

Gamification in Education: Enhancing Student Engagement and Learning Outcomes

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Abstract

Gamification has emerged as a transformative strategy in educational environments, integrating game-like elements such as points, badges, leaderboards, and challenges to foster student engagement and improve learning outcomes. This study explores the effectiveness of gamification in enhancing student motivation, participation, and academic performance. By reviewing existing literature and analyzing data from gamified courses, the study reveals that gamification significantly increases student engagement and knowledge retention. The research also highlights key benefits, such as fostering a positive learning atmosphere, supporting skill development, and improving student satisfaction. However, challenges such as the over-reliance on extrinsic rewards and insufficient depth for complex topics are identified. The findings suggest that while gamification can be a powerful tool in education, it must be implemented with care, balancing rewards with meaningful educational content and addressing the diverse needs of learners. Future research should focus on the long-term effects of gamification and its integration into different educational contexts, with attention to refining design principles and optimizing the learning experience.

Keywords: Gamification, Education, Student Engagement, Learning Outcomes, Motivation, E-learning, Game Mechanics, Educational Technology

1. Introduction

Gamification refers to the use of game design elements in non-game contexts, such as education, to increase user engagement, motivation, and performance. It has been widely adopted in classrooms and online education platforms to create an immersive and interactive learning experience. In the context of education, gamification aims to harness the inherent appeal of games to make learning more enjoyable and effective. Studies show that gamified learning environments can foster higher levels of student engagement, motivation, and knowledge retention, especially when used to complement traditional teaching methods (Bai, Hew, & Huang, 2020). However, there is still debate regarding the most effective implementation strategies and the long-term impacts on learning outcomes. This paper investigates how gamification can be leveraged in educational settings to enhance student engagement and learning outcomes, while addressing the challenges and limitations that may arise during its implementation.

2. Review of Literature

2.1 Theoretical Foundations of Gamification

Gamification's effectiveness is largely grounded in motivation theories such as Self-Determination Theory (SDT) and Cognitive Load Theory (CLT). SDT emphasizes the role of intrinsic motivation, where students are motivated by the inherent enjoyment of the task, and extrinsic motivation, where external rewards encourage performance (Villalobos-Zúñiga & Cherubini, 2020). CLT, on the other hand, suggests that learning should be structured in a way that minimizes cognitive overload, making gamification an effective tool when properly implemented to present information in bite-sized, digestible segments (Díaz Redondo et al., 2021). By engaging students in a fun, interactive manner, gamification reduces boredom and fosters a deeper connection to the material being taught.

2.2 Impact on Student Engagement and Motivation

Several studies have shown that gamification can significantly increase student engagement and motivation. Bai et al. (2020) conducted a meta-analysis of gamification in educational settings, finding that it improves students' learning outcomes by enhancing their intrinsic motivation and engagement with course content. Furthermore, Camacho et al. (2021) highlighted that gamified elements such as leaderboards, badges, and points increase competition, which can motivate students to perform better. Saleem, Noori, & Ozdamli (2020) also noted that gamification encourages students to actively participate and engage with course materials, increasing the likelihood of successful learning.

2.3 Gamification's Effect on Learning Outcomes

Gamification has been associated with positive academic outcomes, particularly in areas such as knowledge retention, skill acquisition, and academic performance. Huang & Hew (2021) found that students who participated in gamified learning environments demonstrated significantly higher retention rates compared to those engaged in traditional educational methods. This improvement in retention can be attributed to the interactive and engaging nature of gamified tasks, which help reinforce learning through repeated practice and instant feedback. Sanchez et al. (2020) demonstrated that students in gamified classrooms were more likely to retain information and perform better on assessments, highlighting the potential of gamification to foster deeper learning and critical thinking.

2.4 Challenges of Gamification in Education

Despite its benefits, gamification presents several challenges in educational settings. One of the primary concerns is balancing the use of intrinsic and extrinsic motivation. Over-reliance on external rewards, such as points or badges, can undermine intrinsic motivation, leading to decreased engagement once the rewards are removed (Khan et al., 2021). Additionally, the design of gamified activities must align with learning objectives to ensure that students are not merely playing games but also achieving educational goals. Mazarakis (2021) warned against overly complex gamification designs that could overwhelm students, thus detracting from the learning experience. Kamalodeen et al. (2021) pointed out that poorly implemented gamification can lead to frustration and disengagement, particularly if students feel they are being manipulated into playing games rather than learning.

3. Methodology

The research adopts a mixed-methods approach to evaluate the effectiveness of gamification in enhancing student engagement and learning outcomes. By combining quantitative and qualitative data collection methods, the study aims to provide a comprehensive understanding of how gamified learning environments influence student participation, motivation, and academic performance.

3.1. Data Collection

Surveys

The primary method of data collection was through surveys, which included both closed-ended and open-ended questions. The surveys aimed to gather self-reported data on various aspects of gamification, including student engagement, motivation, and satisfaction with gamified learning activities. The survey was administered to students from both educational and corporate settings, ensuring a diverse range of responses.

Interviews

In addition to the surveys, semi-structured interviews were conducted with a subset of students. These interviews allowed for a deeper exploration of students' experiences with gamified learning, focusing on their perceptions of the game mechanics, the challenges they faced, and the perceived impact on their learning outcomes. This qualitative data provided richer insights into how gamification influences student behavior and attitudes toward learning.

Performance Assessments

To assess learning outcomes more objectively, performance assessments were conducted before and after the implementation of gamified elements. These assessments included tests, quizzes, and practical tasks designed to measure knowledge retention, skill acquisition, and academic performance. The pre- and post-test results were compared to evaluate the effectiveness of gamification in improving learning outcomes.

3.2. Sample Selection

The study sampled a total of 200 participants, split between two educational settings: 75% educational participants (150 students enrolled in undergraduate university courses) and 25% corporate participants (50 employees participating in corporate training programs). Participants were selected across three age groups: 18-24 years (30%), 25-34 years (40%), and 35+ years (30%). The gender distribution was balanced, with 50% male and 50% female participants. This sample allowed for a diverse representation of different educational backgrounds, age groups, and gender, providing a broader understanding of gamification's impact on various learner demographics.

3.3. Data Analysis

Quantitative Data Analysis

The quantitative data collected through surveys and performance assessments were analyzed using descriptive and inferential statistics. Descriptive statistics were used to summarize engagement levels, satisfaction, and improvements in learning outcomes. Inferential statistics, such as t-tests and regression analysis, were applied to determine the statistical significance of changes in knowledge retention, skill acquisition, and student engagement before and after the implementation of gamified learning.

Qualitative Data Analysis

The qualitative data from interviews were analyzed using thematic analysis, a method that involves identifying patterns, themes, and key insights from the responses. This approach helped in understanding the nuanced experiences of students, including their perceptions of gamification's effectiveness and challenges. Themes were categorized, and key findings were compared across different educational environments (corporate vs. academic).

3.4. Ethical Considerations

This research adhered to ethical guidelines for conducting studies with human participants. All participants were informed about the study's purpose, and their consent was obtained prior to participation. The study ensured confidentiality by anonymizing responses and securely storing data. Participation was voluntary, and participants had the right to withdraw at any point without penalty. The study was also reviewed and approved by an ethical review board to ensure that all research protocols were in line with ethical standards.

3.5. Limitations

While this study provides valuable insights into the impact of gamification, there are some limitations. The sample size, though diverse, may not be fully representative of all educational settings. Additionally, the study focuses primarily on short-term outcomes, and future research should explore the long-term effects of gamification. There may also be a sampling bias in that participants in gamified courses were likely to be more receptive to gamification, potentially skewing the results. Further research is necessary to explore the effects of gamification in various disciplines and over extended periods.

4. Analysis

4.1 Demographic Profile of the Respondents

Table 1: Demographic Profile of Respondents

Demographic Variable	Number of Participants (N)	Percentage (%)
Educational Participants	150	75%
Corporate Participants	50	25%
Age Group		
18-24	60	30%
25-34	80	40%
35+	60	30%
Gender		
Male	100	50%
Female	100	50%
Total	200	100%

This table provides a snapshot of the demographic characteristics of the participants involved in the study. The total sample consists of 200 participants, with 75% (150) coming from educational settings and 25% (50) from corporate training environments. The age distribution indicates a balanced representation of age groups, with 30% of participants aged between 18-24, 40% between 25-34, and 30% aged 35 or older. The gender distribution is also balanced, with 50% male and 50% female participants, ensuring that the data is representative of diverse groups. This demographic breakdown

is important because it allows for a more generalizable understanding of how gamification affects learners across different age groups, educational backgrounds, and genders.

4.2 Descriptive Analysis

Table 2: Learner Engagement with Gamified Learning

Frequency of Engagement	Number of Participants (N)	Percentage (%)
Daily	80	40%
Several times a week	70	35%
Weekly	30	15%
Less than once a week	20	10%
Total	200	100%

This table presents the frequency with which participants engaged with gamified learning modules. The data shows that 40% of participants engage with gamified learning daily, 35% engage several times a week, 15% weekly, and 10% engage less than once a week. This suggests that gamified learning is highly effective in encouraging frequent interactions with educational content, especially since 75% of participants engage at least once a week. Regular engagement indicates that gamification captures students' attention and fosters a sustained interest in learning, which aligns with findings from Bai et al. (2020), which noted that gamified systems significantly improve learner motivation and participation.

Table3: Effectiveness of Gamification in Knowledge Retention

Statement	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
Gamification improves my ability to retain knowledge.	5 (2.5%)	10 (5%)	25 (12.5%)	75 (37.5%)	85 (42.5%)
I remember what I learned through gamification after one month.	7 (3.5%)	15 (7.5%)	22 (11%)	70 (35%)	86 (43%)
Gamified content is memorable.	4 (2%)	8 (4%)	30 (15%)	62 (31%)	96 (48%)

This table explores the effectiveness of gamification in enhancing knowledge retention. The data shows that over 80% of respondents reported that gamification improved their ability to retain knowledge, with 42.5% strongly agreeing and 37.5% agreeing. Furthermore, 43% of participants recalled what they learned after one month, emphasizing the long-term retention benefits of gamified learning. A significant 48% found gamified content to be memorable, which suggests that the interactive and enjoyable nature of gamified learning contributes to better retention compared to traditional methods. These findings are consistent with the research by Huang & Hew (2021), who found that gamification positively impacts knowledge retention, particularly due to its interactive nature.

Table 4: Improvement in Skill Acquisition through Gamification

Statement	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
Gamification helped me develop new skills.	3 (1.5%)	7 (3.5%)	20 (10%)	70 (35%)	100 (50%)
My job performance has improved due to gamification.	2 (1%)	6 (3%)	18 (9%)	72 (36%)	102 (51%)
I can apply the skills learned through gamification to my work.	4 (2%)	8 (4%)	24 (12%)	62 (31%)	102 (51%)

This table presents the data on the effectiveness of gamification in improving skill acquisition. According to the table, 80% of participants strongly agreed or agreed that gamification helped them develop new skills. Similarly, 87% of respondents felt their job performance improved due to gamification, and 83.5% stated that they could directly apply the skills learned through gamification to their work. These results suggest that gamified learning not only engages students but also helps them develop practical, transferable skills that can be applied in real-world scenarios. This finding aligns with Sanchez et al. (2020), who highlighted the impact of gamification on practical skill development, showing that gamified approaches can bridge the gap between theoretical learning and real-life application.

Table 5: Learner Satisfaction with Gamified Learning Format

Statement	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
I am satisfied with the gamified learning format.	4 (2%)	6 (3%)	18 (9%)	70 (35%)	102 (51%)
The gamified modules are easy to follow.	3 (1.5%)	5 (2.5%)	15 (7.5%)	68 (34%)	109 (54.5%)
The content is well-organized and clear in gamified learning.	4 (2%)	8 (4%)	25 (12.5%)	62 (31%)	101 (50.5%)

This table measures learner satisfaction with the gamified learning format. The results are overwhelmingly positive, with 51% of respondents strongly agreeing that they were satisfied with the gamified format and 35% agreeing. Additionally, 54.5% found the gamified modules easy to follow, and 50.5% agreed that the content was well-organized and clear. This high level of satisfaction indicates that learners appreciate the structure and clarity that gamified learning provides. The findings support the work of Rivera & Garden (2021), who argue that well-designed gamified learning environments improve overall learner experience by making learning more engaging and accessible.

Table 6: Comparison of Gamification and Traditional Learning Methods

Statement	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
Gamification is more effective than traditional learning.	6 (3%)	10 (5%)	20 (10%)	80 (40%)	84 (42%)
I find gamification to be more time-efficient than traditional learning.	5 (2.5%)	7 (3.5%)	18 (9%)	65 (32.5%)	105 (52.5%)
Gamification keeps me more engaged than traditional learning.	4 (2%)	9 (4.5%)	22 (11%)	60 (30%)	105 (52.5%)

This table compares the effectiveness of gamification to traditional learning methods. A significant 82.5% of participants agreed or strongly agreed that gamification was more effective than traditional learning methods. Similarly, 52.5% found gamification to be more time-efficient, and 83% reported that gamification kept them more engaged than traditional methods. These findings suggest that gamification not only enhances learning outcomes but also increases learner engagement and time efficiency. This supports previous studies, such as Huang et al. (2020), which showed that gamified learning tends to be more engaging and efficient in terms of both time and content delivery, leading to better learning outcomes.

Table 7: Challenges with Gamified Learning

Challenge	Number of Participants (N)	Percentage (%)
Lack of interactivity	25	12.5%
Insufficient depth for complex topics	55	27.5%
Limited feedback or guidance during learning	45	22.5%
Difficulty with pacing or scheduling	40	20%
No challenges	35	17.5%

This table highlights the challenges participants faced with gamified learning. The most common challenges reported were insufficient depth for complex topics (27.5%) and limited feedback or guidance during learning (22.5%). These results suggest that while gamification is effective in enhancing engagement, there are areas where improvements can be made, such as providing deeper content for complex subjects and incorporating more feedback mechanisms. Khan et al. (2021) and Mazarakis (2021) highlighted similar concerns, emphasizing that over-simplified content and a lack of feedback can hinder the effectiveness of gamification in educational settings.

4.3 Hypothesis Testing

- **Null Hypothesis (H_0):** There is no significant difference in knowledge retention before and after engaging in gamified learning modules.

- **Alternative Hypothesis (H_1):** There is a significant improvement in knowledge retention after engaging in gamified learning modules.

Table 8: Knowledge Retention Improvement

Test	Pre-Test Mean	Post-Test Mean	t-Statistic	p-value
Knowledge Retention	60%	85%	8.75	<0.001

The pre-test mean score for knowledge retention was 60%, while the post-test mean increased to 85%. The t-statistic was 8.75, and the p-value was less than 0.001, which is below the 0.05 threshold. Since the p-value is less than 0.05, we reject the null hypothesis and confirm that gamification significantly improves knowledge retention.

- **Null Hypothesis (H_0):** There is no significant difference in skill acquisition before and after engaging in gamified learning modules.
- **Alternative Hypothesis (H_1):** There is a significant improvement in skill acquisition after engaging in gamified learning modules.

Table 9: Skill Acquisition Improvement

Test	Pre-Test Mean Skill Score	Post-Test Mean Skill Score	t-Statistic	p-value
Skill Acquisition	68%	90%	7.12	<0.001

The pre-test mean skill score was 68%, and the post-test mean score was 90%. The t-statistic was 7.12, and the p-value was less than 0.001. Given that the p-value is less than 0.05, we reject the null hypothesis and confirm that gamification significantly improves skill acquisition.

- **Null Hypothesis (H_0):** There is no significant difference in student engagement before and after engaging in gamified learning modules.
- **Alternative Hypothesis (H_1):** There is a significant improvement in student engagement after engaging in gamified learning modules.

Table 10: Student Engagement Improvement

Test	Pre-Test Engagement Score	Post-Test Engagement Score	t-Statistic	p-value
Student Engagement	65%	88%	6.52	<0.001

The pre-test engagement score was 65%, and the post-test engagement score was 88%. The t-statistic was 6.52, and the p-value was less than 0.001. Since the p-value is below 0.05, we reject the null hypothesis and confirm that gamification significantly improves student engagement.

5. Discussion

The results of this study highlight the positive impact of gamification on student engagement, knowledge retention, and skill acquisition. Overall, the data confirms that gamification, when

thoughtfully implemented, fosters a more engaging and dynamic learning environment. These findings are consistent with previous studies that have shown that integrating game mechanics such as challenges, rewards, and competition into the learning process can significantly increase student motivation and participation (Bai, Hew, & Huang, 2020; Saleem, Noori, & Ozdamli, 2020). The majority of participants in this study reported higher engagement levels, with 75% engaging with gamified learning content at least once a week. This suggests that gamification effectively maintains student attention and sustains interest, making learning more enjoyable and rewarding. These results align with Huang & Hew (2021), who found that gamification promotes more frequent student interaction with educational content compared to traditional methods.

Furthermore, gamification was shown to enhance knowledge retention, with 80% of participants agreeing that gamified learning improved their ability to retain information. This supports the claims made by Huang & Hew (2021) and Sanchez et al. (2020), who highlighted that gamified tasks reinforce learning through active participation and immediate feedback, leading to deeper retention. The ability of gamification to improve long-term retention is also supported by studies that indicate interactive elements in gamified settings help students revisit material multiple times, improving memory consolidation (Bai et al., 2020; Camacho et al., 2021). These findings are promising, as they suggest that gamified learning environments are not only engaging but also effective in enhancing learning outcomes by reducing cognitive load and improving retention over time (Díaz Redondo et al., 2021).

Despite these positive outcomes, the study also reveals several challenges associated with gamification. The most significant challenges reported were the lack of interactivity in some modules and the insufficient depth of content for complex topics. These issues point to the potential for gamified learning to oversimplify complex material, which may limit its effectiveness for more advanced subjects. Mazarakis (2021) and Khan et al. (2021) similarly cautioned that poorly designed gamification systems might lead to student frustration or disengagement if they fail to align well with learning objectives. It is crucial for educators to ensure that gamification tools are well-integrated with the course material and that they do not substitute depth for superficial engagement. Over-reliance on extrinsic motivators, such as points or badges, was also identified as a concern. Khan et al. (2021) and Villalobos-Zúñiga & Cherubini (2020) emphasize the importance of balancing intrinsic and extrinsic motivation, suggesting that the excessive use of rewards could undermine students' internal motivation to learn.

Moreover, the study demonstrated that gamified learning not only improves academic performance but also leads to enhanced skill acquisition. The findings showed that 87% of participants agreed that gamification helped them develop new skills, and a similar percentage reported improved job performance due to their involvement in gamified courses. This echoes the results found in research by Sanchez et al. (2020), which highlighted that gamified learning can promote critical thinking and problem-solving skills by providing opportunities for students to engage in simulations and real-world scenarios. The positive impact on skill acquisition also aligns with the work of Navarro-Espinosa et al. (2022), who found that gamification could help students build practical, transferable skills that are applicable in both academic and professional contexts.

The findings from this study provide strong evidence that gamification can be a highly effective educational tool for increasing student engagement, improving knowledge retention, and facilitating skill acquisition. However, to maximize its benefits, careful consideration is required in designing

gamified systems that align with educational goals, avoid over-reliance on extrinsic motivation, and maintain the depth necessary for more complex subjects. Future research should focus on exploring the long-term impacts of gamification, particularly in higher education settings, to better understand how game-like elements affect student learning outcomes over extended periods. Additionally, studies should investigate best practices for integrating gamification with other teaching methods to create a balanced and holistic learning experience that supports diverse student needs.

6. Conclusion

Gamification has proven to be an effective tool for enhancing student engagement, motivation, and learning outcomes. The results of this study support previous research, showing that gamified learning environments foster higher levels of participation, improved knowledge retention, and better academic performance. However, careful consideration must be given to the design of gamified activities to avoid over-reliance on extrinsic rewards, which can diminish the effectiveness of gamification in the long term. Future research should focus on exploring the long-term effects of gamification and developing best practices for its implementation across various educational contexts.

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