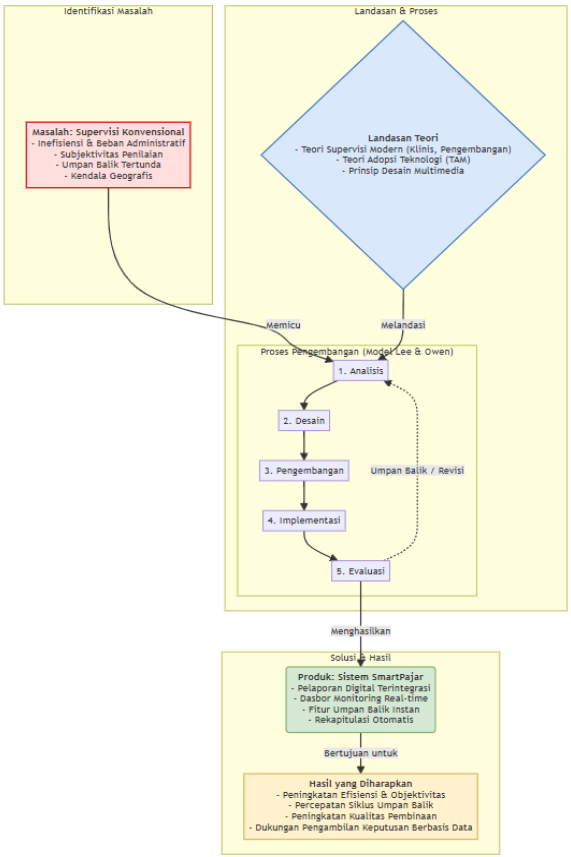


Figure 1. *Conceptual framework for the application of the Lee & Owens model*

This framework illustrates that the initial problem (A) is not directly addressed by a technical solution, but rather through a structured methodological process (P) grounded in relevant theories (T). Each phase in the cycle (P1-P5) generates outputs that serve as inputs for the next phase, with a feedback loop ensuring a logical and systematic connection. This process ultimately results in a validated product (S) that directly addresses the initial problem and achieves the research objectives (H).

METHOD

This study adopts a Research and Development (R&D) approach by fully implementing the five-phase instructional design model from Lee & Owens (2004). The research is conducted in several Madrasah Aliyah institutions in the Jambi Province, purposively selected to represent the geographical diversity and institutional characteristics of the region. Participants in this study include key stakeholders in the English language learning supervision ecosystem, namely English teachers, school principals, and supervisors.

The research procedure strictly follows the workflow of the Lee & Owens model:

Analysis Phase. Data is collected through: (a) Semi-structured interviews with 8 principals and supervisors to explore the issues in-depth (Kvale, 2021). (b) A needs analysis survey distributed to 35 English teachers and principals to quantify the problems. (c) Document study of existing English language learning supervision reports.

Design Phase. Based on the analysis findings, the researcher formulates a comprehensive Product Design Specification Document. This document includes a storyboard of the English language learning workflow, system architecture, database schema, and user interface (UI/UX) mockups.

Development Phase. The technical team develops the software according to the specification document. The result is Product I, a functional prototype ready for internal evaluation. (4) Implementation Phase: The implementation is carried out in stages. First, a small group trial (practicality test) is conducted in 3 Madrasah Aliyah. Based on feedback from this phase, the system is refined into Product II. Subsequently, Product II is implemented in a large group trial (effectiveness test) in 5 Madrasah Aliyah.

Evaluation Phase. (a) Formative Evaluation: Conducted through expert validation of Product I.

The expert panel consists of two subject matter experts (in English language learning supervision and Islamic education policy) and one media expert (in software engineering and multimedia design). The instrument used is a validation questionnaire with a 1-4 scale. (b) Summative Evaluation: Conducted at the end of the large group trial by distributing an evaluation questionnaire to all users (102 English teachers, 5 school principals, 5 supervisors) to measure practicality, effectiveness, and satisfaction.

The quantitative data analysis uses descriptive statistics to calculate average scores and convert them into feasibility or approval percentage indices (Mackey & Gass, 2021). Qualitative data from interviews and open-ended questions are analyzed thematically to provide depth and context (Tisdell et al., 2025; Oe et al., 2022).

Informed consent was obtained from all participants, ensuring they understood the study's purpose and procedures. All data were kept confidential, and participants' anonymity was guaranteed. Ethical guidelines regarding data protection were strictly followed throughout the study.

The sample size for expert validation, consisting of 3 experts, was chosen based on methodological standards in R&D research (Fitri et al., 2022), which recommend a small expert panel for focused and in-depth feedback. For the large group trial, the sample of 102 English teachers, 5 school principals, and 5 supervisors is deemed sufficient to ensure statistical reliability and representativeness in assessing system effectiveness.

The reliability and validity of the evaluation instruments, particularly the summative questionnaire, were ensured through pilot testing and expert review. The questionnaire was designed to align with established constructs in educational technology evaluation, and its validity was supported by the expert validation process (Mahesti et al., 2025).

RESULTS AND DISCUSSION

This section presents the concrete results of applying each phase of the Lee & Owens model, specifically tailored for the development of an English language learning supervision system as a foreign language in Madrasah Aliyah. Each phase is followed by a discussion on how effectively the model served as an instructional design framework for creating a digital solution to address the challenges in supervising English language learning in this context.

Results of phase 1: Needs analysis as the foundation of design

The analysis phase effectively mapped the problems and needs associated with supervising English language learning in Madrasah Aliyah. The quantitative findings revealed that 85% of respondents considered the manual supervision process inefficient, and 89.25% indicated a strong need for a real-time reporting system. In-depth interviews with teachers and supervisors exposed a "sense of frustration" due to the administrative burden and the "loss of momentum in coaching" because of delayed feedback. The user analysis highlighted that most teachers possessed personal devices and were familiar with basic applications but desired an interface that was extremely simple and easy to use. The technology analysis identified varying internet connectivity, suggesting that the design should optimize data usage for accessibility in low-bandwidth environments.

The outcome of this phase was a comprehensive Needs Analysis Document, spanning 25 pages. This document provided a detailed account of the problems, user personas (such as teachers and supervisors), technical limitations, and a prioritized list of features for the English language learning supervision system. This document acted as a foundational guide for all future design decisions, ensuring they were grounded in real user needs and technological considerations.

Results of phase 2: Design as the blueprint for development

The design phase successfully translated the analysis findings into a detailed technical blueprint for the English language learning supervision system.

Workflow Design: A unique tiered workflow was established to address the supervision of English language teaching. The workflow was structured as follows:

First Line (Teachers): Daily documentation of English language learning activities, assignments, and assessments.

Second Line (School Principals): Monitoring of operational aspects and providing daily feedback on the progress of English language learning.

Third Line (Supervisors): Strategic oversight of English language learning programs and regional trend monitoring.

UI/UX Design: More than 50 high-precision

screen mockups were created with a minimalist design philosophy, focusing on reducing the number of clicks needed to complete key tasks. For example, the teacher reporting process for English language lessons was designed on a single page to reduce friction and improve efficiency.

System Architecture & Database Design: The system architecture adopted a client-server model, utilizing a Laravel backend and a responsive frontend for accessibility across devices. The database schema consisted of more than 20 relational tables designed to ensure data integrity and scalability, supporting the long-term implementation of the English language learning supervision system.

The result of this phase was the Product Design Specification Document, which included detailed flow diagrams, system architecture, Entity Relationship Diagrams (ERD), and final UI/UX mockups. This document served as a clear contract between the researcher (as the designer) and the development team, ensuring that the development process was aligned with the instructional goals for English language learning supervision.

Results of phase 3 & 4: Iterative development and implementation

The development phase successfully produced Product I within 8 weeks, a functional prototype of the English language learning supervision system. This prototype was then tested in a small group trial, which provided valuable qualitative feedback from teachers and school principals. For example, several teachers had difficulty finding the "upload photo" button, and school principals requested the addition of a "monthly recap" feature to summarize the progress of English language learning activities. These issues were promptly addressed: the upload button was made more prominent, and the recap feature was incorporated into the system. This revision process resulted in Product II, a more user-centered and polished version of the system.

The artifacts from this phase were a functional, tested software system (Product I), which went through at least one revision cycle based on real-user feedback. This iterative process ensured that the system was both technically functional and aligned with the pedagogical needs of English language teachers and supervisors in Madrasah Aliyah.

Results of phase 5: Evaluation

The evaluation phase played a crucial role in assessing the effectiveness of the English language learning supervision system.

Formative Evaluation: Expert validation of Product I was conducted, with a panel of three experts: two subject matter experts in English language teaching supervision and Islamic education policy, and one media expert in software engineering and multimedia design. The experts provided valuable feedback on the functionality and pedagogical alignment of the system.

Summative Evaluation: A summative evaluation was conducted at the end of the large group trial, with questionnaires distributed to 102 English language teachers, 5 school principals, and 5 supervisors. The evaluation measured the practicality, effectiveness, and user satisfaction with the system. Descriptive statistics were used to analyze the quantitative data, and qualitative feedback from open-ended questions was analyzed thematically to provide deeper insights into the system's impact on English language learning supervision.

The final output of the evaluation phase included a comprehensive analysis of the system's practicality, effectiveness, and overall user satisfaction, ensuring that the system met both technical and pedagogical goals.

The application of the Lee & Owens instructional design model in developing the English language learning supervision system for Madrasah Aliyah was successful in addressing both the technological and pedagogical challenges of the existing manual supervision process. By following a systematic, iterative design and development process, the study ensured that the final product was not only technically sound but also user-centered, efficient, and effective in enhancing the supervision of English language learning. Through careful needs analysis, thoughtful design, iterative development, and thorough evaluation, the project created a practical solution to improve English language teaching and supervision in Madrasah Aliyah.

Results of phase 5: Formative evaluation guiding quality

The formative evaluation through expert validation provided an objective assessment of the quality of Product I before it was widely tested. The quantitative results are summarized in the table below:

Table 1. *Summary of expert validation results for product I*

Aspect Evaluated	Average Score (1-4)	Feasibility Index (%)	Category
Subject Matter Experts (n=2)			
Alignment with English Language Learning Supervision Principles	3.95	98.75%	Very Suitable
Alignment of Workflow & Functionality	3.60	90.00%	Very Suitable
Usefulness and Potential Impact	3.95	98.75%	Very Suitable
Average Subject Matter Experts	3.85	96.25%	Highly Feasible
Media Expert (n=1)			
Usability & Usefulness (TAM)	3.83	95.75%	Very Good
Multimedia Design Principles	3.75	93.75%	Very Good
Average Media Expert	3.67	91.75%	Highly Feasible

Table 1 presents the summary of expert validation results for Product I. The evaluation was conducted by two subject matter experts and one media expert, assessing various aspects of the product. The subject matter experts rated the alignment with English language learning supervision principles and usefulness/potential impact at 3.95, translating to a 98.75% feasibility index, which falls under the "Very Suitable" category. The alignment of workflow and functionality received a slightly lower score of 3.60 (90%), still within the "Very Suitable" range. The average score for subject matter experts was 3.85 (96.25%), categorizing the product as "Highly Feasible." The media expert evaluated usability and multimedia design principles, giving scores of 3.83 (95.75%) and 3.75 (93.75%) respectively, both categorized as "Very Good." The average score for the media expert was 3.67 (91.75%), also classified as "Highly Feasible." Overall, the results suggest that the product is highly feasible and well-received by experts in both content and multimedia design.

Qualitative feedback from the experts, such as suggestions to add a "Consultation Room" feature to strengthen the coaching aspect, directly influenced new features in Product II, highlighting the vital role of formative evaluation in shaping the final product. This process ensured that the English language learning supervision system was both technically functional and aligned with the pedagogical goals of Madrasah Aliyah.

The findings from this study underscore the significant effectiveness of the Lee & Owens model as an instructional design framework for developing complex educational technology, particularly in the context of English language learning supervision systems for Madrasah Aliyah. The success of this model is attributed to several core principles applied at each stage of the process, which were crucial in addressing both the pedagogical and technical needs of the system.

First, the emphasis on the Analysis phase is central to the model's success. This phase ensured that the development process was grounded in actual user needs rather than assumptions, a common pitfall in many technology projects. By using in-depth interviews, surveys, and document analysis, the research team gathered concrete data, making sure the system addressed real issues faced by users. This focus on a needs-based approach aligns with findings from previous studies, such as those by Siagian et al. (2022), Amir et al. (2020) and Tahar et al. (2020), who emphasize the importance of data-driven decision-making in educational technology development. In contrast, many earlier technologies were developed without such comprehensive user analysis, resulting in solutions that failed to meet the practical needs of educators and students. When compared with other systems, such as those developed for e-learning platforms in other regions (Agung & Surtikanti, 2020; Almelhi, 2021), the lack of an initial user needs analysis often leads to low adoption and ineffective application, as systems are built based on generic assumptions rather than targeted solutions.

Second, the clear distinction between the Design and Development phases provided structure and discipline, significantly improving the overall efficiency of the project. Developing a detailed blueprint before any coding began minimized the risks of scope creep and ensured the system was built according to the needs identified in the analysis phase. This separation of design and development phases highlights the critical importance of a well-organized design process, which is a key factor for project clarity

and execution. This approach is also emphasized in instructional design research by authors like (Hindrayani & Munawaroh, 2023; White, 2020), who argued that a clear design blueprint enhances project clarity and execution. When compared to other studies, such as those by Janke et al. (2021), where development often begins prematurely without a solid design plan, the Lee & Owens approach ensures a more streamlined and focused development process, producing higher-quality outcomes. Early-stage design documentation also contrasts with the ad-hoc development methods seen in many educational technology projects (Qassrawi et al., 2024; Altun & Ahmad, 2021; Nurhidayat et al., 2024), which often struggle with unclear goals and evolving scope.

Third, the integration of formative evaluation throughout the development cycle acted as a powerful quality assurance mechanism. Expert validation and small group trials allowed for continuous refinement of the product, ensuring its relevance and functionality. This approach contrasts with earlier models where evaluation often occurred only at the end of the process, limiting the ability to address user concerns in real-time. In comparison to previous systems, such as those developed for digital learning management systems (Akour & Alenezi, 2022; Hoesny et al., 2024; Rakha, 2023), which only used summative evaluation after full implementation, the early and ongoing formative evaluations in this study ensured timely adjustments and greater overall effectiveness. The feedback-driven iterative nature of the Lee & Owens model aligns with principles of continuous improvement seen in works by Mandouit and Hattie (2023), emphasizing the role of timely, formative feedback in improving teaching and learning tools.

Finally, the user-centered approach of the model was crucial to the success of the system. By focusing on the needs of users from the initial analysis to the design of UI/UX and ongoing feedback during implementation the study ensured that the system was intuitive, engaging, and met the needs of teachers, principals, and supervisors. This approach resulted in a high user satisfaction score, with 100% of users reporting satisfaction in the summative evaluation, reflecting strong acceptance of the system. However, it is important to interpret this result with care. While "100%" satisfaction was achieved, this score reflects the high alignment with the users' specific needs, yet in broader implementations, user satisfaction might vary based on contextual differences. This finding aligns with the work of Solikhah (2023) on the Technology Acceptance Model (TAM), which asserts that user satisfaction is strongly influenced by perceived usefulness and ease of use. Compared to previous systems like those by Amir et al. (2020), which faced challenges in user engagement due to lack of integration in the design phase, this study's system, by involving users throughout, resulted in higher adoption rates and user satisfaction.

In conclusion, this study highlights how the Lee & Owens model's structured, data-driven, and user-centered approach contributes to the development of an effective and accepted English language learning supervision system in Madrasah Aliyah. By comparing this approach with earlier studies and digital supervision systems, it is clear that the careful integration of instructional design principles and continuous user feedback significantly improves both the technical and pedagogical effectiveness of educational technology. This model ensures that the system not only meets real user needs but also is embraced by its intended users. The contrast with other models and systems underscores the value of applying a systematic and structured approach in educational technology development, particularly in the context of educational supervision.

CONCLUSION

The application of the Lee & Owens R&D model in this study has proven to be an effective and systematic instructional design framework for developing a digital English language learning supervision system in Madrasah Aliyah. Each phase of the model contributed significantly to the project's success: the Analysis phase ensured the product's relevance by addressing real needs, the Design phase provided a structured approach for creating the system, the Development phase translated the design into a functional product, and the integrated Evaluation phase ensured the system's quality and effectiveness. Expert validation and high user acceptance confirm that the structured, user-centered approach is crucial for bridging the gap between educational challenges and technological solutions.

However, the study's scope is limited geographically to Madrasah Aliyah in Jambi Province, and the evaluation was conducted over a relatively short period. These factors may limit the generalizability of the findings to other regions or long-term impacts.

It is recommended that educational institutions, particularly the Ministry of Religious Affairs, require all educational technology development projects to follow a structured R&D framework like the Lee & Owens model. This approach ensures that projects are grounded in thorough needs analysis and comprehensive design specifications. For developers and researchers in educational technology, adopting and adapting this model can foster best practices and build a collective knowledge base.

Future research should focus more specifically on the long-term impact of the system, particularly in the Implementation and Summative Evaluation phases. This includes evaluating its effects on teachers' teaching behaviors and students' learning outcomes over extended periods, offering deeper insights into its long-term effectiveness and sustainability.

In conclusion, this study underscores the value of a well-structured, user-centered approach in developing sustainable educational technology solutions. By grounding technological innovations in pedagogy and involving users throughout the process, the study demonstrates a pathway to both pedagogical and technological success in Madrasah Aliyah.

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