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DEVELOPMENT OF A GAMIFICATION-BASED LEARNING MANAGEMENT SYSTEM (LMS) FOR HIGHER EDUCATION INSTITUTIONS

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Abstrak

Kemajuan teknologi pendidikan menuntut adanya sistem pembelajaran yang adaptif dan inovatif. Penelitian ini bertujuan untuk menelaah dan menganalisis *Learning Management System* (LMS) berbasis gamifikasi yang terintegrasi dengan sistem akademik di perguruan tinggi guna meningkatkan motivasi dan keterlibatan mahasiswa. Metode yang digunakan dalam penelitian ini berupa studi literatur sistematis dengan menelaah berbagai artikel ilmiah dari tahun 2015-2025 melalui berbagai *database* terkemuka, seperti *Google Scholar*, *Publish or Perish*, dan DOAJ. Hasil penelitian menunjukkan bahwa penggunaan elemen-elemen gamifikasi seperti poin, lencana (*badge*), papan peringkat (*leaderboard*), tantangan, dan kuis dapat meningkatkan motivasi baik motivasi intrinsik maupun ekstrinsik mahasiswa, serta mendorong keterlibatan aktif mereka dalam proses pembelajaran. Namun, efektivitasnya terhadap hasil belajar masih beragam tergantung pada rancangan, preferensi individu, dan kesesuaian elemen dengan karakteristik mahasiswa. Ditemukan bahwa elemen kuis memiliki kontribusi kognitif yang signifikan meskipun kurang menarik secara emosional. Penelitian ini menyimpulkan bahwa LMS berbasis gamifikasi yang dirancang secara adaptif dan personal dapat menjadi strategi efektif dalam mendukung pengembangan manajemen pendidikan dan peningkatan hasil belajar di perguruan tinggi.

Kata Kunci: Gamifikasi, Sistem Manajemen Pembelajaran, Perguruan Tinggi, Motivasi Belajar, Keterlibatan Mahasiswa.

Abstract

Advances in educational technology require adaptive and innovative learning systems. This study aims to examine and analyze gamification-based Learning Management Systems (LMS) integrated with academic systems in higher education institutions to increase student motivation and engagement. The method used in this study is a systematic literature review, examining various scientific articles from 2015 to 2025 through leading databases such as Google Scholar, Publish or Perish, and DOAJ. The results of the study indicate that the use of gamification elements such as points, badges, leaderboards, challenges, and quizzes can enhance both intrinsic and extrinsic motivation among students, as well as encourage their

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active engagement in the learning process. However, its effectiveness on learning outcomes remains varied, depending on the design, individual preferences, and the suitability of the elements to the characteristics of the students. It was found that the quiz element has a significant cognitive contribution, although it is less emotionally engaging. This study concludes that an adaptive and personalized gamification-based LMS can be an effective strategy in supporting the development of educational management and improving learning outcomes in higher education.

***Keywords**: Gamification, Learning Management System, Higher Education, Learning Motivation, Student Engagement.*

I. Introduction

Higher education procedures are influenced by the increasingly widespread use of new technologies, such as telephones and the internet. These technologies have a significant impact on education, enabling the integration of new information systems and technologies. In line with UNESCO's (n.d.) objectives, which support the use of digital innovation to expand access to educational opportunities, promote inclusion, enhance the relevance and quality of learning, strengthen education and learning management systems, and monitor the learning process, the development of educational technology has influenced how education is delivered and understood, including the use of LMS.

LMS is one of the online teaching and learning platforms that enables the effective and efficient management and distribution of teaching materials. With the increasing reliance on technology, many educational institutions are striving to improve student interaction, engagement, and learning outcomes through various innovative approaches. The existence of e-learning is closely tied to how such e-learning services are designed, such as some LMS systems in universities that not only serve as teaching and learning platforms but are also used for information on tuition fees, class schedules, grade announcements, and so on.

Sometimes, the learning process through interaction between students and instructors still relies on conventional methods, such as completing assignments on paper, direct discussions in class, and submitting midterm or final exam papers to instructors, resulting in a repetitive pattern without innovation. In the era of the 4th Industrial Revolution, such methods leave educational institutions behind and impact student productivity, leading to boredom and stress due to monotonous learning, which also affects critical thinking and makes students reluctant to explore during the learning process.

Some universities are trying to address this issue by implementing gamification through separate applications such as Quizizz, Kahoot, or other websites to create a more interactive and entertaining learning experience. However, some of these

gamification applications are paid for with certain conditions, so the use of gamification applications outside the LMS can fragment learning activities, as students and lecturers have to switch between platforms to access materials, assignments, or quizzes. One approach that can be taken is to integrate gamification into the LMS, where game elements such as points, badges, leaderboards, and challenges can motivate students to participate more actively during the learning process.

According to (Sunarya et al., 2019), their research shows that the gamification system in the iLearning method proves that the learning process becomes more interactive and efficient, and lecturers can also see students actively participating in class. However, there are limitations in the research related to iLearning on iDu and Rinfo (iLearning Education), which do not include grade management, course registration form (KRS) completion, class scheduling, tuition fee management, and access to online course materials. Furthermore, the research conducted (Yaniaja et al., n.d.) demonstrates that the stages of the e-learning development model using gamification can be accompanied by important elements such as technology, pedagogy, design, finance, and user experience. A limitation of this research is that it does not detail how the effectiveness of the gamification model compares to conventional learning models or other hybrid learning models.

Furthermore, research conducted by Rahardja et al. (2019) examined the effectiveness of gamification in a lecture information system developed with a prototype called LearnUp. The data from this study indicates that gamification can address some of the shortcomings of traditional e-learning platforms in terms of appearance and performance. Therefore, integrating gamification into e-learning can be an effective and efficient solution to improve the quality of learning in higher education. However, there are several differences between this study and previous studies. This study focuses more on the impact and outcomes of gamification implementation and the development of a gamified LMS that is fully integrated with academic systems and other digital platforms in higher education institutions.

Most gamified LMS developments currently operate separately and are not fully integrated with academic systems and other digital platforms used in higher education institutions, resulting in the potential for learning optimization not being fully realized. Therefore, it is important to conduct a more in-depth examination of gamification-based LMS development in higher education to determine whether this gamification method can be developed with features related to the academic system and learning system in higher education.

This study aims to enhance a deeper understanding of the development of gamification-based LMS, specifically for universities. Although several previous studies have discussed the integration of gamification in LMS, their approaches are generally limited to the application of game elements alone without comprehensive integration with academic systems and other campus communication platforms.

Therefore, the primary focus of this research is to develop a gamification-based LMS that not only adopts game mechanics but is also fully integrated with academic systems and various digital platforms used in higher education institutions. The novelty of this research lies in its comprehensive integrative approach to gamification-based LMS, designed to address the specific needs of higher education management. This research is important because it makes a significant contribution to the development of educational management through the development of an adaptive and integrated LMS, which directly supports the effectiveness of academic administration and digital interaction in the university environment. The research results are expected to enrich theoretical contributions in media and technology studies, particularly in the context of developing a gamification-based LMS for universities.

II. Research Method

This study uses a literature review as its main approach. This method was chosen to gain an in-depth understanding of the development of gamification-based Learning Management Systems (LMS) in the context of higher education. The literature review was conducted by examining various relevant scientific sources to support the formulation of innovative and applicable LMS concepts and development frameworks.

The data collection process began by identifying scientific articles through various leading databases, such as Google Scholar, Publish or Perish, and DOAJ. Selection was based on several criteria, including: (1) articles published within ten years (2015–2025), (2) addressing topics related to LMS with a gamification approach, (3) research subjects being university students or learners, (4) articles available in full-text format, and (5) written in Indonesian.

Articles that met the criteria were systematically reviewed to identify key elements in the development of gamification-based LMS, such as effective gamification features, the role of motivation in online learning, and the implementation of educational technology in higher education settings. Of the 21 articles obtained, 14 met the inclusion criteria and were analyzed using descriptive and narrative analysis techniques, namely grouping information based on themes and trends that emerged from previous research results.

III. Findings and Discussion

A. Research Findings

This study examines various studies related to the implementation of gamification in the development of Learning Management Systems (LMS) in higher education. The results show that the integration of game elements into LMS has a significant impact on learning motivation, student engagement, and the effectiveness of the learning process. Table 1 below summarizes the findings from five main studies analyzed,

which have been filtered and processed based on the type of gamification elements, findings, and their implementation in higher education institutions.

Table 1. Results from five major studies

No.	Research Title	Gamification Elements	Key Findings	Implementation Progress	References
1.	Implementation of the Gamification system pada *Learning Management System*	Poin, Level, *Badge*, *Leaderboard*, *Blackbox Testing,* Fitur H5P.	Increasing motivation and active involvement of students in the learning process, encouraging more enjoyable and meaningful learning.	Developing concepts to improve student motivation, testing the system using blackbox testing methods, and distributing the system online via MoodleCloud.	**(Garnisa et al., 2023)**
2.	Application of Gamification in the WeLearn Platform to Improve Student Motivation in the Information Technology Study Program	Poin, *Badge, Leaderboard, progress Bar,* Level, Tantangan dan misi	Before gamification, we learned less interactively, there was no reward system, and forum participation was low. However, gamification has increased student motivation, active participation in discussion forums, and task completion, making learning more interesting.	Points and badges are very helpful, and the reward system encourages active student engagement.	**(Florika et al., 2025)**
3.	Introduction of Gamification Models into e-learning at Universities	Points, levels, leaderboards, awards, competitions,	Increasing student motivation, active student involvement in learning, creating a	M Popular since 2010, it is based on the stages of gamification development	**(Yaniaja et al., n.d.)**

		and achievements.	‘state of flow’ in learning, improving effectiveness and efficiency in learning.	(planning analysis, development, implementation, and evaluation), supports the digital era approach to education, increases attention to user experience (UX), and makes learning effective.	
4.	Implementation of Gamification as Educational Management for Learning Motivation	*Reward*, poin, *leaderboard*, *ilearning (iDu, iMe*, *Rinfo*), level dan challanges	Increased active participation of students, a more enjoyable learning atmosphere, and improved student achievement index.	Using iDu (Learning Education), iMe (Learning Media), Rinfo (Rahaja Info), and currently designing a process to expand the platform to all universities in Indonesia.	**(Sunarya et al., 2019)**
5.	The effectiveness of gamification in lecture information systems: an innovative approach	*Leaderboard, badge, skill*, narasi dan *quest*.	Improving student motivation, increasing student participation, and the Learn Up interface and features greatly assist the learning process.	The method used is waterfall (observation, analysis, design, implementation, and evaluation), and the learn up feature was developed to assist Figma.	**(Rizqullah et al., 2025)**

Source: Previous research findings

The five studies above show that elements such as points, badges, and leaderboards are the most widely used gamification components, followed by challenges, missions, and narratives. The application of gamification in LMS is not limited to symbolic rewards but also creates a healthy, competitive, and collaborative atmosphere among students. Overall, the data presented has been processed into a representative synthesis of findings and organized in a table format for easier understanding.

The integration of gamification in LMS is not merely a technological innovation but is closely related to learning motivation theories such as Self-Determination Theory, which emphasizes the importance of competence, autonomy, and relatedness as drivers of intrinsic motivation (M. Farian Faijel et al., 2024). In all findings, it is evident that elements such as points, badges, and leaderboards serve to foster a sense of competence, while challenges and missions support the formation of more meaningful learning objectives. This aligns with the idea that when students feel they can (competence), have control over the learning process (autonomy), and feel connected to the learning community (relatedness), they are intrinsically motivated to engage in the learning process.

Faculty involvement in designing and implementing learning is one of the crucial elements that determine the effectiveness of LMS in shaping students as independent learners. If faculty members only use the LMS to upload presentation materials, this is not enough to foster a spirit of independent learning in students. On the other hand, when faculty members actively design interactive learning activities, facilitate online discussions, and provide personalized feedback, this encourages students to become active learners who can reflect on their learning process (Depari et al., 2025).

Based on the results of this literature review study, while it provides broad theoretical insights, it lacks in-depth empirical validation regarding the implementation of gamification-based LMS, leading to a general information presentation. All results presented depend on the quality, consistency, and validity of secondary data from the reviewed articles.

B. Definition of Gamification-Based Learning Management System (LMS)

In general, gamification is defined as the application of game elements and techniques in a non-game context, which has proven to be an effective strategy for increasing student motivation, engagement, and learning retention (Ivander et al., n.d.). Meanwhile, LMS is a digital platform designed to manage, distribute assignments, and monitor online learning activities. In higher education, LMS serves as a component in delivering distance learning and blended learning, and is now widely integrated with academic systems, financial systems, and communication platforms such as Telegram or Zoom.

In principle, the implementation of gamification in LMS has several main objectives. First, to increase student motivation. Second, to strengthen student engagement so that they are not just passive users but also actively explore materials, discuss, and consistently complete assignments. Third, gamification is aimed at improving learning retention and conceptual understanding by stimulating critical thinking and reflection through feedback systems and tiered levels. Fourth, in the context of learning management, gamification helps instructors track students' performance and progress in real time, making the learning process more measurable and adaptive to individual student needs (Garnisa et al., 2023).

The implementation of gamification brings a number of important benefits for both students and lecturers. According to Hendriyanti, the integration of gamification in technology-based learning can encourage an increase in students' intrinsic motivation. The study indicates that gamification elements can foster enthusiasm and increase student participation, as they are designed to recognize efforts and achievements made during the learning process, rather than solely focusing on the outcome (Zainal Falah et al., 2025) Another benefit is the enhancement of extrinsic motivation, which is the drive to learn that arises from external rewards or recognition. For example, students who complete certain missions or tasks in the LMS can earn badges displayed on their academic profiles or receive additional points as bonus grades integrated into the academic grading system.

Furthermore, findings from previous research indicate that gamification has also been proven to enhance students' emotional and cognitive engagement. Nugroho explains that when an LMS is developed using a project-based approach combined with gamification, such as in the course on Graphic and Visual Media Innovation, students not only become more active in accessing materials but also demonstrate improvements in behavioral and emotional dimensions. Elements such as punishment (penalties for late assignments), rules, and time constraints are used to foster discipline and responsibility (Garnisa et al., 2023).

B. Types of Gratification

Ariani divides the gamification approach in learning into two main types, namely structural gamification and content gamification. Structural gamification focuses on applying game techniques such as point systems, levels, or leaderboards without changing the structure or content of the learning material. This type of gamification aims to encourage active student participation and create a more visually and systemically engaging learning experience without changing the content of the learning material.

On the other hand, content gamification transforms learning materials into a narrative flow resembling a game, complete with challenges, missions, characters, and game scenarios. This approach changes the way content is presented to be more

imaginative and narrative, so that students feel as though they are “playing” while learning. Content gamification is considered more effective for story-based and project-based learning, where students can engage in decision-making and resolve conflicts relevant to the instructional content (Ariani, 2020).

C. Application of Gamification Elements in LMS

The implementation of gamification elements in LMS can be done in various forms, such as:

1. Points and Levels: Award points for each activity completed by students, such as completing quizzes, participating in discussion forums, or uploading assignments. These points accumulate and can take students to the next level.
2. Badges: Visual rewards for specific achievements, such as completing all quizzes in a module or being an active participant in forum discussions.
3. Leaderboard: Displays student rankings based on points earned, activities, or completion of specific missions. This system fosters a spirit of competition and academic pride.
4. Challenges or Missions: Tasks with time limits, specific scenarios, or special challenges that students must complete.
5. Real-Time Feedback: Provides immediate feedback on quiz answers, discussions, or student learning progress.

Research conducted by Febrianto proves that the use of elements such as quests, points, and badges in a non-formal gamified LMS for education can significantly improve student understanding and participation. This approach was carried out using the ADDIE model in the development of the system, so that each stage of learning was designed with consideration for the needs of participants and the effectiveness of their learning experience (Febrianto, 2025).

Among all gamification elements, quizzes are one of the most important features, despite often being perceived as less appealing to students. However, in practice, quizzes are the most powerful tool in fostering cognitive engagement among students. Students are often motivated to seek additional learning resources, read materials more deeply, and ask questions on the LMS forum to complete quizzes effectively. In a gamified learning scenario, quizzes are not merely evaluations but part of the challenges that must be overcome to unlock the next learning stage.

C. Integration of LMS, Academic Systems, and Other Platforms in Higher Education

The success of gamification cannot be separated from the integration of LMS with academic systems and other platforms in the higher education environment. LMS today does not stand alone, but is connected to academic systems (SIAKAD), assessment systems, student attendance, finance, digital libraries, and communication platforms such as Zoom. One example of such integration is the system developed by Indra Lukmana at Al Lathif Islamic School, where a Moodle-based LMS is integrated with a Telegram chatbot. This chatbot provides real-time feedback, sends task notifications, and facilitates direct communication between students and teachers. This integration offers added value in terms of communication efficiency, flexible access, and a more personalized learning experience (Sardi, n.d.).

LMS has proven effective in managing tasks in a more structured manner and helping students organize their study time. However, regular feature updates and increased awareness among students are needed to ensure optimal utilization of the LMS. LMS also provides flexibility in the learning process by facilitating access to materials and assignments, and helping students motivate themselves to learn (Amelia & Suranto, 2025).

In many universities, LMS systems are also beginning to be linked to student academic dashboards, so that achievements in the LMS can be directly reflected in student grade summaries and learning progress. This kind of integration enables the implementation of digital academic badges that are not only visual rewards, but also serve as micro-credentials that can be used for portfolios and academic transcripts.

C. Challenges and Adaptive Strategies in the Development of Gamified LMS

Despite its many advantages, the gamification approach also faces challenges. Not all students respond positively to gamification systems. Students with a reflective learning style, for example, may be more comfortable with individual challenges and written feedback, while competitive students will be more motivated by leaderboards and group missions. Therefore, LMSs need to provide customization options for the learning experience, such as choosing between individual or collaborative mission paths, or selecting a reward system that aligns with students' personal preferences.

Thus, the implementation of gamification in LMSs at higher education institutions is not merely a technological innovation but a strategic pedagogical approach to enhancing the quality and effectiveness of online learning. Through the integration of game elements such as points, badges, quizzes, and leaderboards, students are encouraged to be more active, engaged, and responsible for their learning process. With inclusive and data-driven design support, a gamified LMS not only drives academic achievement but also helps shape character, social skills, and students' readiness to face workplace challenges.

The results of the study show that the main focus of our research lies on points, badges, and leaderboards. These elements encourage students to be more active and produce significant results during the lecture process. Meanwhile, elements such as narration, storytelling, and other social aspects have not been discussed thoroughly by researchers. These elements can also build emotional engagement and deeper personalization of learning.

IV. Conclusion

The implementation of gamification in LMS in higher education has proven to be effective in increasing learning motivation, active student engagement, and learning effectiveness through elements such as points, badges, leaderboards, challenges, and quizzes that create a fun and meaningful learning atmosphere. Gamification strengthens intrinsic and extrinsic motivation through a sense of competence, social connection, and academic reward systems. The success of this approach is influenced by faculty involvement in designing interactive activities and reflective feedback. Therefore, LMS development should prioritize inclusive design, individual and collaborative learning, and student learning style preferences.

The implications of this research indicate that gamification is a strategic pedagogical approach in shaping active and independent learners in the digital age. As a recommendation, universities need to evaluate the effectiveness of gamification regularly, provide customization options, and involve students in the design process to ensure the sustainability of this strategy. Further research is also recommended, focusing on empirical studies of the effectiveness of various types of gamification (structural and content-based) across disciplines and institutions, as well as the development of an adaptive gamified LMS model based on learning analytics data to create a more contextual digital learning system.

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