JBS Nexus

Gamification and Animation in E-Learning: A Case Study on Engagement and Perceived Effectiveness Among Animation Students

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DOI: https://doi.org/10.30880/jbsnexus.2025.02.01.005

Abstract

Despite growing interest in using gamification and animation to enhance online education, limited research addresses how effectively these methods improve student engagement, motivation, and perceived effectiveness in specialized disciplines such as animation technology. This study investigates the role of gamification and animation in enhancing student engagement, motivation, and perceived effectiveness within an e-learning environment. Using a descriptive survey method, data were collected from 86 Diploma in Animation Technology students through structured questionnaires that measured their perceptions and experiences. The findings revealed strong positive perceptions toward animated and gamified content, with students agreeing that these methods significantly improved their understanding, academic performance, critical thinking, and knowledge retention. Furthermore, correlation analysis showed a strong positive relationship ($r = 0.892$) between student engagement and perceived effectiveness of gamification and animation. Thus, this research confirms that strategically integrating gamification and animation in e-learning can substantially enhance student engagement, learning effectiveness, and overall educational experiences.

1. Introduction

In recent years, the rapid advancement of technology has significantly transformed educational methodologies, particularly through the integration of gamification and animation in e-learning. These methods have gained considerable attention for their ability to enhance learner motivation, engagement, and overall learning outcomes (Alsawaier, 2022). Gamification, which incorporates gaming elements such as points, badges, and leaderboards into educational contexts, fosters intrinsic motivation by making learning activities more interactive and enjoyable (Bai, Hew, & Huang, 2020). Similarly, animation effectively simplifies complex concepts by visually demonstrating processes and ideas, resulting in improved simplifies complex concepts by visually demonstrating process and ideas, improving understanding and retention (Rahim, Yusof, & Hashim, 2021).

Despite the growing evidence supporting the effectiveness of gamification and animation, educators and researchers continue to seek greater insights into how these techniques influence student learning and engagement, particularly in specialized disciplines such as animation technology. Research by Park and Kim (2022) underscores that animation helps learners visualize abstract concepts clearly, enhancing memory recall and facilitating deeper learning. Moreover, Akçayır and Akçayır (2021) emphasize the value of animation as an instructional medium that addresses learners' diverse cognitive needs, providing visual stimuli crucial for skill acquisition and conceptual understanding in technical fields. However, existing studies have predominantly examined gamification and animation separately or in general learning contexts. This study advances prior research by specifically exploring the integrated effect of gamification and animation within an e-learning environment, explicitly targeting Diploma in Animation Technology students. Furthermore, it uniquely investigates the correlation between students' engagement levels and their perceived effectiveness of these combined instructional methods, providing deeper insights that could inform specialized instructional practices.

Therefore, this study investigates the perceived effectiveness of integrating gamification and animation in e-learning among Diploma in Animation Technology students, focusing on student engagement, motivation, and knowledge retention. By assessing students' perceptions and examining the relationship between engagement and perceived effectiveness, this research aims to provide valuable insights for educators, instructional designers, and policymakers in optimizing the educational benefits of gamified and animated learning methods. This study contributes to the expanding body of literature advocating for interactive multimedia as an essential component of contemporary educational practices (Saleem, Saeed, & Ahmad, 2023; Zainuddin *et al.,* 2020).

2. Literature Review

Recent studies emphasize the transformative impact of gamification and animation on student engagement and motivation in e-learning environments. According to Alsawaier (2022), gamification significantly enhances students' intrinsic motivation and active participation by leveraging interactive elements such as badges, leaderboards, and reward systems. These components align closely with Self-Determination Theory (SDT) (Deci & Ryan, 2000), which posits that autonomy, competence, and relatedness significantly drive student motivation. Gamified activities can fulfill these psychological needs by promoting a sense of accomplishment, autonomy in learning, and social connectedness among peers (Ishak *et al.,* 2020). Additionally, animations effectively simplify complex topics, enhancing comprehension and retention by reducing cognitive overload, a concept supported by the Cognitive Load Theory (CLT) introduced by Sweller, Merrienboer and Paas,(1998), highlighting how visually appealing animations help students process information more efficiently (Rahim, Yusof, & Hashim, 2021).

Furthermore, the effectiveness of animation as an instructional tool has been critically examined in recent literature. Park and Kim (2022) argue that animations significantly improve memory recall and long-term retention due to their ability to visually demonstrate dynamic processes clearly, thereby aligning closely with the assumptions of CLT. However, Akçayır and Akçayır (2021) caution that poorly designed animations may overload cognitive capacities, thus reducing their instructional efficacy. Therefore, effective animation design requires careful consideration of learner cognitive capabilities and instructional context (Ali *et al.,* 2023). In the context of animation technology education, well-structured animations play a pivotal role in skill acquisition, facilitating a deeper conceptual understanding by visually illustrating complex technical concepts clearly and interactively.

Additionally, combining gamification and animation has proven to yield more positive outcomes compared to traditional e-learning methods. Saleem, Saeed, and Ahmad (2023) highlight that integrating these approaches significantly improves critical thinking, collaboration, and academic performance. However, critical analysis reveals potential challenges, such as students possibly becoming overly reliant on animated and gamified methods, reducing their motivation when exposed to traditional learning methods (Bai, Hew, & Huang, 2020). Based on these critical insights, this study develops a clear hypothesis: Higher levels of engagement and motivation resulting from integrated gamification and animation positively influence students' perceptions of e-learning effectiveness. Thus, the current research contributes to existing knowledge by empirically investigating this hypothesis within the specific context of Diploma in Animation Technology students.

3. Methodology

A clear methodology is crucial and must be prioritized before and during data collection to ensure the success of research (Hair *et al.,* 2021). This study adopts a descriptive survey research design to assess students' perceptions regarding engagement, motivation, and the effectiveness of gamification and animation within an e-learning environment. Researchers collected feedback through structured questionnaires distributed to 86 Diploma in Animation Technology students, selected from a population of 108 using simple random sampling based on the Krejcie and Morgan sampling table (Krejcie & Morgan, 1970).

The questionnaire consisted of three main sections: (i) Demographic Information (4 items: gender, age, semester of study, and frequency of e-learning usage), (ii) Engagement and Motivation (10 items), and (iii) Perceived Effectiveness of Gamification and Animation (8 items). Both Engagement and Motivation and Perceived

Effectiveness were measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) adapted from previously validated instruments by Alsawaier (2022), Rahim *et al.* (2021), and Saleem *et al.* (2023). The distribution of content in the set of questionnaires is shown in Table 1.

Table 1 *Distribution of questionnaire*

Section	Item	No. of Item
A	Demographic Information	4
B	Engagement and Motivation Metrics	10
C	Perceived Effectiveness of Gamification and Animation	8

To determine the relationship between student engagement and perceived effectiveness, Pearson's correlation analysis was conducted. Pearson's correlation was selected due to its suitability in measuring the strength and direction of linear relationships between continuous variables, particularly appropriate for Likert-scale survey data in educational research (Hair *et al.,* 2021).

4. Result and Discussion

The study involved 86 Diploma in Animation Technology students, sampled from a population of 108. The gender distribution was balanced, with 51.2% female (n=44) and 48.9% male students (n=42), ensuring inclusive results. Most respondents were aged between 18–20 years (43%, n=37), followed by those aged 21–23 years (32.6%, n=28), and students aged 24 years and above (24.4%, n=21). This indicates a predominantly young adult group receptive to digital technologies.

Regarding semesters, 40% were from Semesters 3–4, while 30% each were from Semesters 1–2 and 5–6. This balanced semester distribution helps capture diverse perspectives on gamification and animation in e-learning across different stages of study. Most students frequently used e-learning platforms (daily or several times per week). This indicates broad exposure to digital learning platforms among students, presenting significant opportunities to integrate innovative gamification and animated instructional methods, thereby enhancing student motivation, engagement, and perceived effectiveness (De-Marcos *et al.*, 2016; Lee & Hammer, 2011). Table 2 shows the result of the mean value for engagement and motivation in e-learning.

Table 2 *Engagement and motivation*

No.	Item	Mean	Std. Deviation
1	Gamified elements (badges, leaderboards, points) motivate me to complete my e-learning tasks.	3.98	0.83
2	Animated content makes learning more enjoyable and interesting.	4.07	0.84
3	I feel more engaged in my studies when gamified elements are used.	4.06	0.83
4	Animations help me understand complex concepts more easily.	4.05	0.83
5	Gamification increases my interaction and participation in class activities.	3.93	0.82
6	I feel encouraged to learn more when animations are used in learning materials.	3.91	0.82
7	Gamified rewards make me feel more satisfied with my learning progress.	3.91	0.82
8	The use of animation improves my overall learning experience.	3.93	0.81
9	Gamification reduces my boredom during online learning sessions.	3.93	0.82
10	Animated explanations help me retain information better.	3.90	0.81

The analysis of engagement and motivation metrics in Table 2 demonstrated high agreement among respondents on the positive impact of gamification and animation in e-learning environments. Participants strongly agreed that animated content made learning enjoyable and engaging (Mean = 4.07, SD = 0.84), aligning with recent findings by López-Belmonte *et al.* (2020), who indicated that animated content significantly enhances students' engagement and enjoyment in online settings.

Furthermore, respondents felt more motivated and engaged when gamified elements such as badges, points, and leaderboards were incorporated into the learning process (Mean = 3.98, SD = 0.83). This result is consistent with the findings of Alnuaim (2024), who confirmed that gamification substantially increases student motivation and interaction in digital learning environments. Additionally, the students agreed that animation effectively assisted them in understanding complex concepts (Mean = 4.05, SD = 0.83) and improved their overall learning experience (Mean = 3.93, SD = 0.81). This aligns with recent research by Çeken and Taşkın (2025), who found that

multimedia animations positively influenced students' comprehension and knowledge retention in educational contexts.

Lastly, participants reported that gamification reduced boredom and increased their active participation in online class activities (Mean = 3.93, SD = 0.82). Similar findings were reported by Amin, Shamsuddin and Hamzah (2024), emphasizing that gamified learning environments significantly reduce monotony and enhance overall student engagement during online lessons. Overall, these findings support the strategic use of gamification and animation in e-learning to enhance motivation, engagement, and student learning outcomes. Table 3 shows the result of mean value for the effectiveness of gamification and animation.

Table 3 *Perceived effectiveness of gamification and animation*

No.	Item	Mean	Std. Deviation
1	Using animations helps me achieve better exam scores.	3.90	0.84
2	Gamification positively impacts my overall academic performance.	4.00	0.78
3	Animated content significantly enhances my understanding of practical subjects.	3.93	0.82
4	Gamified activities effectively improve my critical thinking skills.	3.99	0.79
5	The integration of animation in learning activities makes me more confident during assessments.	3.90	0.87
6	Gamification and animated content effectively promote collaborative learning.	4.06	0.87
7	Animations clearly convey course content, reducing my confusion during self-study.	4.06	0.83
8	I prefer gamified and animated e-learning methods compared to traditional methods.	3.88	0.80

Based on Table 3, the respondents perceived gamification and animation as highly effective tools for improving their academic experience. Students notably agreed that animations clearly conveyed course content, significantly reducing confusion during self-study (Mean = 4.06, SD = 0.83). This finding supports recent research by Park and Kim (2022), indicating that animation is particularly effective in clarifying complex content and improving student understanding. Similarly, respondents strongly agreed that gamification and animated content effectively promoted collaborative learning (Mean = 4.06, SD = 0.87). This aligns with studies by Alsawaier (2022), suggesting that gamified elements stimulate interactive and cooperative learning among students, thus improving peer engagement and overall academic performance.

Additionally, students agreed that animated content substantially enhanced their understanding of practical subjects (Mean = 3.93, SD = 0.82) and helped achieve better exam scores (Mean = 3.90, SD = 0.84). These perceptions are supported by Sy *et al.,* (2021), who found animation to be instrumental in improving students' performance by enhancing their conceptual understanding and retention.

However, although respondents generally preferred gamified and animated e-learning methods compared to traditional methods (Mean = 3.88, SD = 0.80), this score was slightly lower compared to other items, suggesting a balanced appreciation yet indicating room for integrating traditional methods effectively alongside gamified approaches (Saleem *et al.,* 2023). Overall, the results strongly support the integration of gamification and animation into learning environments as effective educational strategies to enhance academic performance, critical thinking, collaboration, and student engagement.

Before conducting Pearson's correlation analysis, the normality of the variables was assessed using the Shapiro-Wilk test to ensure the appropriateness of using parametric statistical methods. The results indicated that both variables, Engagement and Motivation (W = 0.989, p = 0.716) and Perceived Effectiveness (W = 0.984, p = 0.380), were normally distributed (p > 0.05). Since normality assumptions were met, Pearson's correlation was deemed suitable for analyzing the strength and direction of the linear relationship between these variables (Hair *et al.,* 2021). Table 4 shows the result of normality test (Shapiro-Wilk).

Table 4 *Normality test (Shapiro-Wilk) results*

Variable	Shapiro-Wilk Statistic	p-value	Distribution
Engagement and Motivation	0.99	0.72	Normal
Perceived Effectiveness	0.99	0.38	Normal

Pearson correlation was used to assess the level of significant relationship strength of correlation between the variables namely the level of engagement and motivation and the level of perceived effectiveness. Table 5 presents the guidelines used to interpret the strength of Pearson correlation values in this research.

Table 5 *Correlation Value (Cohen, 1988)*

Relationship strength	Pearson Correlation Values
Small	±0.1 Until ±0.29
Medium	±0.3 Until ±0.49
Big	±0.5 Until ±1.0

According to Cohen (1988), correlation coefficients ranging from ±0.1 to ±0.29 indicate a small relationship, ±0.3 to ±0.49 represent a medium relationship, and ±0.5 to ±1.0 denote a strong relationship between variables. These criteria were utilized in this study to categorize and interpret the strength of the relationship between students' engagement and motivation levels and their perceived effectiveness of gamification and animation in e-learning. Table 6 shows the relationship between engagement and motivation and perceived effectiveness levels of gamification and animation in e-learning.

Table 6 *Relationship between engagement and motivation and perceived effectiveness levels*

	Engagement and Motivation	Perceived Effectiveness
Pearson Correlation	1	0.892
Sig. (2 tailed)		0.000
N	86	86

The correlation analysis revealed a strong positive relationship (r = 0.892) between student engagement and motivation levels and their perceived effectiveness of gamification and animation in e-learning. This result indicates that as students become more engaged and motivated by gamified and animated learning activities, they tend to perceive these methods as more effective in enhancing their academic performance and learning outcomes. this positive correlation underscores the importance of incorporating visually engaging and interactive elements into learning materials. As suggested by Rahim, Yusof and Hashim (2021), animated instructional content not only simplifies complex concepts but also simplifies complex concepts and boosts students' enthusiasm and motivation, significantly influencing their perception of educational effectiveness.

5. Conclusion

This study highlights the positive impact of gamification and animation on student engagement, motivation, and perceived effectiveness within an e-learning context among Diploma in Animation Technology students. Results indicate that students significantly prefer gamified and animated content, as it notably improves their academic experience, enhances their understanding of complex concepts, and facilitates long-term knowledge retention. Furthermore, a strong positive correlation between students' engagement and motivation levels and their perceptions of effectiveness suggests that increased engagement directly enhances perceived learning outcomes. Theoretically, these findings reinforce the applicability of Self-Determination Theory (SDT) and Cognitive Load Theory (CLT) by illustrating how gamification meets students' intrinsic motivational needs, while animations reduce cognitive load, thereby enhancing understanding and retention. Educators and instructional designers are thus encouraged to integrate gamification and animation strategically to increase student participation, foster critical thinking, and optimize educational outcomes. Future research could further explore longitudinal impacts and specific design elements of gamified and animated content to maximize their effectiveness in various educational disciplines.

Acknowledgement

Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

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Author Contribution

*The authors confirm contribution to the paper as follows: **study conception and design:** Muhammad Fazrulhelmi Ahmad, Dzunnur Zaily Mohd Dzulkifli; **data collection:** Mohamad Ridhwan Mohd Zainuddin, Mohd Hatta Md Hani; **analysis and interpretation of results:** Muhammad Fazrulhelmi Ahmad, Dzunnur Zaily Mohd Dzulkifli, Mohamad Fazirul Rafiq Afandi; **draft manuscript preparation:** Muhammad Fazrulhelmi Ahmad, Mohd Hatta Md Hani, Mohamad Fazirul Rafiq Afandi. All authors reviewed the results and approved the final version of the manuscript.*

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