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GAME ON: EXPLORING MOODLE-BASED GAMIFICATION IN HIGHER EDUCATION THROUGH A PRISMA-GUIDED REVIEW

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ABSTRACT

Gamification has garnered increasing scholarly attention in higher education for its capacity to enhance learner engagement, intrinsic motivation, and academic persistence through the integration of game-based elements such as points, badges, leaderboards, and progress indicators. This scoping review applies the PRISMA-ScR framework to rigorously examine the implementation of gamification in Moodle, a globally prevalent learning management system within higher education institutions. Synthesizing findings from a diverse range of empirical studies, this review identifies dominant gamification mechanics, evaluates their pedagogical effectiveness, and discusses the methodological and technical considerations associated with their deployment. Emphasis is placed on the outcomes related to student performance, satisfaction, and skill development. The review also delineates implementation challenges, offering critical insights and evidence-based recommendations for educators, instructional designers, and policy stakeholders interested in advancing digital pedagogies through gamified approaches in Moodle-enabled environments.

KEY WORDS

blended learning, educational technology, gamification, Moodle, PRISMA model

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INTRODUCTION

The application of game-design elements such as points, badges, leaderboards, and progression systems in non-game context has become an increasingly prominent pedagogical strategy in higher education. Most referred to as the process of gamification, its rise aligns with a broader effort to transform conventional learning experiences into more interactive, motivating, and learner-centred processes. By capitalizing on the intrinsic appeal of games, educators aim to reshape routine academic tasks into more engaging and rewarding experiences that enhance both cognitive and affective learning outcomes Within education, this concept is refined to denote the intentional integration of selected game elements such as points, badges, levels, challenges, and feedback loops, into learning activities, environments, or instructional systems to influence learner motivation, engagement, and behaviour without transforming the activity into a full-fledged game [1, 2]. Analytical perspectives further emphasise that gamification should be understood as a pedagogical design approach whose effects emerge from the interaction between game elements, learner characteristics, and contextual conditions, rather than from the elements themselves. Taken together, the disciplinary consensus frames gamification in education as a design strategy, distinct from game-based learning, that seeks to shape participation and engagement while leaving the core epistemic structure of the learning task intact [3]. Over the past decade, a growing body of empirical research has suggested that gamification can significantly enhance student participation, interactivity, and academic achievement across a variety of educational contexts [4]. The observed benefits are often underpinned by motivational theories, particularly the Self-Determination Theory (SDT) [5], which posits that optimal motivation arises when individuals experience a sense of competence, autonomy, and relatedness. Gamification strategies in educational settings are often designed with those three needs in mind: points and progress bars offer immediate performance feedback that enhances perceived competence; branching pathways and thematic challenges encourage autonomy by allowing learners to chart their own progress; and collaborative elements such as team-based competitions and leaderboards foster a sense of social connection and relatedness [6, 7].

In digital higher education, Learning Management Systems (LMS) such as Moodle (available at Moodle.org) present fertile ground for gamification. As one of the most widely adopted LMS platforms globally, used by hundreds of millions of learners across universities and colleges, Moodle offers both native gamification functionalities and extensibility through plug-ins. Built-in tools such as completion tracking, conditional activity release, and achievement badges support basic gamified structures, while third-party tools such as Level Up and H5P provide enhanced interactivity, feedback mechanisms, and narrative-based engagement. The mentioned functionalities make Moodle uniquely positioned for scalable, customizable gamification initiatives that can be rapidly deployed and evaluated at scale.

It should be noted that research into Moodle-based gamification has shown promising outcomes. Prior studies report that the incorporation of game mechanics within Moodle environments often correlates with higher student satisfaction, improved performance metrics, and reductions in learning-related anxiety. For instance, [8] observed that learners enrolled in a gamified Moodle course for English language learning exhibited higher motivation and lower anxiety compared to those in a non-gamified control group. These findings are congruent with a broader trend in the literature suggesting that gamified interventions can lead to more positive emotional and cognitive engagement with learning tasks.

However, despite the growing adoption and encouraging results, the effectiveness of gamification in higher education remains an evolving area of inquiry marked by considerable variation in the outcomes. While some studies report robust improvements in academic performance and engagement, others note more modest or transient effects, and several raise

concerns regarding the sustainability of gamification's motivational benefits [9, 10]. Critical factors influencing these outcomes include the instructional context, the pedagogical alignment of game elements, and learners' individual differences and preferences.

This scoping review addresses the pressing need for a comprehensive synthesis of empirical evidence on Moodle-based gamification in higher education. Employing the PRISMA methodology [11], this review applies a transparent and structured approach to the identification, selection, and analysis of relevant academic studies. Specifically, the review seeks to: 1) identify the most implemented gamification mechanics within Moodle, 2) evaluate their impact on learner-level and course-level outcomes, and 3) analyse the prevailing methodological approaches, theoretical frameworks, and implementation challenges. By consolidating current evidence and highlighting best practices, this review contributes a strong foundation for future research and informed practice in the evolving domain of gamified digital education.

PREVIOUS RESEARCH

Early research on gamification in education established a foundational understanding that the inclusion of game-like elements can positively affect student motivation, engagement, and academic behaviours. A seminal review by [3] synthesized a broad body of empirical findings and concluded that gamification generally fosters increased engagement and enjoyment across educational and organizational contexts, though the magnitude of these effects is contingent upon the design quality and contextual appropriateness of the implementation. Building on this foundation, an expanding corpus of research in higher education has investigated the application of gamified strategies across diverse disciplines, including language education, social sciences, and STEM fields, often through LMS environments such as Moodle. A recurrent theme across these studies is that gamification tends to shift learning toward more student-centred, active modes, producing improvements in both the affective outcomes (e.g., motivation, interest, satisfaction) and behavioural outcomes (e.g., participation, time-on-task).

In language learning, particularly in ESL/EFL contexts where repetitive skill reinforcement and affective support are critical, gamification has demonstrated notable pedagogical utility. In a comprehensive scoping review, [12] identified a consistent use of gamified features such as points, badges, leaderboards, and interactive progress tracking in digital ESL/EFL instruction, with positive results in vocabulary development, reading comprehension, and learner motivation. Their findings are reinforced by [13], whose systematic review on gamification in language learning confirmed that gamification enhances both learner engagement and language acquisition. These studies highlight the capacity of gamified systems to mitigate communication apprehension and reduce anxiety, making language learning contexts more inviting and enjoyable [14]. Platforms that embed repetitive practice and feedback within playful digital narratives have been shown to promote learner persistence and content mastery [15]. Such outcomes underscore the dual cognitive and emotional benefits of gamification, particularly when it fosters learner autonomy and offers a tangible sense of accomplishment.

Beyond language instruction, the integration of gamification into Moodle-based courses has produced favourable outcomes across a spectrum of disciplines. In STEM education, for example, [16] demonstrated that engineering students in a gamified flipped classroom setting, where Moodle quizzes were employed with real-time scoring, achieved higher levels of preparatory engagement and superior assessment outcomes than their peers in traditional formats. Likewise, [17] reported increased task completion and student participation in IT courses after integrating Moodle-based gamification systems. [18] similarly found that the use of leaderboards, experience points, and narrative quests within Moodle led to improvements in performance metrics in technical subjects such as programming and 3D modelling. These results indicate that gamification can be adapted across subject domains, with technical courses

often emphasizing competitive quest structures and humanities leaning toward narrative or collaborative mechanics [19]. Across all contexts, however, increased learner persistence and engagement with course content remains the most consistently observed outcome [20, 21].

The impact of gamification on learner motivation and attitudes has also received significant empirical support. Studies frequently employ validated motivational inventories to evaluate how game-based interventions influence intrinsic motivation, perceived competence, and enjoyment. For example, [22] found that learners in a gamified online course expressed stronger intrinsic motivation and described their educational experiences as more satisfying and stimulating. The authors noted that learners viewed badges as authentic indicators of achievement, particularly when instructor feedback reinforced their value. Moreover, gamification can create a stimulating social environment. For example, [23] observed that the introduction of competitive leaderboards in an entrepreneurship course fostered collaborative problem-solving and peer interaction, while [24] found that a cooperative gamification design in a teacher-training course improved group cohesion and self-regulated learning. These studies align with the motivational theory, illustrating how extrinsically oriented students may thrive under competition-based systems, whereas intrinsically oriented students benefit from mastery and collaboration-focused mechanics [6, 9].

However, the literature also documents important caveats and limitations. Not all gamified interventions yield uniformly positive results. In a well-known longitudinal study, [9] reported that the initial gains in engagement and motivation among students in a gamified course diminished over time, ultimately leading to lower academic performance relative to a non-gamified course. They attributed this decline to an overreliance on extrinsic incentives, which may crowd out intrinsic motivation if not pedagogically aligned. Other studies have raised concerns about overly competitive designs, which can alienate lower-performing students or increase performance anxiety [25]. These findings highlight the necessity of thoughtful, context-sensitive gamification design, ensuring that game mechanics are not merely decorative but that they meaningfully reinforce learning goals [4].

Another barrier to effective gamification is the complexity of integrating game elements into established curricula and institutional systems. Technical constraints, limited expertise, and inadequate training can hinder adoption. Research shows that educators often underutilize Moodle's gamification functionalities due to unfamiliarity or lack of institutional support [12]. Designing pedagogically aligned gamified courses requires advanced planning, including the strategic sequencing of tasks and meaningful application of game logic such as conditional module release or progress visualization [26]. Poor alignment of mechanics with learning objectives can result in superficial engagement or even counterproductive behaviours, such as students gaming the system to obtain rewards without engaging meaningfully with the content [27]. Studies also often rely on small samples and short-term interventions, which limits the generalizability and robustness of findings. Furthermore, few studies employ experimental designs with control groups or longitudinal tracking, making it difficult to establish causality [3, 7]. Noteworthy exceptions, such as [8], have employed quasi-experimental methods and found statistically significant improvements in motivation and anxiety reduction, reinforcing the need for more rigorous and long-term inquiry.

Previous research hence suggests that gamification within LMS environments such as Moodle holds significant promise for enhancing engagement, motivation, and academic achievement in higher education. The evidence base spans a variety of learning contexts, with strong support in the domains such as language education and technical disciplines. As it has already been mentioned, when designed and implemented with pedagogical integrity, gamified systems foster more interactive, satisfying, and effective learning environments. However, to fully capitalize on gamification's potential, researchers and practitioners must remain attentive to its

design complexities and ensure alignment with educational objectives and learner diversity. This scoping review builds on these insights by systematically aggregating evidence and illuminating the best practices for Moodle-based gamification in contemporary higher education.

METHODOLOGY

A comprehensive and systematic search strategy was developed to identify relevant peer-reviewed literature examining gamification in Moodle-based higher education contexts. The literature search was conducted across two major academic databases: Web of Science Core Collection and Scopus. Both were selected to ensure broad interdisciplinary coverage and consistent indexing of peer-reviewed literature across education, information science, and educational technology, while subject-specific databases (e.g., ERIC, ACM Digital Library) were excluded to maintain a focused and methodologically coherent search scope.

The search utilized a combination of Boolean operators and carefully formulated keyword strings, including:

("gamification" OR "game-based learning" OR "digital games")
AND ("moodle" OR "learning management system" OR LMS).

The search was restricted to English language articles published between 2010 and 2025, reflecting the period in which gamification gained substantial traction in educational research. In Web of Science, the search was confined to the "Topic" field (encompassing title, abstract, author keywords, and Keywords Plus), while in Scopus, the fields searched included "Title", "Abstract", and "Keywords". To maximise search sensitivity in line with PRISMA recommendations, higher education was not imposed as a search-string filter but was instead applied as a strict eligibility criterion during title/abstract and full-text screening, whereby only studies explicitly conducted with undergraduate or postgraduate students in higher education institutions were included. The final sample size included 42 studies in the review.

STUDY DESIGN

This review adhered to the methodological framework established by the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guidelines [28], alongside the updated PRISMA 2020 reporting standards [11]. The screening and selection process for the eligible studies was documented using a PRISMA flow diagram to ensure methodological transparency and replicability, Figure 1.

To structure the formulation of the review questions and inclusion criteria, the PICOS framework was applied:

- population (P) – undergraduate and postgraduate students enrolled in higher education institutions,
- intervention (I) – implementation of gamified Moodle environments incorporating elements such as points, badges, leaderboards, and narrative quests,
- comparison (C) – traditional Moodle environments without gamified elements, or other non-gamified educational interventions,
- outcomes (O) – learner engagement, academic performance, skill development, and student satisfaction,
- study design (S) – empirical studies employing quantitative, qualitative, or mixed methods designs.

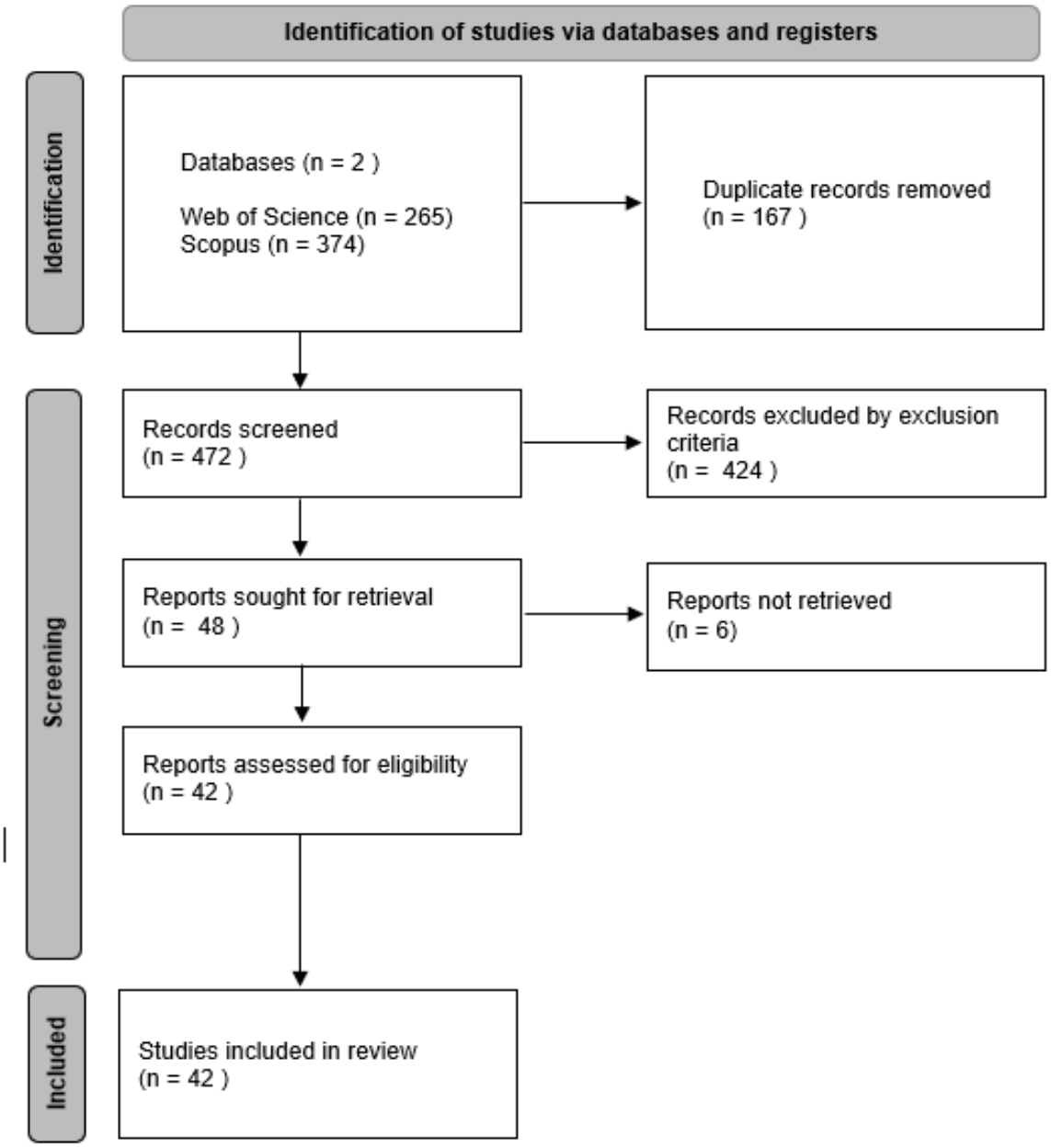

Figure 1. PRISMA flow diagram.

Based on this framework, the guiding research questions for the review were as follows:

- What gamification mechanics are most implemented in Moodle environments within higher education? What learner-level and course-level outcomes are associated with Moodle-based gamification?
- What methodological approaches and assessment metrics dominate the current evidence base?
- Where do critical gaps and limitations persist in literature?

DATA EXTRACTION AND PREPARATION

Data extraction was conducted using a structured and piloted extraction instrument, developed specifically for this scoping review in alignment with the review objectives and the PICOS framework. The spreadsheet included detailed fields designed to ensure comprehensiveness and standardization in data collection. Key categories included:

- identification details – study ID, citation format, publication type (journal article, conference paper, etc.), and country of origin,
- study design and methodology – research paradigms, theoretical frameworks, participant demographics, sample sizes, delivery modes, duration, and institutional context,
- gamification mechanics – detailed descriptions of gamified features used, including specific Moodle functionalities or plug-ins (e.g., Level Up, H5P, completion tracking),
- reported outcomes – both learner-level (e.g., motivation, satisfaction, skill acquisition) and course-level outcomes (e.g., completion rates, performance metrics), as well as statistical significance where applicable,
- quality and bias assessment – judgments concerning methodological rigor, potential sources of bias, and documentation of any limitations,
- implementation facilitators and barriers – technological, pedagogical, or institutional factors that influenced the success or difficulty of gamification deployment.

All studies were independently screened by two reviewers in a two-stage process: first by title and abstract, followed by full-text review. Discrepancies were resolved through discussion and consensus to maintain consistency and reduce selection bias. The resulting dataset provided a robust foundation for thematic synthesis and critical appraisal of trends, methodological patterns, and reported effects within the reviewed body of literature.

RESULTS

As this review adopts a scoping review approach in accordance with PRISMA-ScR, the Results section focuses on a descriptive mapping of recurrent gamification mechanics and design patterns across studies, rather than on quantitative aggregation of their frequency or comparative prevalence.

GAMIFICATION MECHANICS IN MOODLE

The review revealed a range of gamification mechanics frequently utilized in Moodle-based educational environments. Among the most prevalent were badges and points, employed primarily to provide immediate performance feedback and symbolic recognition, thereby reinforcing students' sense of achievement and fostering positive reinforcement [17, 20]. Leaderboards and visual progress indicators, such as progress bars, were also commonly used to stimulate motivation through social comparison and gamified goal setting, encouraging learners to track their advancement relative to their peers [16, 21]. Levels and quests, typically implemented in courses with narrative or thematic structures, were instrumental in enhancing immersion and promoting sustained engagement through storytelling and challenge-based progression [23, 29]. In addition to Moodle's native functionalities, educators frequently employed specialized plug-ins such as Level Up and H5P to create tailored, pedagogically aligned gamification experiences. These tools enabled greater flexibility in the design of feedback loops, branching paths, and interactive content, thereby enhancing instructional coherence and learner agency [18, 30].

LEARNER-LEVEL AND COURSE-LEVEL OUTCOMES

A consistent pattern across the reviewed studies was the positive impact of gamified Moodle environments on both learner-level and course-level outcomes. Enhanced motivation and engagement emerged as recurring themes, with students demonstrating increased participation, persistence, and attentiveness to course content when game elements were present [16, 20]. Academic performance improvements were particularly evident in contexts where game mechanics were directly linked to learning outcomes and reinforced through timely, formative feedback [18, 30]. Beyond cognitive and performance-related gains, several studies reported

skill acquisition in areas such as critical thinking, collaboration, and problem-solving, particularly in project-based and narrative-driven instructional formats [23, 29]. Student satisfaction was also a frequently observed benefit, with learners expressing appreciation for the increased autonomy, interactivity, and recognition afforded by well-designed gamification systems. These factors contributed to the development of more meaningful, rewarding, and student-centred learning experiences [17, 21].

METHODOLOGICAL APPROACHES AND METRICS

The reviewed literature employed a broad spectrum of methodological approaches, with a notable prevalence of mixed methods designs. These studies provided a comprehensive perspective by combining quantitative measurements of learning outcomes with qualitative insights into user perceptions and pedagogical dynamics [16, 21, 23]. Quantitative methods typically involved the analysis of LMS usage data (e.g., login frequency, activity completion), performance assessments (e.g., test scores, assignment grades), and validated psychometric surveys targeting constructs such as motivation, engagement, and satisfaction [18, 30]. On the qualitative side, studies incorporated semi-structured interviews, focus groups, and open-ended surveys to capture student voices, contextualize motivational responses, and identify implementation challenges [17, 29]. Despite the diversity of methods, several limitations persisted. Many studies lacked rigorous experimental controls, such as randomization or well-matched comparison groups, and often omitted statistical reporting of effect sizes or significance levels. This methodological variability constrains the ability to draw generalizable or causal inferences, indicating a critical need for more vigorous empirical designs in future research.

KNOWLEDGE GAPS AND LIMITATIONS

Although the body of evidence supporting gamification in Moodle is growing, several notable gaps remain. Firstly, the long-term effects of gamified learning remain inadequately studied. Most reviewed studies assessed outcomes within a single course or academic term, limiting insights into the sustainability of observed benefits over time [23, 31]. Secondly, there is a scarcity of high-quality comparative studies incorporating control groups or randomized designs, which hinders efforts to attribute causality and delineate the true impact of gamification interventions [7, 30]. Thirdly, questions of scalability and generalizability persist. Most studies were conducted in isolated institutional settings with relatively small and homogeneous samples, making it difficult to extrapolate findings to more diverse learner populations or broader educational contexts [29]. Lastly, while many studies align implicitly with theoretical frameworks such as the Self-Determination Theory, few explicitly operationalize or test these models. This theoretical underdevelopment represents a significant limitation in the literature, as it hinders the formulation of explanatory mechanisms linking gamification design to educational outcomes [21, 24].

A PRACTICAL ROADMAP FOR BRINGING GAMIFICATION INTO ANY MOODLE COURSE

Effectively embedding gamification into Moodle-based courses necessitates a deliberate, theory-informed, and strategically executed instructional design approach. The foundational step involves the precise articulation of pedagogical goals and the establishment of clearly measurable outcomes. Each instructional objective should be explicitly mapped to quantifiable activities, such as the successful completion of quizzes, active forum participation, or peer-to-peer engagement that serve as triggers for the deployment of gamification elements such as badges, experience points (XP), or progression levels [8]. By clearly defining what each gamified element signifies – whether it denotes skill acquisition, content mastery, or learner persistence,

educators can reduce extraneous cognitive load and ensure that students focus on academically meaningful activities. Pedagogical clarity may be enhanced by publishing gamification objectives within the course welcome module and reinforcing them through an introductory quiz that familiarizes students with the reward structure.

ENGAGING LEARNERS

In order to scaffold learning pathways in a coherent and structured manner, educators should harness Moodle's built-in functionalities, particularly its completion tracking and access restriction tools. These functionalities facilitate the sequencing of content based on learner progress and reinforce the principle of mastery learning. When paired with visual cues such as progress bars, these tools help students navigate the course more autonomously while providing a sense of direction and accomplishment, thereby supporting self-regulated learning and intrinsic motivation [8].

Integral to this process is the incorporation of motivational feedback loops. Symbolic rewards, such as digital badges awarded for milestone achievements, including accessing all course materials or providing peer support, can foster a sense of recognition and belonging. Concurrently, XP-based systems, as enabled through the Level Up plug-in, enable incremental reinforcement for sustained effort and consistency. When learners perceive such feedback as meaningful and when these rewards are made visible, either through user profiles or public acknowledgment, their motivational impact is significantly amplified [8, 22].

To maintain learner momentum throughout the duration of the course, it is advisable to integrate low-stakes, mastery-oriented micro-challenges. These can take the form of H5P's interactive video activities or Moodle quizzes that provide immediate, formative feedback and multiple attempts, emphasizing learning through iteration rather than penalization. Such interventions have been demonstrated to minimize cognitive fatigue, increase learner focus, and enhance overall satisfaction by emphasizing growth-oriented progress [8].

Social engagement mechanisms offer another critical vector for gamification. Peer-rating features in discussion forums, cooperative task checklists, and group-based leaderboards can foster collaboration and community building. Evidence suggests that such mechanisms not only enhance autonomous motivation but also improve learners' sense of accountability and social presence. Nonetheless, the implementation of competitive elements such as leaderboards should be approached with caution. To avoid counterproductive competition, educators may choose to either limit leaderboard visibility or replace it mid-course with individualized performance tracking tools designed to highlight personal progress rather than peer comparison [22].

Closing the motivational loop requires the thoughtful integration of analytics and reflective activities. Weekly monitoring of completion data through Moodle's reporting tools enables educators to proactively identify disengaged learners and intervene with targeted nudges or scaffolded recovery activities (e.g., "catch-up quests"). Moreover, reflective journal prompts, e.g. asking students to articulate which actions contributed to their progress or badge acquisition, can deepen metacognitive awareness and reinforce internal motivation [22].

MEANINGFUL IMPLEMENTATION

From the perspective of implementation, educators are advised to begin with Moodle's native tools (e.g., badges, completion tracking, and discussion forums) before progressively incorporating advanced plug-ins such as Level Up, Completion Progress, and H5P. Conducting a pilot run or using a sandbox course environment to test these elements prior to full deployment ensures not only technical compatibility but also pedagogical coherence and accessibility.

As it has been mentioned earlier, to optimize learning outcomes and mitigate common pitfalls, gamification components should be pedagogically meaningful and directly aligned with course objectives. Superficial reward structures, such as points awarded for passive behaviours, should be avoided. Empirical evidence suggests that focusing on a select set of mechanics, such as badges, XP systems, and visual progress tracking, yields greater learner satisfaction and cognitive engagement than deploying an excessive number of disparate game elements [32]. Furthermore, instructional design should be sensitive to the cognitive load theory, segmenting video content appropriately and minimizing distracting visual elements [8]. Equity and inclusion are also paramount, i.e. learning analytics should be leveraged not to rank or penalize students, but to provide adaptive support to those who may require additional guidance or motivation.

A student testimonial shared by [22] clearly illustrates the value of meaningful gamification: "Badges felt like real appreciation, not just a sticker, because they came straight from our professor and showed up in our profile". This sentiment underscores the importance of authenticity in gamified recognition. Educators who invest in professional development opportunities such as Moodle "boot camps" or peer-led training initiatives are more likely to implement gamification strategies with fidelity and pedagogical depth. When executed with intentionality and backed up by empirical evidence, gamification in Moodle can significantly elevate both engagement and academic success across diverse higher education contexts.

CONCLUSION

This PRISMA-guided scoping review synthesized the existing body of empirical literature on gamification within Moodle-based higher education environments, revealing both encouraging trends and enduring challenges. Overall, the evidence supports the notion that gamification, when thoughtfully designed and pedagogically aligned, can be a powerful catalyst for enhancing student engagement, motivation, and academic participation in online and blended learning contexts. Across the studies reviewed, game mechanics such as badges, points, leaderboards, and progress indicators were frequently associated with increased learner interactivity, extended time-on-task, and improved course completion rates. Notably, the students enrolled in gamified courses often demonstrated more positive attitudes toward learning and heightened enthusiasm for course content [17, 21]. In scenarios where gamification strategies were closely linked to explicit learning outcomes and paired with timely, formative feedback, significant improvements in academic performance were also documented [18, 30]. These findings underscore a central insight: gamification is the most effective when employed not as a superficial motivational tool, but as an integrated, evidence-based instructional strategy aligned with learner needs and course objectives.

From a practical standpoint, this review provides actionable insights for educators, instructional designers, and higher education policymakers. For teaching staff and course developers, the evidence highlights specific gamification practices such as the strategic use of completion tracking, conditional activity release, and badge systems that can be implemented with minimal technical overhead but meaningful pedagogical benefit. Simple yet targeted interventions, such as visual progress bars or milestone-based rewards, have demonstrated the potential to elevate learner engagement and autonomy. Moreover, incorporating social mechanics such as collaborative challenges or leaderboard-based quizzes can stimulate intrinsic motivation when carefully balanced with cooperative structures [9, 24]. Instructional designers may also consider enhancing Moodle's native capabilities through the integration of external plug-ins, such as Level Up for XP management or H5P for interactive multimedia. These tools enable greater flexibility and allow for the personalization of learning experiences across various academic disciplines.

Institutional stakeholders and policy leaders are likewise encouraged to invest in faculty development initiatives that support the pedagogically sound adoption of gamification. Training workshops, sandbox environments for experimentation, and incentives for innovative course design can significantly enhance implementation fidelity. Such investments are especially critical given that one frequently cited obstacle is the initial time and knowledge required to design gamified learning environments. At a strategic level, the promotion of gamification aligns with broader institutional goals related to active learning, student retention, and inclusive pedagogy.

Despite these positive outcomes, this review also draws attention to the methodological limitations and research gaps that warrant caution. The limitation that stands out is the predominance of short-term studies, typically confined to a single course or semester, which limits the ability to assess the long-term sustainability of gamification's effects. Questions remain regarding whether initial gains in motivation and performance persist over time or fade as novelty wears off. The generalizability of findings is also constrained by small sample sizes, single-institution case studies, and the frequent use of voluntary participants, many of whom may already possess high digital literacy or intrinsic motivation. Moreover, while this review has aggregated findings from multiple studies, a large portion of the literature continues to lack experimental rigor, particularly the use of control groups, randomized assignment, or longitudinal tracking. This methodological weakness limits causal inference and highlights the need for stronger study designs.

Interpreted through the lens of SDT, the design patterns identified in the Results section reveal distinct pathways by which Moodle-based gamification may support or constrain learners' basic psychological needs. As reported, progress indicators, completion tracking, and formative feedback mechanisms are consistently associated with increased engagement and persistence. From an SDT perspective, these features support perceived competence by making goal structures, performance standards, and incremental achievements salient and intelligible to learners. Similarly, the widespread use of conditional activity release, self-paced progression, and optional learning pathways closely aligns with autonomy support, as these features enable learners to regulate pacing, sequence, and depth of engagement according to individual preferences and capacities. Socially oriented mechanics, including collaborative tasks, discussion-based challenges, and competitive elements such as leaderboards, primarily address the need for relatedness by structuring peer visibility, comparison, and interaction. However, as reflected in the mixed outcomes, several studies indicate that strongly competitive implementations may reduce relatedness for some learners by amplifying social comparison or performance anxiety. Taken together, these findings suggest that the educational effectiveness of Moodle-based gamification is not attributable to the game elements themselves, but to the extent to which specific design configurations align with, or inadvertently frustrate, the core SDT needs. While the reviewed studies rarely operationalise SDT constructs directly, this theory-informed synthesis provides an explanatory framework for understanding the observed variability in engagement and learning outcomes across contexts.

Another underexplored area involves the potential drawbacks of gamification. Although the literature overwhelmingly reports positive outcomes, some studies note that poorly implemented gamification, specially designs overly reliant on extrinsic rewards or competition, can reduce intrinsic motivation, increase anxiety, or alienate students who struggle to keep pace [25]. A more nuanced understanding is needed of when gamification supports learning, when it may hinder it, and how different learner profiles respond to specific mechanics. Moreover, while many studies reference theoretical models such as the Self-Determination Theory, few test these frameworks empirically, leaving a gap between theory and practice. Our review was also limited in scope by its focus on English-language publications and its restriction to Moodle-based higher education contexts. Future reviews should consider broadening their inclusion criteria to encompass different age groups, linguistic settings, and LMS platforms.

Looking ahead, future research should address these gaps through longitudinal studies that track learner behaviour and outcomes across extended timeframes. Such research could, for example, examine the cumulative effects of gamified learning over the course of an academic program and assess whether early gains lead to improved retention, deeper learning, and better student outcomes over time. Comparative studies are also needed to determine which game elements are the most effective for different types of learners and learning goals. Isolating specific mechanics, such as narrative quests versus spaced rewards, could clarify which approaches are best suited to cognitive, affective, or behavioural learning outcomes. Investigating gamification in diverse cultural and institutional contexts could also help establish the global applicability of current findings. Finally, research that incorporates cost-benefit analyses and implementation case studies can assist institutions in determining the scalability and return on investment of gamified interventions.

This scoping review affirms the pedagogical potential of gamification in Moodle-based higher education environments. The aggregated evidence suggests that, when grounded in theory and executed with intentionality, gamification can enrich digital learning by fostering motivation, engagement, and in many instances, improved academic performance. It should be noted that the review reinforces that gamification should not be treated as the end goal, but as a pedagogical strategy that enhances well-structured instruction. As the field of digital education continues to evolve, gamification stands poised to play a central role in shaping more inclusive, motivating, and learner-centred teaching practices. By adhering to evidence-based design principles and remaining attentive to contextual factors and learner diversity, educators and institutions can confidently harness the transformative potential of gamified learning environments.

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