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# Determinants of Students' Continuance Intention Toward Gamified Learning in Higher Education: A Systematic Review

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**Abstract**

The increasing adoption of gamified learning platforms in higher education has raised significant interest in understanding the factors that influence students' continuance intention to use these systems beyond initial engagement. While numerous investigations have underscored the immediate advantages of gamification in enhancing motivation and learning outcomes, the enduring nature of student engagement within gamified settings has received comparatively scant attention. This research aims to systematically identify and synthesize the factors influencing university students' intention to continue using gamified learning platforms in higher education. Using a quantitative methodology and adhering to the PRISMA protocol, a systematic literature review was conducted, with data extraction and synthesis focused on motivational, behavioral, and technological factors that affect user retention. The analysis indicated that intrinsic motivation, perceived usefulness, engagement quality, and adaptive personalization emerged as the most reliable predictors of continuance intention. Conversely, extrinsic rewards and competitive components demonstrated positive yet diminishing effects over time, thereby highlighting the necessity for a balanced motivational design. This study contributes to the existing body of knowledge by offering a comprehensive, evidence-based model of continuance behavior within gamified higher education, while also contextualizing the findings within the digital learning environment. Consequently, the results provide valuable insights for educators, instructional designers, and policymakers aiming to foster sustainable student engagement through gamification.
**Keywords:** Systematic Review, Gamification, Continuous Intention, Learning Platform, Higher Education Students

## Introduction

Gamification has become one of the most innovative developments in higher education, with the aim of enhancing learning outcomes, motivation, and engagement (Baah et al., 2023). Evidence indicates that students' continuous usage or continuation intention remains inconsistent over time, despite the widespread use of gamified learning management systems (LMS) and educational applications (Aguilos & Fuchs, 2022). Many students initially express enthusiasm for gamified platforms, but their motivation often declines as novelty fades or extrinsic rewards lose their appeal (Daliranfirouz et al., 2024). This kind of behavior raises a significant empirical question: while gamification can successfully boost short-term engagement, it is unclear what factors sustain long-term involvement among college students, particularly in digital learning environments that increasingly rely on gamified LMS (Ishaq et al., 2024).

Recent research has offered significant perspectives on the psychological and educational processes inherent in gamified learning environments. Specifically, Serna et al.

(2021) and Ding and Zhang (2025) demonstrated that dynamic and adaptive gamification strategies, through the implementation of personalization and feedback loops, can enhance learner engagement. Similarly, Ahmed and Asiksoy (2021) showed that gamified flipped classrooms enhance innovation skills, while Dabbous et al. (2022) proven motivating tools that gauge students' interest in learning in game-based environments. Moreover, Bai et al. (2022) emphasized the potential of narrative and fantasy elements to sustain attention and quality of interaction. However, rather than continuance intention the willingness of learners to continue using gamified platforms beyond initial exposure. We have studied these dynamics in the context of higher education in underdeveloped countries, where cultural learning orientations, digital literacy, and technological access may change motivating responses (Leung et al., 2023).

While previous studies, including Baah (2023), have shown that gamification can enhance learning outcomes and student motivation, a significant gap remains in understanding the determinants of university students' continuance intention. Although theoretical frameworks such as Self-Determination Theory (SDT) and Gamified Learning Theory proposed by Zaric (2021) emphasize the interaction between intrinsic and extrinsic motivations, empirical studies often examine these factors separately. As a result, little research has examined the combined effects of user experience, perceived usefulness, and intrinsic enjoyment on continued engagement with gamified learning platforms (Palomino et al., 2022). Furthermore, much of the existing evidence is derived from controlled or experimental settings, which may limit external validity (Yang et al., 2023). Therefore, a systematic synthesis of existing findings is needed to identify consistent predictors of continuance intention across diverse gamified learning systems and to contextualize them within the sociocultural and technological landscape of higher education student.

To fill these gaps, the current study systematically examines empirical data on factors affecting students' intention to continue using gamified learning platforms through a Systematic Literature Review (SLR) guided by the PRISMA methodology. In particular, the following research questions are the focus of this study:

1. What factors influence the continuance intention to use gamified learning platforms among active university students?
2. How do intrinsic and extrinsic motivational factors affect students' continuance intention toward gamified learning platforms?
3. How does adaptive gamification design influence user engagement and continuance intention in higher education?

This project aims to create a complete conceptual framework to support future empirical research. It will also map the relationship between behavioral, technological, and motivational factors, and combine different research findings using this structured approach (H. M. M. Ahmed et al., 2025).

This study distinguishes itself from prior research, which has largely concentrated on the effects of individual platforms or short-lived motivational factors, by providing a systematic synthesis of the factors influencing continuation intention within gamified higher education settings. Unlike earlier meta-analyses, this research incorporates perspectives from behavioral engagement, motivational psychology, and technology acceptance models to contextualize gamified learning within the educational landscape (Vanacore et al., 2023). This investigation enhances transparency and replicability within educational technology research by adhering to PRISMA guidelines and employing statistical mapping to delineate correlations across various dimensions. The findings are expected to broaden theoretical understanding of gamified learning persistence and provide actionable insights for educators, instructional designers, and policymakers seeking to establish enduring gamified ecosystems within higher education.

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## Method

This systematic literature review was conducted following the guidelines of Lockwood and Oh (2017) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Page et al., 2021). The research questions were created using the PICOT framework, which helped to ensure a structured and clear review process.

To ensure that only relevant, valid research that is in line with the focus of the study is analyzed, Inclusion criteria were developed, covering:

1. Focused on gamified learning or adaptive gamification in higher education.
2. Addressed continuance intention, motivation, engagement, or user experience as variables.
3. Published in peer-reviewed journals (Q1–Q3 Scopus indexed) between 2021–2025.
4. The research model was clearly defined, and full-text access was provided
5. University students, specifically.
6. Publications in English.
7. Employed quantitative, mixed-method, or experimental design.

Since each database has its own search strings, as shown in Table 1, a custom query was used to identify records that met the inclusion criteria.

Table 1. Search String

| Database | Search String |
|---|---|
| Google Scholar | (“Adaptive” OR “Flexible”) AND (“Gamification” OR “Game-based Learning”) AND (“Motivation” OR “Engagement” OR “Participation” OR “Involvement”) AND (“Academic” OR “Learning Outcomes” OR “Educational Performance”) AND (“Higher Education” OR “Undergraduate” OR “University Student”) |
| ACM | (“Adaptive” OR “Flexible”) AND (“Higher Education” OR “Undergraduate” OR “College student” OR “University student”) AND (“Gamification” OR “Game-based Learning”) AND (“Motivation” OR “Engagement” OR “Participation” OR “Involvement”) AND (“Academic” OR “Learning Outcomes” OR “Educational Performance”) |
| IEEExplore | (“Adaptive” OR “Flexible”) AND (“Higher Education” OR “Undergraduate” OR “College student” OR “University student”) AND (“Gamification” OR “Game-based Learning”) AND (“Motivation” OR “Engagement” OR “Participation” OR “Involvement”) AND (“Academic” OR “Learning Outcomes” OR “Educational Performance”) |
| ScienceDirect | (“Adaptive Gamification” OR “Personalized Gamification” OR “Flexible Gamification”) AND (“Undergraduate” OR “Higher Education” OR “University Student”) AND (“Motivation” OR “Engagement”) |

The population of this study comprised peer-reviewed journal articles that investigated the use of gamified learning systems in higher education. The unit of analysis was the research article, while the implicit subject population represented undergraduate students participating In gamified or adaptive learning environments. As shown in the PRISMA flow (see picture 1), the identification phase retrieved a total of 1.283 records from major databases: ACM (n = 667),

IEEE Xplore (n = 74), ScienceDirect (n = 42), and Google Scholar (n = 500). Prior to screening, 455 records were removed, including 432 without identifiable authors and 24 duplicates. The remaining 827 records were screened for relevance, leading to the exclusion of 754 non-relevant papers based on title and abstract. A total of 73 reports were then sought for full-text retrieval, of which 39 could not be accessed. Following the eligibility assessment, a thorough examination of 34 studies was conducted, resulting in the exclusion of seven studies for non-compliance with the inclusion criteria: five were non-adaptive, and two did not include undergraduate participants. Subsequently, thematic analysis and narrative synthesis were employed to analyze the remaining papers, with the aim of identifying trends, establishing connections, and pinpointing areas for further research. The PRISMA diagram (Figure 1), which visually represents the process of reducing the literature from an initial pool of 1,283 research articles to the 27 studies ultimately included in this review, illustrates the overall identification and selection process.

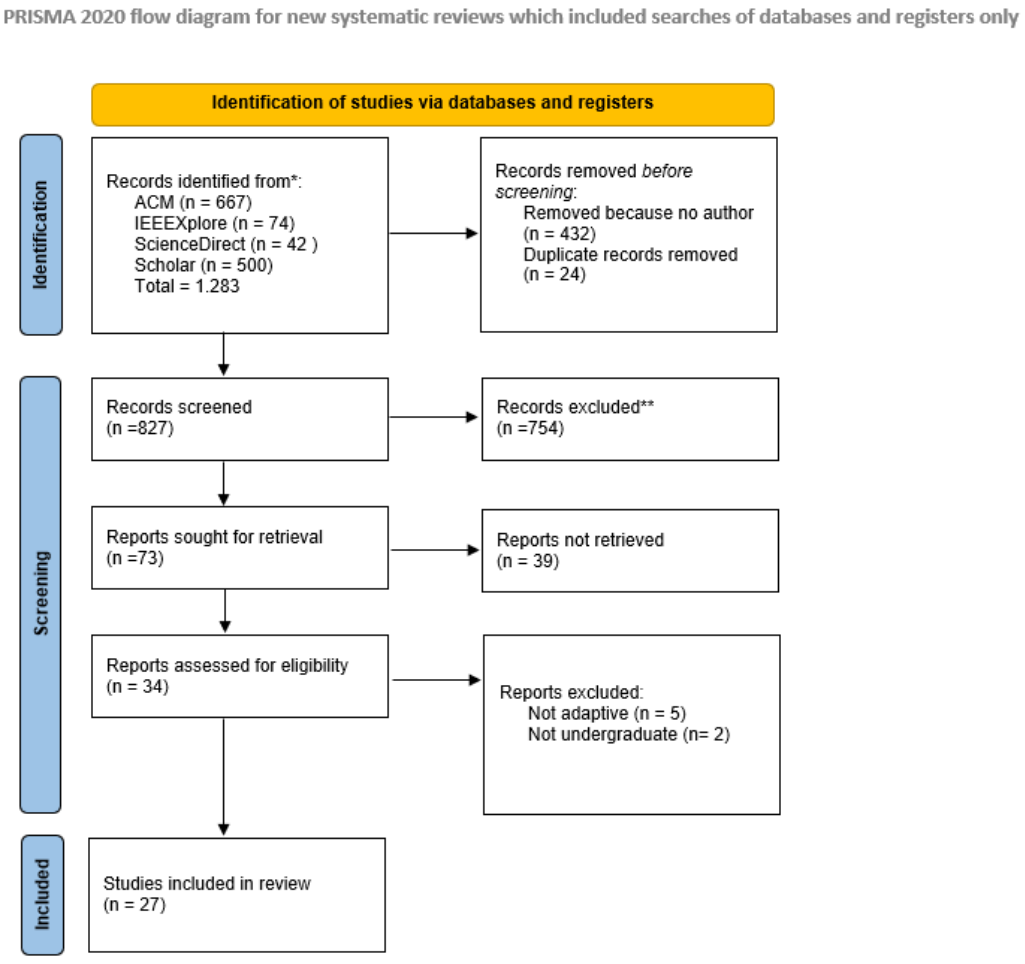



Figure 1. Search Process with the PRISMA Framework

The extraction phase utilized the 27 identified records, with data entered into a standardized Microsoft Excel form. This process involved documenting key study characteristics, such as the initial author, title, publication year, country, and study design, as well as population demographics and the specific intervention or exposure. Furthermore, to ensure a comprehensive synthesis of the literature, the extraction focused on identifying predictor and outcome variables, as well as any reported theoretical frameworks and moderating factors.

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## Results

***RQ 1. What factors influence the intention to continue using gamified learning platforms among active university students?***

Figure 2 presents the distribution of outcome variables across the 27 studies reviewed, illustrating the key factors affecting students' sustained use of gamified learning platforms. The data reveal a predominance of research centered on academic achievement and engagement. Specifically, ten studies examined student involvement as the primary determinant of continued use, while eleven studies examined the combined effects of academic outcomes and engagement. Conversely, only one or two studies explored hybrid dimensions, such as engagement achievement and emotional engagement, and a more limited subset of four studies examined academic improvement in isolation.

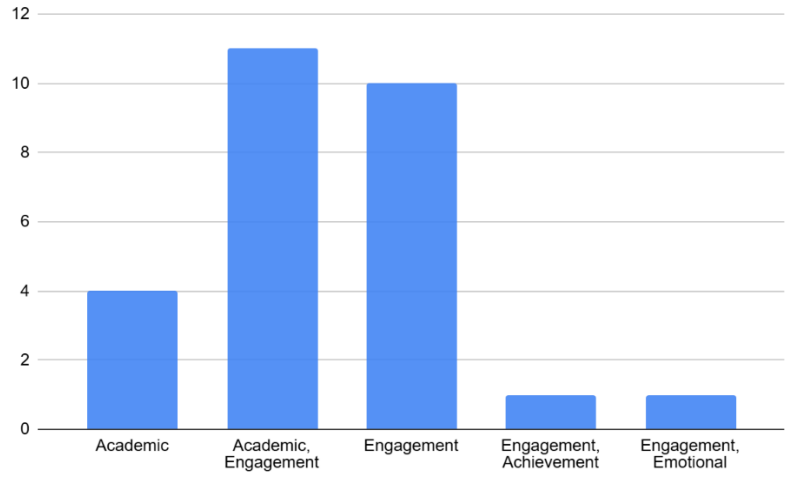



Figure 2. Key factors influencing continuance intention

The observed distribution suggests that constructs associated with engagement, encompassing behavioral, cognitive, and emotional dimensions, represent the most frequently identified precursors to continuance intention. These results are consistent with earlier research indicating that sustained user participation within gamified learning environments is primarily influenced by student involvement and the perceived academic significance (Aguilos & Fuchs, 2022; H. M. M. Ahmed et al., 2025; Baah et al., 2023). Therefore, it can be inferred that the interaction between engagement and academic outcomes forms the central mechanism influencing students' intention to continue using gamified learning systems in higher education contexts. The thematic distribution of variables affecting university students' intention to continue in gamified learning environments is summarized in Table 2. The study's findings showed that most of the research (n=11) combined academic and engagement elements. This suggests that students continued use of these elements depends on both their behavioral engagement and their cognitive learning results. In contrast, the main factors that encouraged continued participation in studies focused only on engagement (n=10) were interaction, motivation, and perseverance. There may be gaps in the study of emotional and performance-based engagement processes, as fewer studies examined the affective or achievement-related aspects of engagement.

Table 2. Thematic Identification of Factors Influencing Continuance Intention

| Theme Category | Description of Focus | Frequency (n) | Representative Studies | Interpretation (Descriptive Summary) |
|---|---|---|---|---|
| Academic | Focus on learning outcomes, knowledge gain, and performance improvement through gamified systems | 4 | (Aldalur & Perez, 2023; Dabbous et al., 2022; Ishaq et al., 2024; Yang et al., 2023) | Academic enhancement is linked with improved satisfaction and continuance through gamified feedback mechanisms. |
| Academic & Engagement | Combined focus on learning outcomes and emotional/behavioral engagement of students | 11 | (Aguilos & Fuchs, 2022; H. M. M. Ahmed et al., 2025; Bai et al., 2022; Choi & Choi, 2021; Kian et al., 2022; Küçükali, 2025; Kuo, 2022; nosir, 2025; Rodrigues & Isotani, 2023; Serna et al., 2021; Zaric et al., 2021) | Studies emphasize that engagement mediates academic motivation, forming the strongest determinant of continuance intention. |
| Engagement | Focused primarily on interaction, motivation, and behavioral persistence in gamified environments | 10 | (H. D. Ahmed & Asiksoy, 2021; Alvi, 2025; Baah et al., 2023; Chávez Holguín et al., 2025; Daliranfirouz et al., 2024; Ding & Zhang, 2025; Leung et al., 2023; Palomino et al., 2022; Serna et al., 2023; Zhumbei et al., 2025) | Engagement emerged as a dominant construct influencing sustained use of gamified platforms. |

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| | | | | |
|---|---|---|---|---|
| Engagement &Achievement | Analyzed the link between engagement levels and achievement goals or performance metrics | 2 | (Shamsudin & Cao, 2025; Vanacore et al., 2023) | Goal-oriented engagement correlates positively with task persistence and retention. |

***RQ 2. How do intrinsic and extrinsic motivational factors affect students' continuance intention toward gamified learning platforms?***

Motivational elements play a crucial role in determining how students sustain their engagement and their intention to persist in using gamified learning platforms. The studies consistently identified intrinsic motivation, encompassing enjoyment, curiosity, autonomy, and competence, as a key factor in fostering enduring engagement (H. D. Ahmed & Asiksoy, 2021; Chávez Holguín et al., 2025). Students driven by self-satisfaction and a sense of achievement demonstrated greater persistence and deeper engagement in learning, which is consistent with Self-Determination Theory (SDT) and Flow Theory; both theories underscore autonomy and enjoyment as essential elements of sustained motivation. Conversely, extrinsic motivation, such as points, rewards, and leaderboards, proved effective in eliciting short-term engagement, yet it frequently failed to ensure long-term continuation unless it was integrated with intrinsic satisfaction (Aguilos & Fuchs, 2022; Baah et al., 2023). Furthermore, several studies emphasized that a combination of internal and external incentives, known as mixed motivation, produced the most stable form of engagement, as external rewards were gradually internalized into self-driven motivation (Daliranfirouz et al., 2024; nosir, 2025).

Figure 3 illustrates the distribution of motivational factors influencing continuance intention. Extrinsic motivation represents 48.1% of the total, followed by intrinsic motivation at 44.4%, while mixed motivation accounts for the remaining 7.4%. This distribution indicates that although extrinsic elements are somewhat more prevalent in gamified learning research, intrinsic factors are nearly as significant, thereby reflecting an increasing focus on self-directed learning. Consequently, these findings suggest that while extrinsic motivators are effective in fostering initial engagement, intrinsic motivation is more influential in maintaining the intention to continue. Mixed motivational strategies integrating rewards with autonomy supportive features were identified as the most effective in maintaining long-term engagement and learner persistence (Chávez Holguín et al., 2025; Daliranfirouz et al., 2024).

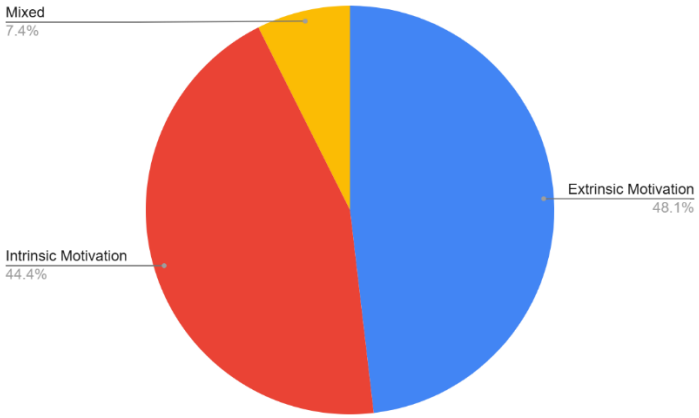



Figure 3. Distribution of intrinsic, extrinsic, and mixed motivational factors influencing continuance intention in gamified learning platforms.

***RQ 3. How does adaptive gamification design influence user engagement and continuance intention in higher education***

Figure 4 illustrates the correlation between diverse interaction modalities and adaptive gamification elements. The data indicate that cognitive engagement elicits the most significant response, followed by behavioral and emotional engagement. This observed sequence suggests that adaptive gamification systems primarily shape students' cognitive processes and information processing during learning experiences, rather than merely impacting their affective states or engagement frequency. This observation aligns with the conclusions of prior research. For example, Leung et al. (2023) research indicated that adaptive goal-setting and tailored feedback within Massive Open Online Courses (MOOCs) fostered enhanced cognitive engagement and improved knowledge retention. Likewise, Holguin et al. (2025) highlighted the positive impact of adaptive mechanisms that promote autonomy and competence on intrinsic motivation, thereby contributing to sustained engagement. Furthermore, Ding and Zhang (2025) additionally demonstrated that cyclical adaptive gamification, characterized by dynamically adjusting challenge levels in response to learner performance, aids in maintaining both flow and cognitive persistence.

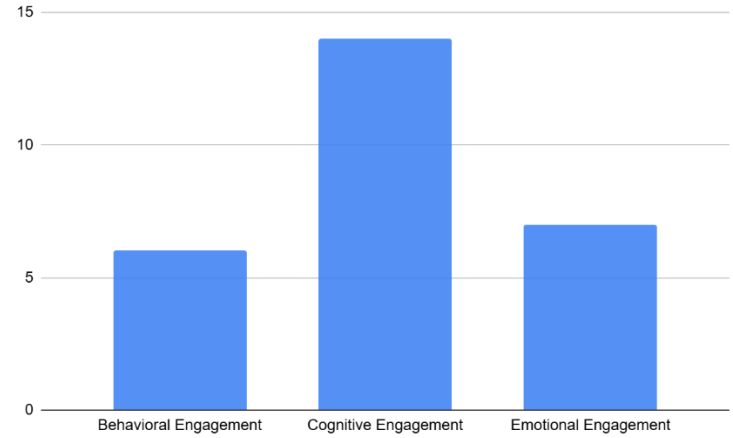



Figure 4. Adaptive gamification enhances student engagement

From a behavioral standpoint, Serna et al. (2023) and Rodrigues & Isotani (2023) demonstrated that personalized challenges and rewards correlate with increased student engagement and reduced attrition in computer science and STEM curricula. This finding aligns

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with Self-Determination Theory (SDT), which holds that when students feel greater levels of competence and autonomy, adaptive learning settings encourage persistent engagement (Paul & Barari, 2022). Emotional engagement while less dominant still plays a supportive role, Aldalur and Perez (2023) discovered that gamification based on adaptive discovery stimulated interest and enjoyment, which in turn influenced the intention to continue. Similarly, Nosir (2025) found that by adjusting feedback severity and tone based on learners' emotional states, AI-driven adaptive systems improved emotional satisfaction. Overall, the examined literature's findings support the notion that adaptive gamification increases engagement through dynamic feedback and personalization. Ahmed et al. (2025), Kuo (2022), and Baah et al. (2023) suggest that systems capable of adapting difficulty levels, providing meaningful rewards, and aligning learning content with individual development can enhance cognitive processing. These mechanisms subsequently promote behavioral persistence and emotional satisfaction. Consequently, in higher education contexts, adaptive gamification emerges as an important approach for sustaining students' continuance intention.

Table 3 presents the temporal distribution of scholarly studies on adaptive mechanisms in gamified learning from 2021 to 2025. An upward trend in the number of studies is observed over this period, indicating growing scholarly interest in gamification in higher education. The majority of the reviewed studies employed a quantitative research design, underscoring the prevalence of empirical and experimental methodologies for evaluating motivational and engagement-related outcomes. Research conducted between 2021 and 2022 primarily focused on foundational elements of gamification, including engagement detection and motivation analysis. Subsequently, in 2023, the emphasis of research shifted towards personalized and time-sensitive engagement strategies within learning environments. Furthermore, research conducted in 2024 concentrated on the examination of adaptive and intrinsic–extrinsic motivation models. By 2025, the focus shifted to AI-powered, cloud-based adaptive gamification, marking a methodological and conceptual transition from static game elements to intelligent, data-driven systems. Overall, the distribution indicates a continuous methodological refinement and a deepening exploration of how adaptive gamification supports students' continuance intention and long-term engagement in higher education contexts.

Table 3. Frequency of Engagement Types Influenced by Adaptive Gamification

| Year | Number of Studies | Research Design/ Methodology | Study Context | Main Focus of Study | Representative Studies |
|---|---|---|---|---|---|
| 2021 | 2 | Quantitative | Higher Education | Dynamic gamification, engagement detection, motivational analysis | (H. D. Ahmed & Asiksoy, 2021; Zaric et al., 2021) |
| 2022 | 6 | Mixed Methods | Higher Education | Perceived usefulness, fantasy gamification, motivation validation | (Aguilos & Fuchs, 2022; Bai et al., 2022; Dabbous et al., 2022; Dederichs et al., 2022; |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Kian et al., 2022; Kuo, 2022) |
| 2023 | 9 | Quantitative | Higher Education | Personalized gamification, engagement over time, discovery learning | (Aldalur & Perez, 2023; Baah et al., 2023; Leung et al., 2023; Palomino et al., 2022; Puig et al., 2023; Rodrigues & Isotani, 2023; Serna et al., 2023; Vanacore et al., 2023; Yang et al., 2023) |
| 2024 | 2 | Quantitative | Higher Education | Intrinsic-extrinsic duality, adaptive learning models, personalization | (Daliranfirouz et al., 2024; Ishaq et al., 2024) |
| 2025 | 8 | Quantitative | Higher Education | Continuance intention, engagement mediation, AI-powered gamification | (H. M. M. Ahmed et al., 2025; Alvi, 2025; Chávez Holguín et al., 2025; Ding & Zhang, 2025; Küçükali, 2025; nosir, 2025; Shamsudin & Cao, 2025; Zhumbei et al., 2025) |

# Discussion

### *Interpretation of Results*

The findings of this systematic review revealed that students' continuance intention to use gamified learning platforms is primarily influenced by a combination of motivational,

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engagement, and adaptive design factors. Across 27 studies examined, intrinsic motivation consistently proved to be the most significant predictor, with engagement serving as a mediating variable that connected motivation to the intention to continue. This suggests that students persist in using gamified platforms not merely for rewards or achievements, but because they find intrinsic enjoyment, relevance, and a sense of competence through adaptive feedback mechanisms. Moreover, the results demonstrate a progressive evolution of gamified learning research between 2021 and 2025, moving from basic motivational experiments to sophisticated AI-based personalization. This indicates that the sustainability of gamified learning in higher education is no longer dependent solely on static reward systems, but on dynamic, learner-centered designs that adjust to individual needs and learning behaviors. In the higher education context, where student engagement often fluctuates due to digital learning fatigue, adaptive gamification can help sustain motivation by aligning the system's challenges with students' skill levels and preferences.

***Comparison with Other Research***

These findings align strongly with previous meta-analyses on the effectiveness of gamification. For instance, Bai et al. (2022) and Daliranfirouz et al. (2024) found that intrinsic motivation was a critical determinant of sustained engagement, consistent with the present review. Similarly, Serna et al. (2023) reported that personalized feedback loops enhance emotional involvement, supporting the argument that adaptive features promote continuance intention by creating meaningful user experiences. However, unlike earlier studies that focused primarily on short-term engagement (e.g., (H. D. Ahmed & Asiksoy, 2021)). This review highlights the long-term dimension of continuance intention. The integration of AI-driven adaptive gamification (as explored by Holguin et al. (2025), Ding & Zhang (2025)) introduces a paradigm shift in which engagement is maintained through system intelligence rather than repetitive reward cycles. Therefore, this review expands the scope of previous work by emphasizing that adaptivity is not gamification itself but rather the actual driver of sustained learning behavior.

***Theoretical Implications***

The results support the ideas of the Technology Continuance Model (TCM) and Self-Determination Theory (SDT) from a theoretical standpoint. According to the SDT concept, competence, autonomy, and intrinsic motivation are important psychological needs that enhance continuation intention when met by adaptive gamified systems. In the meantime, the TCM emphasizes how recurring technology use is influenced by perceived utility and satisfaction. By combining the two frameworks, this study shows how adaptive gamification links technological acceptance theory and motivation theory, yielding a more comprehensive understanding of long-term student involvement in higher education.

***Practical Implications***

Practically speaking, the results provide instructors and instructional designers with insightful information. In digital classrooms, creating adaptive, gamified learning systems that dynamically adjust difficulty levels, offer tailored feedback, and incorporate meaningful rewards can improve student engagement and retention. Adaptive gamification can be a strategic approach to enhancing learning persistence in higher education, especially in hybrid or fully online settings, given the country's diverse learner profiles and varying levels of digital literacy.

***Research Limitations***

This review has a number of shortcomings despite its thorough synthesis. First, although 27 studies were examined, most research may have limitations in terms of cultural generalizability. More localized studies across a broader range of student populations are needed to confirm whether the suggested adaptive elements have consistent effects in

different higher education environments. Second, because the study was primarily quantitative, qualitative insights such as lived student experiences and emotional narratives were underrepresented. Third, despite the optimistic nature of AI-based gamification trends, there remains a lack of long-term empirical validation, as most research has been cross-sectional rather than longitudinal. As a result, care should be taken when interpreting the evidence of causality in continuing intention.

***Suggestions for Future Research***

Future research should examine more closely how adaptive design elements interact with students' psychological demands, especially in higher education. Researchers are urged to:

1. Conduct longitudinal studies to track changes in motivation and engagement over time.
2. Integrate AI and learning analytics to model personalized gamified experiences at scale.
3. Explore qualitative dimensions (e.g., emotional resonance, cognitive absorption) to enrich understanding of engagement sustainability.
4. Examine the ethical and cognitive impacts of algorithmic personalization in gamified education systems.
5. Develop frameworks that combine motivation theory, engagement analytics, and educational data mining to predict and enhance continuance intention more effectively.

## Conclusion

With a contextual focus on higher education, this systematic literature review critically analyzed 27 empirical studies published between 2021 and 2025 to identify factors affecting students' intention to continue using gamified learning platforms in higher education. The results showed that motivational, engagement, and adaptive design aspects interact to shape continuance intention. While engagement served as a mediating construct linking motivational drivers to persistent platform use, intrinsic motivation consistently emerged as the most significant determinant. A clear methodological shift can be observed in research trends over the past five years. Earlier studies primarily focused on static gamification features such as leaderboards and rewards. More recent research, however, emphasizes AI-driven adaptive gamification that personalizes learning experiences based on learners' needs and performance data.

This study advances scientific understanding by bridging motivation theory and technology adoption models, offering an integrative framework that connects Self-Determination Theory (SDT) and the Technology Continuance Model (TCM) within the context of gamified higher education. It emphasizes how adaptive mechanisms meet learners' psychological demands for autonomy, competence, and relatedness, which determines sustainable engagement rather than just gamified features. Adaptive gamification, then, is a significant development in educational technology that shifts user experience design from static interaction to dynamic, data-driven learning ecosystems that promote long-term student retention.

However, this review acknowledges several limitations. First, rich qualitative insights into learners' emotional and behavioral aspects may have been overlooked due to the dominance of quantitative methodologies. Second, even though adaptive gamification has great promise, there remains a lack of experimental and longitudinal validation, necessitating careful interpretation regarding causation.

This study, despite its limitations, contributes to the educational technology field by providing a systematic, evidence-based synthesis of how adaptive gamified learning environments can enhance student motivation, engagement, and the intention to persist. Future research should focus on replicating these findings in the higher education context and exploring AI-assisted,

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longitudinal designs to develop more inclusive, predictive models of sustainable digital learning engagement.

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