

From Repository to Engagement: Optimizing Learning Management System Delivery Strategies for Interactive Media in Primary Classrooms

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Abstract:

This study aims to analyze the optimal delivery strategy for LMS-based interactive learning media to increase engagement among elementary school students. This study used a qualitative case study approach, in which data were collected through interviews, observations, and documentation. Data analysis was conducted through qualitative analysis stages, including data condensation, data presentation, conclusion drawing, and verification. The results indicate that LMS optimization can be achieved through four main strategies: the implementation of micro-learning and scaffolding to manage cognitive load, the integration of direct feedback and gamification to increase learning motivation, the strengthening of multi-dimensional engagement through cognitive, emotional, and behavioral engagement, and a combination of asynchronous and synchronous orchestration to integrate self-directed learning with classroom interactions. The research findings indicate that an LMS designed around appropriate delivery strategies can evolve into an interactive learning ecosystem that supports students' holistic learning experiences. This research has implications for teachers and digital learning system developers in designing LMSs that are more adaptive, interactive, and oriented towards increasing engagement among elementary school students.

Keywords: *Learning Management System, Interactive Learning Media, Student Engagement*

Abstrak:

Penelitian ini bertujuan untuk menganalisis optimalisasi strategi penyampaian media pembelajaran interaktif berbasis LMS dalam meningkatkan keterlibatan siswa sekolah dasar. Penelitian ini menggunakan pendekatan kualitatif dengan jenis studi kasus, di mana data dikumpulkan melalui wawancara, observasi, dan dokumentasi. Analisis data dilakukan melalui tahapan analisis kualitatif yang meliputi kondensasi data, penyajian data, serta penarikan kesimpulan dan verifikasi. Hasil penelitian menunjukkan bahwa optimalisasi LMS dapat dilakukan melalui empat strategi utama, yaitu penerapan micro-learning dan scaffolding untuk mengelola beban kognitif, integrasi umpan balik langsung dan gamifikasi untuk meningkatkan motivasi belajar, penguatan multi-dimensional engagement melalui keterlibatan kognitif, emosional, dan perilaku, serta kombinasi *asynchronous* dan *synchronous* orchestration untuk mengintegrasikan pembelajaran mandiri dengan interaksi di kelas. Temuan penelitian menunjukkan bahwa LMS yang

dirancang berdasarkan strategi penyampaian yang tepat dapat berkembang menjadi ekosistem pembelajaran interaktif yang mendukung pengalaman belajar siswa secara holistik. Penelitian ini memberikan implikasi bagi guru dan pengembang sistem pembelajaran digital dalam merancang LMS yang lebih adaptif, interaktif, dan berorientasi pada peningkatan keterlibatan siswa sekolah dasar.

Kata Kunci: *Learning Management System, Media Pembelajaran Interaktif, Keterlibatan Siswa*

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INTRODUCTION

Digital transformation in education has become a global phenomenon, influencing how schools design, deliver, and evaluate learning processes (Rahimi & Oh, 2024; Valiyev, 2026; C. Wang et al., 2024). Advances in information technology have enabled educational institutions to deliver more flexible, personalized, and interactive learning experiences through various digital platforms, including Learning Management Systems (LMS) (Balalle, 2024; Munna et al., 2024; Pan et al., 2024). Implementing an LMS is crucial for society because it expands access to learning resources and supports the continuity of learning across diverse settings. Numerous studies have shown that integrating educational technology can improve the quality of learning interactions when tailored to student needs (Al Nabhani et al., 2025; Isaeva et al., 2025). Therefore, optimizing LMS utilization is not only about providing technology, but also about how that technology can create meaningful learning engagement.

At the elementary school level, the need for digital learning strategies is increasing, in line with the characteristics of a generation of students growing up in a technological environment, particularly in Islamic Religious Education (IS). Elementary school-aged children have learning patterns shaped by attention spans, cognitive development, and a need for concrete, engaging learning experiences (Iramadhani et al., 2026; Lestari et al., 2026). However, LMS implementation in the educational community is often limited to storing digital learning materials. This situation has resulted in the LMS's potential as a medium for interaction and learning stimulation not being fully utilized. Evidence from various technology-based learning implementations shows that the success of digital systems is determined not only by the availability of infrastructure, but also by the design of content delivery that simultaneously engages students' cognitive, emotional, and behavioral aspects (Culcasi et al., 2025; Gong, 2025; Long et al., 2026; Sidik et al., 2025).

The main problem in implementing LMSs in elementary schools lies in the gap between the technology's function and students' pedagogical needs. Many schools have adopted digital platforms, but the learning media delivery strategies used still focus on one-way information distribution. Interactive media, which should enhance students' exploration, motivation, and active participation, are often not optimally designed to suit children's developmental characteristics. As a result, LMS use has the potential to reduce its effectiveness because students act only as recipients of material rather than as active participants in the learning process. This problem demonstrates that the presence of technology alone is

insufficient to produce high-quality digital learning without a delivery strategy that considers instructional design principles.

In addition to limitations in delivery design, another challenge is maintaining student engagement in digital learning environments. The relatively limited attention spans of elementary school children require a media delivery approach that offers a variety of activities, immediate feedback, and interactive learning experiences. Previous research has extensively discussed the acceptance of LMS technology, teacher readiness, the development of learning multimedia, and the effectiveness of digital media use in general (Amemasor et al., 2025; Herniawati et al., 2025; Munyaradzi et al., 2024; Ndibalema, 2025). However, these studies still tend to separate aspects of technology, content, and student learning behavior. Few studies have examined how LMS-based interactive media delivery strategies can be optimized to foster active engagement among elementary school students while accounting for their developmental characteristics.

Previous studies have shown that LMSs have great potential as learning environments that support collaboration, personalization, and digital learning evaluation (Pan et al., 2024; Rana et al., 2024; Yekollu et al., 2024). Several studies on interactive multimedia have also demonstrated that the use of visual elements, audio, animation, and interaction-based activities can enhance student understanding (Fatmasari et al., 2025; Fawaid et al., 2025; Sari & Sidik, 2025; Wang, 2024). However, most research still focuses on media product development or measuring learning outcomes without paying in-depth attention to the delivery mechanisms of media through LMSs. This limitation creates a research gap regarding how LMSs can be developed from mere repositories into interactive learning ecosystems. Addressing this gap is crucial because the effectiveness of educational technology ultimately depends on the system's ability to connect media design, delivery strategies, and student learning experiences.

Based on this gap, this study offers a novel approach by formulating a framework to optimize LMS-based interactive learning media delivery strategies tailored to the characteristics of elementary school students. Unlike previous studies that position LMSs as mere storage and distribution facilities, this study views LMSs as interactive ecosystems designed to enhance student engagement by integrating cognitive, emotional, and behavioral aspects. The proposed research problem is how LMS-based interactive learning media delivery strategies can be optimized to stimulate active engagement among elementary school students in Islamic Religious Education. This research argues that optimizing the delivery strategy through developmentally appropriate interaction design can increase the effectiveness of LMS as a more adaptive, engaging, and meaningful learning environment for students.

RESEARCH METHODS

This research uses a qualitative case study design (Fahmi, 2024; Mishra & Dey, 2022) to gain an in-depth understanding of the optimization of interactive learning media delivery strategies within a Learning Management System (LMS) in elementary schools. The case study design was chosen based on the research objective, which focuses on exploring a contextual phenomenon: how an LMS is

implemented and optimized as an interactive learning ecosystem according to the characteristics of elementary school students in Islamic religious education. This approach allows researchers to gain a comprehensive understanding of the experiences, strategies, and digital learning practices applied by teachers in a real-life school environment. The case study was chosen because it can reveal the relationship among technology, pedagogical strategies, and student engagement that cannot be fully explained by quantitative measurements alone.

This research was conducted at Al-Furqon Elementary School in Jember. The location was chosen because the school has implemented digital learning technology via an LMS to support the learning process. Al-Furqon Elementary School in Jember was chosen because it has implemented interactive learning media practices relevant to the research focus, particularly the use of digital platforms to support elementary school students' learning activities. Furthermore, the school's integration of technology into learning provides an appropriate context for examining how media delivery strategies through an LMS are designed, implemented, and developed to increase student engagement.

Data collection was conducted through in-depth interviews, observation, and documentation (Chand, 2025). Interviews were conducted with informants directly involved in LMS-based learning, such as teachers and other relevant parties familiar with planning and implementing digital learning. Observations were conducted of learning activities to obtain an overview of students' interaction patterns with LMS-based interactive media, including cognitive, emotional, and behavioral engagement. Documentation was used as supporting data, including learning tools, LMS activities, digital materials, and other documents related to the implementation of interactive media delivery strategies.

Data analysis was conducted using qualitative analysis stages, including data condensation, data presentation, and conclusion drawing and verification (Adu, 2026; Ahmed et al., 2025; Bingham, 2023). Data from interviews, observations, and documentation were systematically analyzed to identify patterns, themes, and relationships between categories related to the LMS delivery strategy. Data validity was maintained through triangulation of sources and methods by comparing information from various informants and by matching interview results with observations and documentation. Furthermore, a verification process was conducted throughout the research to ensure that the resulting interpretations align with empirical conditions in the field. This approach was used to produce credible research findings regarding the optimization of LMS-based interactive learning media delivery strategies in elementary schools.

RESULTS AND DISCUSSION

Results

The research results show that optimizing the delivery strategy for LMS-based interactive learning media in elementary schools can be achieved by adapting content to student characteristics, enhancing interactivity, and designing engaging learning flows. The LMS serves not only as a repository for materials but also as a learning ecosystem that supports active student engagement through

multimedia, feedback, and collaborative activities. An appropriate delivery strategy can increase student cognitive, emotional, and behavioral engagement in digital learning.

Micro-Learning & Scaffolding-Based Learning

In this study, micro-learning and scaffolding-based learning are understood as interactive media delivery strategies delivered via an LMS (Learning Management System) for Islamic Religious Education (PAI) learning in elementary schools. This strategy is implemented by breaking down multimedia content, such as interactive animated videos and digital simulations, into short learning modules of approximately 3–7 minutes. Furthermore, the LMS is designed with a scaffolding mechanism that gradually introduces material (drip content), allowing students to access advanced material after completing simple activities or challenges in the previous stage. This strategy aims to reduce cognitive load and maintain student focus throughout the digital learning process.

One teacher stated that students find it easier to follow the material when digital content is presented in small chunks rather than in long blocks. The informant stated that "children usually start to lose focus when videos or material are too long, but they become more engaged when each section has a short activity to complete (w_if3)." Based on these findings, it is understood that dividing material into simpler learning units can accommodate the attentional characteristics of elementary school students. The gradual delivery style allows students to understand one concept before moving on to the next, making the learning process more focused.

Furthermore, another teacher stated that arranging the sequence of materials in the LMS helps teachers monitor students' learning progress. The informant explained that "the gradual opening of the material prevents students from receiving too much information at once, allowing them to focus more on completing tasks at each stage (w_if6)." This statement demonstrates that the scaffolding mechanism in the LMS serves as a learning-load regulator by providing progressive support. The controlled presentation of material based on the completion of previous activities allows students to build their understanding gradually and reduces the risk of cognitive overload in digitally based learning.

During the fieldwork, researchers observed that students were more actively engaged in activities when LMS material was presented in short modules with interactive elements. During the learning process, students appeared more consistent in completing the activities in each section compared to when presented with long digital materials. Researchers found that transitions between modules, accompanied by simple instructions and immediate feedback, helped students understand the purpose of each activity. The implementation of micro-learning and scaffolding not only serves as a strategy for organizing material but also as an approach to maintaining student engagement during interactions with digital learning media.

Ideally, micro-learning and scaffolding-based learning should be adapted to the limited attention span of elementary school students. Material broken down into smaller chunks and delivered in stages helps students absorb information more effectively. In the context of an LMS, this strategy transforms the platform's function from simply storing material to a learning system that organizes students' learning experiences through structured stages.

Based on this, it can be concluded that the success of LMS-based interactive media delivery is influenced by three main aspects: content size, delivery sequence, and level of learning support. Short content helps maintain student attention, gradual delivery reduces cognitive load, while connecting activities between modules increase student engagement in the learning process. Therefore, micro-learning and scaffolding patterns are crucial components in optimizing LMS delivery strategies to create digital learning experiences that meet the developmental needs of elementary school students.

Integrating Direct Feedback and Gamification for Interactive Learning

The integration of direct feedback and gamification in this study is defined as a strategy for delivering interactive Islamic Religious Education (PAI) learning media, built on an LMS (Learning Management System), that combines direct feedback mechanisms with game elements to increase engagement among elementary school students. This strategy is implemented through interactive quizzes, a points system, badges, and a leaderboard to recognize student learning activities. Furthermore, the LMS provides immediate feedback when students complete an activity, including answer confirmation, visual explanations, and guidance for improvement. This strategy is designed to create a more responsive and engaging learning experience, encouraging students to engage cognitively, emotionally, and behaviorally.

One teacher stated that providing direct feedback through the LMS helps students understand errors and improve their understanding independently. The informant explained that "when students immediately know whether an answer is correct or incorrect, they are more interested in trying again and are less afraid of making mistakes (w_if1)." Based on this statement, immediate feedback serves as a learning reinforcement mechanism that provides a quick response to student activity. Immediate feedback creates a connection between actions, outcomes, and reflection, enabling students to build understanding through active learning experiences.

The use of gamification elements in the LMS increases student motivation to complete learning activities. One informant stated that "points and simple rewards make students more enthusiastic about participating in each learning stage because they feel they have a goal to achieve (w_if3)." This indicates that game elements serve as motivational stimuli that encourage student engagement in completing learning tasks. This strategic flow begins when students access interactive materials in the LMS. Students complete quizzes or challenges, receive immediate feedback from the system, earn points or rewards, and move on to the next activity. This cycle creates an interactive and continuous learning experience.

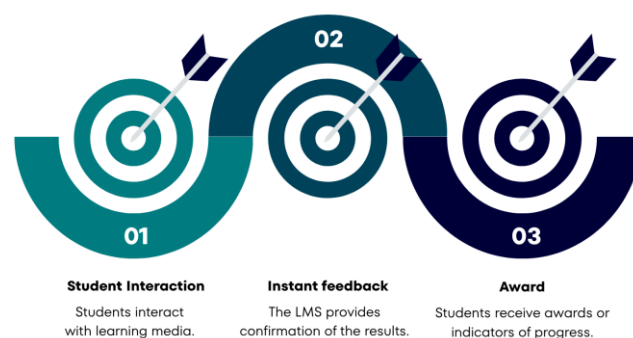


Figure 1. Increasing Student Engagement

Students participate more actively when learning media in the LMS is equipped with interactive quizzes, a points system, and immediate feedback. Students appear more enthusiastic about trying a variety of activities, paying attention to their answers, and striving to improve their performance in subsequent activities. Researchers interpret that gamification elements and immediate feedback can create a more engaging digital learning environment than presentations without interaction. This observation suggests that rapid-response mechanisms and digital rewards can sustain students' attention and increase their engagement with learning media.

Based on the overall research data, integrating direct feedback and gamification suggests that optimizing LMS-based media delivery strategies can be achieved by creating responsive, meaningful learning experiences. Data patterns show that student engagement increases when each learning activity is followed by immediate feedback and clear achievement indicators. Thus, gamification serves as a motivator for learning, while immediate feedback supports understanding. The combination of these two elements forms an LMS delivery strategy that can increase students' cognitive, emotional, and behavioral engagement in interactive learning in elementary schools.

Multi-Dimensional Engagement

In this study, Multi-Dimensional Engagement is defined as student engagement encompassing three main dimensions: cognitive, emotional, and behavioral, within the LMS-based learning process. Field findings indicate that optimizing interactive media delivery strategies is not sufficient; they must also be designed to build learning experiences that simultaneously engage students' thinking, feeling, and acting.

This strategy is implemented through problem-solving activities, engaging narrative elements, and digital interaction features that enable active student participation. This multidimensional approach positions the LMS as a learning environment that more comprehensively addresses the developmental needs of elementary school students.

Table 1. Multi-Dimensional Engagement

Interview Results	Dimensions of Engagement	LMS Delivery Strategy
"Students are more challenged when given questions in the form of games or puzzles"	Cognitive	Presenting problem-solving-based media and

because they have to find solutions, not just read the material (w_if5)."		interactive puzzles.
"Children are more interested in using interactive learning media when it has an engaging story, characters, and visuals, like the apps they usually use (w_if2)."	Emotional	Incorporating narrative elements (storytelling), mascot characters, and a child-friendly interface (UI/UX).
"Activities such as sliding images, filling in answers, and writing reflections make students more actively engaged in learning (w_if4)."	Behavioral	Utilizing drag-and-drop features, brief reflection spaces, and structured independent assignments.

Based on Table 1, student engagement in LMS-based learning is shaped by the interplay between media design, learning activities, and student responses to the digital environment. In the cognitive dimension, delivery strategies that use problem-solving activities and interactive puzzles encourage students to engage in higher-order thinking rather than merely receive information. An LMS designed with exploratory activities transforms students from passive recipients of material into active agents constructing their own understanding. Thus, the cognitive aspect of engagement is influenced not only by the content itself but also by how that content is delivered through challenging learning experiences.

Regarding the emotional dimension, data indicate that visual elements, narratives, and interface experiences play a crucial role in fostering a positive relationship between students and the LMS. The inclusion of characters, stories, and designs tailored to children's characteristics creates a more enjoyable learning atmosphere, dispelling the notion that the LMS is merely a space for digital assignments. Meanwhile, in the behavioral dimension, interactive features – such as drag-and-drop tasks, reflection exercises, and independent activities – provide students with opportunities for tangible action during the learning process. This suggests an interconnection among the three dimensions: positive emotional experiences can strengthen a student's desire to interact, while interactive activities can deepen their cognitive processing.

Field observations reinforce the interview findings, showing higher levels of student participation when the LMS offers a variety of activities engaging cognitive, emotional, and behavioral aspects. Students appeared more focused when tackling interactive challenges, more enthusiastic when engaging with visual elements and storytelling, and more active in navigating digital learning features. This demonstrates that student engagement does not stem from a single feature but rather from a combination of delivery strategies that create a holistic learning experience. LMS designs that account for the multidimensional nature of engagement are more effective at sustaining the attention and participation of elementary school students.

In summary, the concept of Multi-Dimensional Engagement highlights the importance of LMS delivery strategies that simultaneously foster student engagement across three key dimensions: cognitive, emotional, and behavioral. Problem-solving activities foster cognitive engagement by developing students' thinking and reasoning skills. Meanwhile, narrative elements build an emotional connection to the learning material, and interactive features encourage behavioral

engagement through active participation during the learning process. Thus, the effectiveness of an LMS is determined not merely by the availability of digital content, but by its ability to create a learning experience that holistically engages students' cognitive, emotional, and behavioral aspects.

There is a clear link between LMS-based delivery strategies and enhanced student engagement. This pattern illustrates that cognitively designed interactive media stimulate understanding, emotional design fosters motivation and interest, and digital interaction mechanisms reinforce student participation. Together, these elements form a unified delivery strategy that transforms the LMS from a mere information repository into an interactive learning ecosystem. Therefore, optimizing an LMS for primary schools requires balancing instructional design, user experience, and students' developmental characteristics.

Combining Asynchronous and Synchronous Orchestration

The combination of asynchronous and synchronous orchestration in Islamic Religious Education (PAI) at the elementary school level is an LMS management strategy that integrates independent learning through digital media with direct teacher-student interaction to reinforce understanding of religious subject matter. Field findings indicate that the LMS is not utilized as a standalone learning system; rather, it is designed to support classroom dynamics by blending flexible study times with face-to-face interaction. This strategy is implemented through a simplified "flipped classroom" format, involving the delivery of interactive media via the LMS either before or after class sessions, using LMS student activity results as a basis for discussion and providing live feedback during teacher-led instruction.

Interview results with a teacher reveal that using the LMS for pre-learning activities helps ensure students are prepared before attending class. The informant noted, "When students have watched videos or completed LMS activities before entering the classroom, they grasp the material more easily and ask more questions during discussions (w_if2)." This indicates that asynchronous learning via an LMS serves as a cognitive preparation stage, allowing students to familiarize themselves with foundational concepts at their own pace. This strategy helps shift classroom activities from mere information delivery toward reinforcement, discussion, and problem-solving.

Furthermore, other informants indicated that integrating LMS activities with face-to-face instruction enhances student engagement, as their digital contributions are acknowledged during classroom interactions. Informants explained that "students' answers or work submitted on the LMS are frequently used as a basis for discussion, making them feel that their efforts on the platform are meaningful (w_if1)." This demonstrates that the link between asynchronous and synchronous activities fosters a continuous learning experience. The strategy unfolds as students independently access materials or complete activities on the LMS; the resulting work is then analyzed and discussed with the teacher and classmates during face-to-face sessions. This mechanism positions the LMS as a bridge between individual and collaborative learning.

The pattern of asynchronous and synchronous orchestration reveals that an LMS's effectiveness depends on its ability to connect digital activities with social interactions in the classroom. Independent learning via the LMS offers space for initial exploration, while face-to-face meetings provide opportunities for clarification, reflection, and deeper understanding. Researchers found that this strategy creates a continuous learning cycle: students gain experience through independent study, receive feedback from the system, and subsequently deepen their understanding through interactions with the teacher and peers. Thus, the LMS acts as a supporting component that reinforces the learning process rather than replacing classroom interaction.

Observational results indicate that students participate more actively in discussions when teachers utilize LMS activity outcomes as classroom learning materials. Students appear more confident in expressing their opinions, having gained prior experience with digital materials. The integration of online and face-to-face activities enhances learning continuity and reinforces students' perception that their LMS activities have real value and impact. Guided collaboration via the LMS fosters a balance between independent learning and social support within the learning process.

The combination of asynchronous and synchronous orchestration demonstrates that an optimal LMS delivery strategy lies not in the standalone use of technology, but in the system's ability to integrate digital learning experiences with classroom interactions. Data patterns reveal that asynchronous activities support flexibility and student readiness, while synchronous activities strengthen communication, reflection, and the collaborative construction of knowledge. Combining these approaches creates a delivery strategy that transforms the LMS into an adaptive learning ecosystem, where technology serves as a bridge connecting individual learning, collaboration, and active engagement among elementary school students.

Discussion

The research findings indicate that optimizing LMS-based interactive learning delivery strategies in elementary schools depends not merely on the presence of technology but on how the LMS is designed as a learning ecosystem that boosts student engagement. These findings align with previous research highlighting the LMS's potential to support access to materials, interaction, assessment, and the digital management of learning activities (Munna et al., 2024; Rafiq et al., 2024). However, while earlier studies largely positioned the LMS as a supplementary learning tool, this research expands that perspective by identifying the delivery strategy as the primary factor determining the effectiveness of LMS usage. Thus, this study contributes to a paradigm shift, moving the LMS from a mere repository toward an interactive learning environment that accounts for the developmental characteristics of elementary school students.

Findings regarding the implementation of micro-learning and scaffolding demonstrate that presenting material in small, incremental units effectively accommodates the limited attention spans of elementary school students. These results reinforce previous studies suggesting that short-unit-based learning can

help reduce cognitive load while enhancing student learning flexibility. Research on the development of LMS-based micro-learning media also indicates that integrating concise content with interactive digital design can enhance learner engagement (Karlina & Muali, 2025; Nisak, 2024). What distinguishes this study is that it goes beyond merely highlighting the media format; it explains how the LMS delivery mechanism requires control through staged access to material (drip content) to ensure students receive progressive learning support. Its theoretical contribution lies in reinforcing the relationship between cognitive load theory principles, digital learning design, and the management of LMS-based learning pathways.

Research results regarding the integration of direct feedback and gamification indicate that game elements – such as points, badges, and immediate feedback – can enhance student motivation and participation. These findings align with prior research showing that gamification within a Learning Management System (LMS) can strengthen student engagement through reward mechanisms, instant responses, and more interactive learning experiences (Rachmadi et al., 2025; Slamet, 2024). However, this study offers a distinct contribution by positioning gamification not merely as an add-on feature, but as an integral part of the instructional delivery strategy. In this study, direct feedback is understood as a pedagogical mechanism that enables students to reflect on and refine their understanding immediately. In practice, these findings imply that LMS development for primary schools must prioritize interaction designs that enable rapid responses to student activities.

Findings regarding multi-dimensional engagement reveal that student engagement within an LMS emerges from a combination of cognitive, emotional, and behavioral aspects. These results support research on interactive learning media, demonstrating that digital multimedia can boost student motivation and engagement when designed to meet specific learning needs (Staneviciene & Žekienė, 2025; Wong & Hughes, 2023). However, while much previous research has focused on measuring the general impact of media on learning outcomes or motivation, this study elucidates the mechanisms by which LMS delivery strategies can simultaneously influence various dimensions of engagement. Theoretically, this study expands the concept of student engagement in primary school digital learning by incorporating learning experience design as a mediating factor linking technology and students' learning behavior.

Research results concerning the combination of asynchronous and synchronous orchestration indicate that an effective LMS does not replace classroom interaction but rather reinforces the link between independent study and collaborative learning. These findings are consistent with literature explaining that an LMS can facilitate flexible learning through independent activities, discussion forums, digital assessments, and direct interaction with teachers (Cabero-Almenara et al., 2019; Morze et al., 2024). This study distinguishes itself by emphasizing that successful LMS integration relies on the orchestration of digital activities and classroom dynamics. Activities conducted before or after face-to-face sessions serve as preparation and reinforcement phases, whereas direct interaction provides a space for clarification and knowledge construction.

The practical implication is that schools need to design the LMS as an integral part of the instructional design, rather than as an add-on platform separate from the teaching process.

Overall, this study contributes to the development of a conceptual model for LMS-based interactive media delivery strategies to foster active engagement among elementary school students. Unlike previous studies that generally focused on technology acceptance, media development, or learning outcomes, this research integrates content design, interaction mechanisms, motivation, and learning experience management into a unified delivery-strategy framework. Theoretically, the study reinforces the understanding that LMS effectiveness stems not merely from technological features, but from the alignment of technology, pedagogy, and learner characteristics. In practice, it implies that teachers and LMS developers must prioritize instructional designs that are adaptive, interactive, and appropriate to the developmental stages of elementary school students.

The study's findings reveal that LMS optimization occurs when technology is designed based on student-centered learning principles. Micro-learning and scaffolding strategies sustain student attention; gamification and immediate feedback boost motivation; multi-dimensional engagement broadens the scope of learning involvement; and the orchestration of asynchronous and synchronous elements bridges digital experiences with classroom social interactions. These patterns demonstrate that an LMS should not be viewed merely as a technological tool, but as a pedagogical system requiring a well-planned delivery design. Consequently, this research establishes a conceptual and practical foundation demonstrating that successful LMS implementation in elementary schools depends on integrating technology with instructional strategies that account for students' cognitive, emotional, and behavioral aspects.

CONCLUSION

This study reveals that optimizing delivery strategies for LMS-based interactive learning media depends not merely on technology use but also on integrating pedagogical design, students' developmental characteristics, and meaningful interaction mechanisms. A key insight is that LMS platforms must evolve from simple material repositories into learning ecosystems that foster cognitive, emotional, and behavioral student engagement through strategies such as microlearning, scaffolding, gamification, immediate feedback, and the orchestration of synchronous and asynchronous learning. The study's scholarly contribution lies in the formulation of an LMS delivery strategy framework centered on the learning experiences of elementary school students. However, the study is limited by its scope and participant characteristics; therefore, future research should test this model across more diverse educational levels, regions, and school types, while employing quantitative or experimental approaches to measure the effectiveness of its implementation on a broader scale.

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