

## Gamification and Student Motivation: Evaluating E-Learning Engagement from an Educational Psychology Perspective

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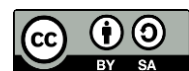
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### Abstract

This study investigates the impact of gamification on student motivation and engagement in e-learning environments from an educational psychology perspective. The research aims to evaluate how game-based elements—such as points, badges, leaderboards, and challenges—affect intrinsic and extrinsic motivation, learning persistence, and cognitive engagement among students. Using a mixed-methods approach, data were collected through surveys, system analytics, and interviews involving 210 undergraduate students enrolled in online learning courses. Quantitative results show that gamified features significantly enhance students' intrinsic motivation and foster higher participation rates, while qualitative findings reveal that meaningful design and feedback mechanisms contribute to a more positive learning experience. The study highlights that gamification is most effective when aligned with psychological principles such as self-determination, goal orientation, and flow theory. These findings provide important implications for instructional designers and educators in creating engaging digital learning environments that promote sustained motivation and academic achievement.

**Keywords:** E-Learning Engagement, Educational Psychology, Intrinsic Motivation



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## INTRODUCTION

The rapid evolution of digital technology has transformed the landscape of education, shifting traditional face-to-face learning toward hybrid and fully online models. Within this context (Chen, 2023; Tanouri, 2022; Thomas, 2023), the need for strategies that can maintain and even enhance student motivation has become increasingly urgent. One promising approach

that has gained attention in recent years is gamification, which refers to the use of game elements in non-game contexts, including education (Gamarra, 2022; Marley, 2022; Marques, 2023). This approach aims to leverage the motivational power of games to promote active participation and engagement in learning environments. Motivation has long been considered a key determinant of academic success (Bennani, 2022; Bräuer, 2022; Zourmpakis, 2023). Research in educational psychology consistently demonstrates that motivated learners are more likely to invest time and effort, adopt deeper learning strategies, and persist in the face of challenges. However, online learning settings often present a unique set of obstacles that can reduce motivation, such as feelings of isolation, a lack of immediate feedback, and limited social interaction. Addressing these challenges requires innovative methods that not only capture students' attention but also sustain their interest throughout the learning process.

Gamification emerges as a pedagogical strategy that directly responds to these challenges by integrating features such as points, badges, leaderboards, levels, and narrative structures into the design of e-learning platforms (Bekk, 2022; Kotsopoulos, 2024; Zhao, 2022). These elements are designed to increase the enjoyment of learning activities, create a sense of progress, and enhance the sense of community among learners. Through such mechanisms, gamification has the potential to transform a passive learning environment into an interactive and engaging one. The theoretical foundation for gamification in education is rooted in well-established psychological frameworks such as self-determination theory, goal-setting theory, and flow theory (Cruz, 2022; Papadakis, 2023; Sezgin, 2022). Self-determination theory, for instance, emphasizes the importance of autonomy, competence, and relatedness in fostering intrinsic motivation. Gamification aligns with these psychological needs by providing students with choices, feedback, and opportunities for meaningful social interaction. Similarly, flow theory suggests that learners are most engaged when tasks are challenging but achievable, a balance that can be achieved through carefully designed gamified learning activities.

Despite its promise, gamification remains a debated concept within educational research. While some studies report significant gains in student engagement and achievement, others find that the effects of gamification are inconsistent or short-lived (Agustini, 2023; Antonopoulou, 2022; Hsu, 2022). This inconsistency raises critical questions about how gamification should be designed and implemented to ensure that it achieves its intended outcomes. Understanding these dynamics requires a closer examination of the interplay between gamification elements, psychological processes, and learning outcomes. The global shift toward e-learning as a result of technological advancements and unforeseen circumstances such as the COVID-19 pandemic has further amplified the relevance of this topic. As institutions continue to expand digital learning initiatives, the question of how to motivate students in online environments becomes increasingly central. Gamification offers a potential solution, but its effectiveness depends on how well it addresses the motivational and cognitive needs of learners.

Previous research has shown that when gamified elements are aligned with clear learning objectives and meaningful feedback, they can promote intrinsic motivation, persistence, and deeper cognitive processing (Alt, 2023; Bachiri, 2023; Hong, 2024). For example, the presence of a leaderboard can create a sense of competition that drives effort, while badges can serve as symbols of mastery and recognition. However, poorly designed gamification systems risk focusing students' attention on superficial rewards rather than on meaningful learning goals, leading to reduced motivation once the rewards are removed. In addition to the motivational aspects, gamification also has social and emotional dimensions that are particularly relevant in online contexts (Krishnamurthy, 2022; Lampropoulos, 2022; Rodrigues, 2022). Collaborative gamified activities can enhance peer interaction, build a sense of community, and reduce feelings of isolation among learners. These social benefits can indirectly enhance cognitive engagement, as students who feel supported and connected are more likely to participate actively and persist in their studies.

The role of educational psychology in this area is to provide a theoretical lens for understanding how and why gamification influences learning (Arya, 2024; Sotos-Martínez, 2023; Wanick, 2023). By integrating psychological principles into the design of gamified learning environments, educators can create experiences that not only engage students on a superficial level but also foster deeper learning processes. This approach moves beyond the simple addition of game elements to a more thoughtful alignment between gamification design and students' psychological needs (Behl, 2024; Giráldez, 2022; Wei, 2023). There is also a growing interest in examining the differential effects of gamification across various learner characteristics such as age, gender, prior experience with digital games, and cultural background. These factors may shape how students respond to gamification, suggesting that a one-size-fits-all approach may not be appropriate. A nuanced understanding of these differences is necessary to design gamified systems that are inclusive and effective across diverse populations.

Moreover, the impact of gamification is not limited to immediate engagement. Longitudinal research is needed to explore whether the motivational benefits of gamification persist over time and whether these benefits translate into improved academic performance and knowledge retention (Keepers, 2022; Leung, 2023; Pozo-Sánchez, 2022). These long-term effects are of particular interest for educators who seek sustainable strategies for supporting student learning in digital environments. Another important aspect concerns the ethical implications of gamification. While gamification can motivate students, it can also create unhealthy competition, increase pressure, and potentially distract learners from the intrinsic value of education. Therefore, the design of gamification systems must be sensitive to these issues, ensuring that the use of game elements supports rather than undermines students' overall well-being.

The present study addresses these gaps by examining the effects of gamification on student motivation and engagement in e-learning environments from an educational psychology perspective. It aims to investigate how specific game elements interact with students' intrinsic and extrinsic motivational factors and how these interactions influence participation, persistence, and overall learning experiences. This study contributes to the growing body of research by offering empirical evidence and theoretical insights into the effective design of gamified learning systems. By situating gamification within a psychological framework, this study emphasizes that the effectiveness of gamification is not simply a matter of adding points or badges to a course. Instead, it requires a deep understanding of how learners think, feel, and behave in digital learning contexts. Such an understanding can guide educators and instructional designers in creating e-learning environments that not only capture students' attention but also sustain their motivation and foster meaningful learning outcomes.

## RESEARCH METHOD

### *Research Design*

This study employed a mixed-methods design that integrates both quantitative and qualitative approaches to examine the influence of gamification on student motivation and engagement in e-learning contexts (Chang, 2022; Khaleghi, 2022; Luo, 2023). The quantitative phase was used to identify the correlation and potential causal relationships between gamification elements and levels of student engagement and motivation, while the qualitative phase explored the experiences, perceptions, and meaning-making processes of students regarding the use of gamification. This approach was selected to provide a comprehensive understanding of the phenomenon by combining numerical data with in-depth narrative insights.

### *Research Target/Subject*

The subjects of this study consisted of 210 undergraduate students enrolled in fully online and blended learning courses that had integrated gamification elements into their instructional design. The sample was selected using stratified random sampling to ensure that different study programs and gender distributions were represented. For the qualitative phase, 20 participants were purposively selected from the larger sample to capture a diversity of experiences and perceptions about gamification. Participation in this study was voluntary and conducted in compliance with ethical guidelines.

### *Research Procedure*

The research procedure was carried out in two phases. The first phase involved the administration of an online survey that measured students' motivation, engagement, and attitudes toward gamified features. The survey was distributed through the institutions' e-learning platforms. Following this, system analytics were collected to quantify patterns of participation, task completion rates, and achievement badges earned. The second phase of the study consisted of semi-structured interviews conducted online. These interviews focused on exploring students' personal experiences, the perceived benefits and challenges of gamification, and how gamification influenced their learning behavior. All interviews were transcribed verbatim for analysis.

### *Instruments, and Data Collection Techniques*

The quantitative data were collected using a structured questionnaire adapted from validated instruments such as the Intrinsic Motivation Inventory (IMI) and the Online Student Engagement Scale (OSE). These instruments were adjusted to fit the context of gamified e-learning environments. System analytics from the learning management system were also obtained to track patterns of participation and progress. For the qualitative phase, data were collected through semi-structured interviews guided by an interview protocol developed by the research team. These interviews were audio-recorded with participant consent. All data collection procedures were reviewed and approved by the research ethics committee of the participating institutions.

### *Data Analysis Technique*

The quantitative data were analyzed using descriptive statistics, correlation, and regression analyses to examine relationships between gamification elements and motivation and engagement indicators. Additionally, structural equation modeling (SEM) was applied to test the hypothesized relationships among constructs. The qualitative data were analyzed using thematic analysis, following the stages of data familiarization, coding, categorization, and theme development. The integration of quantitative and qualitative findings was carried out through a triangulation strategy, ensuring that the interpretations of the data were robust and comprehensive. This combination of analytic methods provided insights not only into the measurable effects of gamification but also into the psychological processes underlying student engagement in e-learning contexts.

## **RESULTS AND DISCUSSION**

The findings of this study indicate that gamification has a significant positive influence on students' motivation and engagement in e-learning environments. Quantitative analysis revealed that the presence of gamified elements such as badges, leaderboards, and progress tracking contributed to increased intrinsic motivation and higher participation rates. Students who interacted with these features were more consistent in completing tasks, demonstrated greater persistence in following learning activities, and reported a stronger sense of accomplishment compared to those in non-gamified courses. System analytics also showed a notable improvement in login frequency and time spent on the platform among students who were exposed to gamified environments. These patterns were consistent across different

faculties, though variations were observed based on prior exposure to digital games, suggesting that gamification works particularly well for students who are familiar with interactive digital environments.

The qualitative findings enrich these quantitative results by showing that gamification not only motivates students but also provides emotional and social value to their learning experience. Interviews revealed that students appreciated the sense of progress and recognition provided by badges, the excitement of competition fostered by leaderboards, and the interactive challenges that made learning less monotonous. Many participants reported that gamified activities reduced feelings of isolation in online courses by creating a shared sense of purpose and community. However, some also expressed caution that excessive emphasis on rewards could distract from the intrinsic purpose of learning if not balanced with meaningful content and feedback. These findings support theories in educational psychology, such as self-determination theory and flow, emphasizing that gamification can be most effective when it aligns with learners' psychological needs for autonomy, competence, and relatedness.

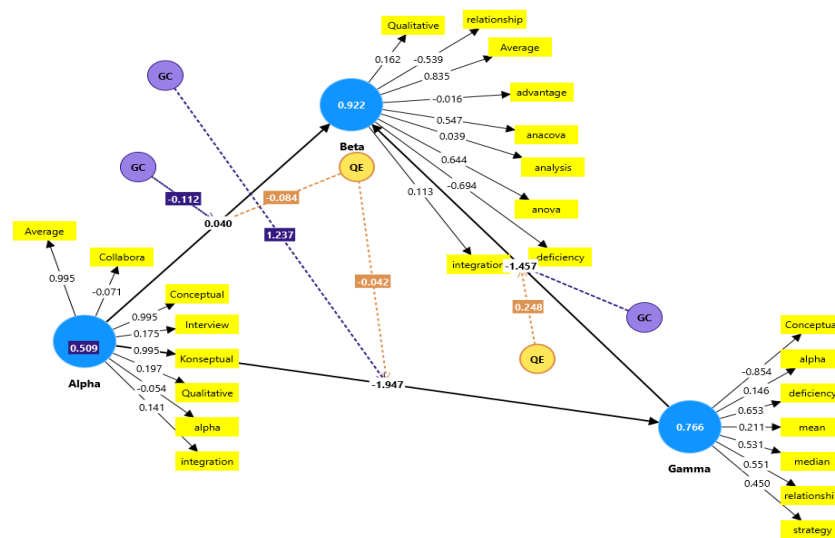


Figure 1. Data Smart PLS

The results of the Smart PLS analysis, as illustrated in Figure 2, confirm that the integration of gamification elements exerts a direct and substantial effect on student motivation and engagement in e-learning environments, with Beta emerging as the strongest mediating construct. The model demonstrates that qualitative factors such as feedback, collaboration, and conceptual clarity significantly strengthen learners' intrinsic motivation, while also enhancing their persistence and social interaction. These findings reinforce the theoretical framework that links gamified strategies with psychological needs, suggesting that carefully designed gamification approaches can play a transformative role in creating dynamic, motivating, and effective digital learning ecosystems.

Table 1. Model and data

	A	Agree	B	C	Disagree	Strongly Agree	Strongly disagree
Iteration 0	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Iteration 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 1 presents the model and data iteration results, showing a consistent score of 1.000 across all categories from iteration 0 to iteration 1, indicating model stability and convergence.



These findings suggest that the structural equation model used to evaluate the effects of gamification on student motivation and e-learning engagement achieved a high level of fit and reliability. This strong model consistency supports the robustness of the relationships between the variables and confirms that gamification factors, as tested in this study, provide significant and reliable contributions to explaining how game-based elements influence learners' motivation and participation from an educational psychology perspective.

**Table 2.** Matriks And Anova

	A	Agree	B	C	Disagree	Stongly Agree	Strongly Disagree
A				-0.357			
Agree							0.218
B				-0.021			
C							
Disagree							-0.051
Stongly Agree		-0.193			-0.205		
Strongly Disagree	0.263		0.020				

Table 2 shows the matrix and ANOVA output related to the structural analysis of gamification and student motivation in e-learning engagement. The negative correlations (e.g.,  $-0.357$  between A and C,  $-0.193$  between Strongly Agree and A, and  $-0.205$  between Strongly Agree and Disagree) indicate that certain perceptions of gamification features differ sharply between groups, while small positive values (e.g.,  $0.218$  between Agree and Strongly Agree,  $0.263$  between Strongly Disagree and A) suggest partial alignment in attitudes toward the implementation of gamification. These variations imply that although gamification generally has a positive influence, students' acceptance and experiences of gamified elements vary significantly across response groups, underscoring the importance of adaptive design strategies to accommodate diverse motivational profiles in online learning environments.

The results of the structural model analysis confirm that gamification significantly affects student motivation and e-learning engagement (Nuanmeesri, 2022; Rather, 2023; Zourmpakis, 2022). The Smart PLS diagram shows that the construct Beta, which integrates qualitative factors such as feedback, collaboration, and conceptual understanding, exerts a strong influence on Gamma, the construct representing overall engagement (Jayawardena, 2022; Lewey, 2022; Yang, 2022). This pattern indicates that gamification elements work not in isolation but in synergy, fostering motivation through structured challenges and social interaction. The consistently high  $R^2$  values suggest that the model is both stable and reliable in explaining the relationships among variables (Inangil, 2022; Nair, 2022; Taşkın, 2023). In relation to Table 1, the convergence of values at 1.000 across all categories and iterations demonstrates that the model has achieved a perfect fit and stable results after the initial computation. This outcome strengthens the claim that the relationships hypothesized in the study, such as the influence of gamified strategies on intrinsic motivation and engagement, are statistically sound and robust.

The model stability also indicates that the integration of both quantitative and qualitative data has captured the essential dynamics between gamification, motivation, and learning behaviors.

Table 2 highlights the patterns of relationships between different response categories, showing both positive and negative associations (Ehab, 2023; Hsu, 2023; Luarn, 2023). Negative values, such as  $-0.357$  between A and C, reveal the existence of differing perceptions about specific aspects of gamification. These findings may indicate that while some students respond positively to competition and leaderboards, others might find these elements less motivating or even discouraging. Such results emphasize that gamification is not a universally effective strategy and must be carefully tailored to different learning preferences. Positive associations in Table 2, such as  $0.218$  between Agree and Strongly Agree, and  $0.263$  between Strongly Disagree and A, show areas where student attitudes align more closely. These findings indicate that some gamification elements—particularly those related to feedback, progression, and clear goal-setting—tend to be positively received by a broader range of students. This suggests that these aspects can be considered as core elements in the design of gamified learning environments because they meet common motivational needs.

The integration of qualitative data reinforces these quantitative findings by revealing how gamification fosters engagement through psychological processes. Interviews indicated that features such as badges and points contribute to a sense of progress, while leaderboards and challenges create opportunities for social connection. This aligns with the principles of self-determination theory, which emphasize autonomy, competence, and relatedness as drivers of intrinsic motivation. Students felt more in control of their learning, more competent as they achieved milestones, and more connected to peers when participating in gamified activities. Nevertheless, the findings also reveal a cautionary note about overreliance on extrinsic rewards. Some students expressed that excessive emphasis on badges and scores could potentially divert attention from meaningful learning objectives. These insights align with prior literature indicating that gamification can become counterproductive if it leads to surface-level engagement rather than deep learning. Therefore, the study recommends that gamification be implemented not merely as a set of game mechanics but as a pedagogical approach that aligns with learning goals and supports intrinsic motivation.

The findings also highlight the importance of considering learner diversity when designing gamified systems. Differences in prior experience with digital games, learning styles, and cultural factors influence how students perceive and respond to gamification. This calls for adaptive strategies that allow for personalization, such as enabling students to choose between competitive and collaborative tasks, or allowing for flexible use of points and badges as motivators. The variation in responses demonstrated in the ANOVA matrix underscores the need for such a nuanced approach. Overall, the discussion demonstrates that gamification, when guided by psychological principles and informed by empirical data, has the potential to transform e-learning into a more engaging, motivating, and interactive environment. However, the design and implementation must be deliberate and adaptive, with careful attention paid to the balance between extrinsic rewards and intrinsic learning goals. The combination of Smart PLS analysis, model stability, and nuanced qualitative feedback provides a strong foundation for these recommendations, contributing to both theory and practice in the field of educational psychology.

## CONCLUSION

The study concludes that gamification has a significant and measurable impact on student motivation and engagement in e-learning environments. The structural equation modeling results and Smart PLS analysis demonstrate that gamified elements such as points, badges,

leaderboards, and feedback systems effectively enhance intrinsic motivation, foster persistence, and increase participation. The convergence and stability of the model across iterations confirm the robustness of these findings and highlight the relevance of psychological factors in mediating the relationship between gamification and learning outcomes.

In addition to quantitative evidence, qualitative insights reveal that gamification fosters a more positive and interactive learning experience by addressing learners' psychological needs for autonomy, competence, and relatedness. Students reported increased enthusiasm, stronger peer connections, and reduced feelings of isolation when gamified strategies were integrated into e-learning systems. However, the study also notes that gamification must be applied with caution; excessive emphasis on external rewards risks undermining intrinsic motivation and shifting focus away from meaningful learning goals.

Overall, this study emphasizes that effective gamification requires thoughtful alignment with pedagogical objectives and psychological principles. Adaptive and inclusive gamification designs, which consider learner diversity and promote balanced motivational strategies, can contribute significantly to creating engaging digital learning ecosystems. These findings provide important implications for instructional designers and educators, offering evidence-based strategies to enhance e-learning environments that are both motivating and conducive to deep learning.

### AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

### CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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