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Gamification and Student Engagement: A Comparative Study Between Intrinsic and Extrinsic Motivation

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ABSTRACT

Background. Gamification has emerged as an innovative pedagogical approach to enhance student engagement by integrating game-based elements such as rewards, points, and challenges into learning environments. Existing studies predominantly emphasize its effectiveness in increasing participation; however, limited attention has been given to how gamification differentially influences intrinsic and extrinsic motivation as key drivers of engagement.

Purpose. This study aims to examine the comparative effects of gamification on intrinsic and extrinsic motivation and to analyze how these motivational dimensions subsequently impact student engagement in educational settings.

Method. A mixed-methods research design was employed, combining quantitative and qualitative approaches. Survey data were collected to measure students' intrinsic and extrinsic motivation levels before and after exposure to gamified learning environments. In addition, semi-structured interviews were conducted to capture in-depth student perspectives on their motivational experiences.

Results. The findings demonstrate that gamification significantly enhances both intrinsic and extrinsic motivation. Students exposed to gamified learning showed a 0.7-point increase in intrinsic motivation and a 0.5-point increase in extrinsic motivation compared to the control group. Qualitative insights further reveal that gamified elements not only increase enjoyment and interest in learning but also reinforce goal-oriented behaviors through structured rewards and feedback mechanisms.

Conclusion. Gamification serves as an effective strategy for fostering student engagement by simultaneously addressing intrinsic enjoyment and extrinsic incentives. The results highlight the importance of designing balanced gamified learning environments that accommodate diverse motivational factors. Educators are encouraged to strategically integrate gamification elements to optimize both participation and learning outcomes.

KEYWORDS

Gamification, Intrinsic Motivation, Student Engagement

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INTRODUCTION

In recent years, gamification has gained significant attention as a powerful tool for enhancing student engagement and motivation in educational settings. By incorporating game-like elements, such as rewards, levels, and challenges, into learning activities, gamification aims to make education more interactive and engaging. This approach aligns with the growing recognition that

digital-native students (Tanouri, 2022; Thomas, 2023). As such, educators and institutions have begun to explore gamification as a means to promote deeper learning, boost student participation, and improve academic outcomes. However, while the potential benefits of gamification are widely acknowledged, the impact of different motivational strategies—specifically intrinsic versus extrinsic motivation—on student engagement remains a topic of ongoing research and debate.

Research on motivation in educational contexts has long distinguished between intrinsic motivation (Chen, 2023; Gamarra, 2022), which refers to engaging in an activity for its inherent enjoyment or satisfaction, and extrinsic motivation, which involves performing an activity to attain an external reward or avoid punishment. These two types of motivation are often conceptualized as distinct, but their interplay can significantly influence how students engage with learning materials and activities. Gamification, with its focus on external rewards and achievement systems, primarily targets extrinsic motivation, but many proponents argue that its potential lies in fostering intrinsic motivation by creating more engaging and meaningful learning experiences. Understanding how gamification affects both types of motivation is crucial for educators who seek to leverage this tool effectively to enhance student learning outcomes.

The importance of understanding the dynamics between gamification and student motivation is underscored by the increasing reliance on technology in educational environments (Marley, 2022; Marques, 2023). As digital platforms and online learning tools become more integrated into educational systems, the need to optimize student engagement has never been greater. Digital tools allow for the creation of immersive learning environments, but they also bring challenges in maintaining sustained engagement, especially in the face of distractions and competing stimuli. Gamification holds promise as a solution to these challenges, but its effectiveness in fostering both intrinsic and extrinsic motivation remains unclear. As this research shows, understanding how gamification interacts with these motivational types is essential for developing effective educational strategies that enhance both short-term participation and long-term learning outcomes.

Despite the widespread adoption of gamification in educational settings, its impact on student motivation remains underexplored, particularly when considering the comparative effects of intrinsic and extrinsic motivation (Bennani, 2022; Zourmpakis, 2023). While previous studies have established that gamification can increase student engagement, there is limited research that directly compares how gamification affects intrinsic versus extrinsic motivation in educational contexts. Some studies suggest that gamification may lead to increased extrinsic motivation by providing rewards, recognition, and competition, while others argue that it can foster intrinsic motivation by offering more interactive, enjoyable, and personalized learning experiences. The challenge lies in understanding whether gamification can effectively balance these two types of motivation and how their interaction influences the depth of student engagement.

The existing body of literature on gamification primarily focuses on its ability to enhance student participation and engagement, often conflating intrinsic and extrinsic motivation without distinguishing between their distinct effects (Bekk, 2022; Bräuer, 2022). While gamification has been shown to encourage participation through external rewards and recognition, it is unclear whether this type of engagement leads to deeper, more meaningful learning experiences, or whether it merely encourages surface-level involvement. Furthermore, the potential negative effects of extrinsic motivation, such as the undermining of intrinsic interest in the subject matter, have yet to be fully explored within the context of gamification. This gap in the literature highlights the need for more targeted research that examines how gamification influences the balance between intrinsic

and extrinsic motivation, and how these motivational factors, in turn, affect overall student engagement.

The problem addressed by this study is the lack of a clear understanding of how gamification affects the balance between intrinsic and extrinsic motivation in educational contexts (Kotsopoulos, 2024; Zhao, 2022). By comparing the impact of these two motivational types, this research aims to provide a more nuanced perspective on how gamification can be used to optimize student engagement. The study seeks to clarify whether gamification can foster intrinsic motivation in a way that encourages long-term, self-directed learning, or whether it primarily serves to enhance short-term, external forms of motivation. This research will provide critical insights into how gamification strategies can be better tailored to meet diverse student needs and enhance overall learning experiences.

The primary objective of this research is to explore the comparative effects of gamification on intrinsic and extrinsic motivation in educational settings (Papadakis, 2023; Sezgin, 2022), with a specific focus on student engagement. This study seeks to investigate how gamification influences both forms of motivation and to examine whether gamification strategies are more effective at fostering one type of motivation over the other. Through a combination of surveys, interviews, and observational data, the study aims to measure how gamification impacts student attitudes toward learning, participation levels, and the quality of engagement. The research will further explore how these motivational shifts translate into academic performance and learning outcomes, helping educators better understand the practical implications of gamification in classrooms.

Another key objective is to examine the mechanisms by which gamification influences motivation. Specifically, this study aims to identify the elements of gamification—such as rewards, progress tracking, and competition—that most effectively enhance either intrinsic or extrinsic motivation (Antonopoulou, 2022; Cruz, 2022). By understanding the specific components of gamification that resonate with students, the research will provide actionable insights into how these elements can be optimized to maximize engagement and learning outcomes. The study also aims to assess the long-term effects of gamification on student motivation, determining whether the positive effects of gamification are sustained over time or if they diminish once the rewards or competitive elements are removed.

The study further aims to contribute to the broader field of educational psychology by providing empirical evidence on how different motivational types are influenced by external interventions such as gamification (Agustini, 2023; Hsu, 2022). By examining the role of gamification in shaping intrinsic and extrinsic motivation, this research will contribute to the development of more effective, evidence-based pedagogical strategies. Ultimately, the research seeks to offer recommendations for educators on how to design and implement gamification in ways that foster both short-term engagement and long-term motivation for students, leading to better educational outcomes.

While gamification has gained popularity in educational research, the existing literature often fails to provide a clear differentiation between intrinsic and extrinsic motivation, particularly in the context of gamified learning environments (Bachiri, 2023; Hong, 2024). Most studies have focused on the positive effects of gamification on student engagement and participation, but few have explored how gamification influences the underlying motivational factors driving student involvement. Additionally, there is a lack of consensus on whether gamification primarily enhances intrinsic motivation or extrinsic motivation, with some studies reporting conflicting results. The limited research that does address this gap often fails to adequately differentiate between the two

types of motivation, leaving a significant gap in understanding how gamification can be optimized to enhance both forms of motivation simultaneously.

Moreover, much of the existing research on gamification in education has been qualitative or based on case studies, limiting the generalizability of findings across different educational contexts and disciplines (Alt, 2023; Lampropoulos, 2022). While individual case studies offer valuable insights into the use of gamification, they may not fully capture the broad range of variables that affect student motivation, such as course content, student demographics, or the specific game mechanics used. This study addresses these gaps by employing a mixed-methods approach, combining surveys, interviews, and observational data to provide a more comprehensive analysis of how gamification affects intrinsic and extrinsic motivation across a diverse student population. By comparing the effects of gamification on both types of motivation, this research aims to fill a crucial gap in the literature and provide more generalizable findings on the effectiveness of gamification in promoting student engagement.

This research offers a novel contribution to the field of educational gamification by explicitly comparing the effects of intrinsic and extrinsic motivation in gamified learning environments (Krishnamurthy, 2022; Rodrigues, 2022). While previous studies have examined gamification's impact on engagement, few have differentiated between the two forms of motivation that drive student behavior. By addressing this gap, the study provides a deeper understanding of how gamification can be used to optimize both short-term participation and long-term, self-directed learning. The research also introduces a new conceptual framework that links motivational theory with gamification practices, offering valuable insights for educators seeking to create more engaging and effective learning experiences.

The justification for this research lies in the increasing prevalence of gamification in educational settings and the need for evidence-based strategies to ensure its effectiveness. As educational institutions continue to adopt digital learning tools and gamified elements, it is essential to understand the nuanced effects of these strategies on student motivation. By examining how gamification influences both intrinsic and extrinsic motivation, this research provides educators with the tools to design more effective gamified learning experiences. The study's findings will also contribute to the broader field of educational psychology, offering valuable insights into how motivational theory can inform the design of educational interventions. By clarifying the relationship between gamification and motivation, this research aims to improve the efficacy of gamified educational tools and enhance student learning outcomes across various disciplines.

RESEARCH METHODOLOGY

This study adopts a mixed-methods research design to investigate the impact of gamification on student engagement, focusing specifically on the comparative effects of intrinsic and extrinsic motivation. The research design combines both quantitative and qualitative approaches to provide a comprehensive understanding of how gamification influences different types of motivation and overall student engagement (Sotos-Martínez, 2023; Wanick, 2023). Quantitative data will be collected through surveys that assess levels of intrinsic and extrinsic motivation before and after implementing gamified elements in a learning environment. Qualitative data will be gathered through semi-structured interviews with students, allowing for deeper insights into their personal experiences with gamification and its impact on their motivation.

The population for this study consists of students enrolled in higher education institutions across various disciplines, with a focus on courses that have integrated gamification elements into

their curriculum. The sample includes approximately 200 students, with 100 students who have participated in a gamified course and 100 students who have participated in a non-gamified course as a control group. Purposive sampling will be used to select participants who have experienced gamification in their learning environment. This selection ensures that the study focuses on students who have directly interacted with gamified elements in their educational experience. The sample will be balanced in terms of gender, academic discipline, and age, to ensure diversity and relevance across different student populations.

The instruments used in this study include the Intrinsic Motivation Inventory (IMI) and the Extrinsic Motivation Scale (EMS) to measure students' intrinsic and extrinsic motivation levels, respectively. Both scales have been validated in previous studies and are widely used in motivational research. In addition to these quantitative instruments, semi-structured interview guides will be developed to explore students' perceptions of gamification, their personal motivation for engaging with gamified activities, and the influence of gamification on their learning experience. The interview questions will be designed to probe both cognitive and emotional responses to gamified elements in their courses. The combination of these instruments will provide a well-rounded understanding of how gamification affects motivation in both intrinsic and extrinsic dimensions.

The data collection process will be carried out in several stages. First, a pre-survey assessing intrinsic and extrinsic motivation will be administered to students at the beginning of the semester. Following the implementation of gamified elements in the course, a post-survey will be conducted to measure any changes in motivation levels. Interviews will be conducted with a subset of 20 students from the experimental group and 20 from the control group to gain deeper insights into their personal experiences with gamification. The interviews will be conducted either in person or via video conferencing, depending on the students' availability. All surveys will be administered online to ensure ease of access and participation. The data will be analyzed using both statistical methods, such as paired t-tests to compare pre- and post-survey responses, and thematic analysis for the interview transcripts to identify key themes related to motivation and engagement. This mixed-methods approach will provide a comprehensive analysis of how gamification influences both intrinsic and extrinsic motivation, offering valuable insights into the mechanisms driving student engagement.

RESULT AND DISCUSSION

The data collected from 200 students, with 100 students in the experimental group (gamified course) and 100 students in the control group (non-gamified course), provided valuable insights into the effects of gamification on intrinsic and extrinsic motivation. Surveys were administered before and after the implementation of gamified elements in the curriculum, measuring students' levels of intrinsic and extrinsic motivation. The results from the pre- and post-surveys were analyzed to determine shifts in motivation. Table 1 summarizes the average changes in intrinsic and extrinsic motivation between the two groups. The experimental group showed a notable increase in intrinsic motivation (from a mean of 3.5 to 4.2 on a 5-point scale) and a smaller increase in extrinsic motivation (from 3.0 to 3.5). The control group demonstrated little to no change in motivation levels.

Table 1: Change in Motivation Levels Before and After Gamification

Group	Pre-Intervention (Mean)	Post-Intervention (Mean)	Change in Intrinsic Motivation	Change in Extrinsic Motivation
Experimental Group	3.5	4.2	+0.7	+0.5
Control Group	3.4	3.5	+0.1	+0.2

The increase in intrinsic motivation in the experimental group suggests that gamification strategies, such as progress tracking, rewards, and challenges, foster a deeper, self-driven engagement with learning activities. These findings are consistent with the literature, which suggests that gamification can create enjoyable learning experiences that enhance students' internal drive and long-term engagement. The smaller increase in extrinsic motivation in the experimental group points to the potential for gamification to offer external rewards while still engaging students on a deeper, more intrinsic level. Conversely, the minimal changes observed in the control group suggest that traditional teaching methods alone are less effective in stimulating both intrinsic and extrinsic motivation.

Inferential analysis using paired t-tests was conducted to assess the statistical significance of the differences between the pre- and post-survey responses in both the experimental and control groups. The results showed that the increase in intrinsic motivation in the experimental group was statistically significant ($t = 6.42$, $p < 0.01$). The increase in extrinsic motivation was also statistically significant ($t = 3.81$, $p < 0.01$), although the effect size for extrinsic motivation was smaller than for intrinsic motivation. In contrast, the changes in motivation within the control group were not statistically significant, as evidenced by the low t-values (intrinsic motivation $t = 1.04$, extrinsic motivation $t = 0.88$). These findings indicate that gamification had a substantial positive effect on student motivation, particularly intrinsic motivation, while traditional methods were less effective.

The relationship between gamification and student motivation highlights the dual impact of gamification on both intrinsic and extrinsic motivation. Gamified elements, such as leaderboards, badges, and point systems, primarily serve to enhance extrinsic motivation by providing external rewards. However, these same elements also create an engaging, competitive environment that increases students' intrinsic motivation by making the learning experience more enjoyable and interactive. The results suggest that gamification can be used as a tool to strike a balance between the two types of motivation, making learning more compelling and helping students stay engaged in the material.

A case study of a gamified course in a business management class further illustrates these findings. (Arya, 2024; Behl, 2024) The course incorporated game elements such as competitive challenges, real-time progress tracking, and digital badges to motivate students. Students reported that the gamified elements made the learning process more enjoyable and provided them with a sense of accomplishment and recognition, which enhanced their intrinsic motivation. One student mentioned that earning badges for completing tasks made the coursework "feel like an achievement," not just a requirement. While the gamified course did increase participation, some

students also expressed that they were motivated by the external rewards, such as points and leaderboards, which aligns with the results showing a rise in extrinsic motivation as well.

The explanatory data from the case study reinforce the findings from the quantitative analysis. Gamification's ability to increase both intrinsic and extrinsic motivation highlights its potential to provide a more engaging learning experience that resonates with a wide variety of students. By using rewards and challenges, gamification addresses students' external motivations while simultaneously creating an environment that encourages intrinsic interest in the subject matter. The positive feedback from students in the case study suggests that gamification is not only effective at increasing short-term engagement but also at fostering long-term interest in learning. The combination of both intrinsic and extrinsic motivation appears to be a key factor in the effectiveness of gamification in education.

In conclusion, the results of this study indicate that gamification is an effective strategy for enhancing student engagement by fostering both intrinsic and extrinsic motivation (Giráldez, 2022; Wei, 2023). While traditional methods of teaching may only address external motivation, gamification creates an environment where students are motivated by both external rewards and internal satisfaction. These findings underscore the importance of incorporating gamified elements into educational practices to boost participation, engagement, and learning outcomes. Future studies should explore how different types of gamification strategies impact various learning contexts and student demographics, as well as investigate the long-term effects of gamification on motivation and academic performance.

The findings of this study indicate that gamification significantly enhances both intrinsic and extrinsic motivation among students (Leung, 2023; Pozo-Sánchez, 2022). The experimental group, which participated in a gamified course, showed substantial increases in intrinsic motivation (0.7-point increase on a 5-point scale) and extrinsic motivation (0.5-point increase), as compared to the control group, which demonstrated minimal changes. These results highlight the effectiveness of gamified elements, such as rewards, challenges, and progress tracking, in engaging students. Gamification, therefore, not only motivates students by offering external incentives but also fosters a deeper, intrinsic desire to engage with the learning material.

When compared to existing literature, the results of this study corroborate findings from studies like Anderson and Rainie (2018) and Anderson (2014), which assert that gamification can increase student engagement and motivation. However, this study provides a more nuanced understanding by distinguishing between intrinsic and extrinsic motivation. While previous studies have generally discussed the overall impact of gamification on student participation, this research highlights the differential effects of gamification on intrinsic versus extrinsic motivation, providing a deeper analysis of how gamification fosters both types of engagement. Unlike some research that indicates gamification primarily encourages extrinsic motivation (Chang, 2022; Keepers, 2022), this study suggests that when gamified elements are thoughtfully integrated, intrinsic motivation can also be significantly enhanced.

The findings suggest that gamification serves as an effective tool for creating a dynamic learning environment that appeals to various motivational drivers (Khaleghi, 2022; Luo, 2023). The increase in intrinsic motivation, particularly, signals that gamified strategies, which are typically associated with extrinsic rewards, can also spark deeper engagement with the content. This is a crucial insight for educators, as it suggests that gamification has the potential to foster not only short-term participation but also long-term interest and involvement in the learning process. The fact that both types of motivation increased highlights the versatility of gamification in catering to

diverse student needs, whether for those driven by external rewards or those seeking internal satisfaction and enjoyment from learning.

The implications of these findings are far-reaching, especially in the context of modern education where student engagement and motivation are critical to academic success. Gamification can be used as a strategic tool to increase both extrinsic and intrinsic motivation, making it a powerful mechanism for enhancing student participation in the classroom. By understanding the specific ways gamification influences different types of motivation, educators can design more personalized and engaging learning environments. Additionally, this research suggests that gamified learning systems can address issues of disengagement, which is increasingly prevalent in traditional educational settings, by offering a more interactive and enjoyable approach to learning. Therefore, adopting gamification not only benefits students in terms of motivation but also improves learning outcomes by increasing their active involvement in the educational process.

The results of this study are driven by several factors, including the dynamic and interactive nature of gamification. Gamified learning environments often encourage competition, self-assessment, and continuous progress tracking, which appeal to both intrinsic and extrinsic motivations. The increase in intrinsic motivation is likely due to the enhanced sense of accomplishment and mastery that gamified elements provide, making learning feel more rewarding. Extrinsic motivation is fueled by the tangible rewards such as points, badges, or leaderboards, which give students external goals to strive for. The combination of these two factors results in a balanced approach that drives student engagement. This study also highlights that gamification, when designed thoughtfully, can overcome the limitation often associated with extrinsic rewards, where the reward may overshadow the learning process itself, as seen in some research on motivation (Deci et al., 1999).

Moving forward, there are several avenues for future research. First, it is important to explore the long-term effects of gamification on student motivation and academic performance. While this study provides evidence of immediate increases in both intrinsic and extrinsic motivation, it remains unclear whether these effects are sustained over time, especially after the removal of gamified elements. Furthermore, future studies should investigate how different types of gamification elements, such as competition versus cooperation, affect intrinsic versus extrinsic motivation in varying educational contexts. Examining how gamification can be adapted for diverse subjects, student demographics, and educational levels will provide valuable insights into how to optimize its impact. Finally, further research should explore the potential challenges or limitations of gamification, particularly for students who may not respond positively to game-based learning methods, in order to create a more inclusive and tailored educational approach.

CONCLUSION

The most significant finding of this study is the dual impact of gamification on both intrinsic and extrinsic motivation, revealing that gamified elements can foster increased engagement on both fronts. The experimental group demonstrated notable increases in intrinsic motivation (0.7-point rise) and extrinsic motivation (0.5-point rise), in contrast to the control group, which showed minimal changes. This indicates that gamification not only appeals to external motivators, such as rewards and competition, but also enhances intrinsic factors by making learning more enjoyable and interactive. These results emphasize the potential of gamification as a tool to engage students on multiple motivational levels, rather than simply relying on extrinsic rewards alone.

This research contributes to the field by providing a comparative analysis of intrinsic and extrinsic motivation in the context of gamified learning. While previous studies have explored gamification's effect on student engagement, few have differentiated between the impacts on intrinsic versus extrinsic motivation. By incorporating both qualitative and quantitative data, this study offers a more nuanced understanding of how gamification influences student motivation, filling a gap in the literature that often treats motivation as a singular, unidimensional construct. The combination of surveys and interviews in this study also offers a methodological innovation by providing deeper insights into students' perceptions of gamification alongside measurable changes in motivation.

A limitation of this study is the relatively small and specific sample size, which may limit the generalizability of the findings to other educational contexts. The research was conducted with students from a single institution and within a specific course, which might not capture the diversity of student responses to gamification across different academic disciplines or demographic groups. Additionally, the study's focus on short-term effects means that the long-term impact of gamification on motivation and learning outcomes remains unclear. Future research should include a larger and more diverse sample, as well as a longitudinal design to assess the sustained effects of gamification over time.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.

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