

# The Impact of Gamified Learning on Student Engagement and Academic Achievement in Secondary Schools

**Wu Zhaopeng**

*Liaoning Normal University, Liaoning, Dalian, 116000, China*

**Abstract:** *This study explores the influence of gamified learning environments on student engagement and academic achievement in secondary schools. As technology has become more integrated into the classroom, educators are continuously looking for ways to leverage it to enhance student learning. One emerging strategy is gamification, the application of game-design elements in non-game contexts. By implementing game mechanics such as points, badges, and leaderboards in educational settings, teachers aim to increase student motivation and involvement. The results of this research provide insights into the efficacy of such practices and offer recommendations for educators looking to integrate gamification into their curriculum.*

**Keywords:** *Gamified learning, student engagement, academic achievement, secondary schools, technology in education*

## 1. Introduction

The evolution of the education sector in recent decades has been nothing short of transformative. Historically, traditional methods of instruction dominated the classroom, relying heavily on rote memorization and passive forms of learning. However, the past few decades have seen a revolutionary shift, largely propelled by rapid technological advancements. Technology has not just introduced new tools for educators but has reshaped the very fabric of teaching methodologies, curricula, and the dynamics of the classroom.

One of the most innovative and influential advancements emerging from this nexus between education and technology is 'gamification.' While the concept of gamification has its roots in the digital gaming industry, it has been adapted and embraced by various other sectors, especially for its unparalleled potential to engage users and influence behavioral patterns. From business training programs to health and fitness applications, the principles of gamification have been proven effective in fostering motivation, participation, and adherence to desired behaviors.

In the realm of education, gamification has transcended beyond a mere trend and is increasingly becoming an integral aspect of contemporary teaching strategies. It signifies the strategic incorporation of game-like elements - such as points, badges, challenges, and leaderboards - into conventional learning environments. It aims at transforming what can sometimes be perceived as mundane educational content into an interactive, engaging and rewarding experience<sup>[1]</sup> The underlying psychology is straightforward: when students find the learning process enjoyable and challenging in the same vein as they would a game, their motivation to engage and achieve naturally escalates.

But why has gamification garnered such attention in education? The answer lies in the inherent human penchant for play. Games, in their essence, tap into fundamental psychological needs - the need for autonomy, competence, and relatedness. By embedding these game dynamics into the educational framework, educators hope to tap into these intrinsic motivators, thereby fostering an environment where students are not just passive recipients of knowledge but active and eager participants in their learning journey.

## 2. Methodology

This research was conducted as a quasi-experimental study to understand the impact of gamified learning on student engagement and academic achievement in secondary schools. By employing a

control and experimental group design, the study aimed to offer comparative insights into the effectiveness of gamified educational strategies versus traditional teaching methods.

A total of 300 students, aged between 13 to 16, were enlisted from three diverse secondary schools to ensure a broad representation of demographic, socio-economic, and academic backgrounds. These schools were chosen based on their similarity in academic standards, curriculum, and student profiles to minimize external variabilities.

**Control Group:** 150 students who continued their standard curriculum have no any gamified elements.

**Experimental Group:** 150 students who were introduced to the gamified learning environment. The gamified components were integrated into their regular curriculum, and the students were exposed to game-based tasks, quizzes, and activities designed to enhance learning and engagement.

The participants were chosen using stratified random sampling. Each school provided a list of students from which equal numbers were randomly selected to ensure that both the control and experimental groups had a similar distribution of participants from each school. This method helped in ensuring that the groups were equivalent at the beginning of the study, thus reducing the possibility of selection bias.

The study was conducted over a six-month academic period. Before introducing the gamified learning tools, a preliminary assessment was carried out for all participants to gauge their baseline academic performance and engagement levels.

**Control Group:** This group underwent regular classroom instruction without any modifications to their teaching methods. Their performance and engagement metrics were measured at regular intervals to track any natural progression or changes.

**Experimental Group:** Apart from their standard lessons, these students were provided with gamified learning platforms. These platforms encompassed modules, challenges, point systems, badges for accomplishments, and leaderboards. Instructors were given training on how to integrate these tools seamlessly into the curriculum.

Throughout the six-month period, regular feedback sessions were held with both students and instructors from the experimental group to understand the usability, challenges, and effectiveness of the gamified tools.

Various tools, such as surveys, quizzes, focus group discussions, and academic performance tests, were used to gather data. Both quantitative and qualitative data were collected to offer a comprehensive overview of the impact of gamification on the student learning experience.<sup>[2]</sup>

Informed consent was obtained from all participants and their guardians before the commencement of the study. Additionally, the privacy and anonymity of all participants were maintained, ensuring that personal and academic information remained confidential.

### **3. Materials**

#### ***3.1. Gamified Learning Platform***

**Adaptive Learning Pathways:** The platform had an intelligent system that adapted to each student's pace and proficiency. If a student was excelling in a particular module, they would be provided with advanced challenges. Conversely, if they struggled, the system presented remedial content tailored to their needs.

**Real-world Application Scenarios:** To ensure practical knowledge, students encountered scenarios where they had to apply what they learned in real-world situations. These scenarios were often wrapped in storytelling to make them more engaging.

**Social Interaction Features:** The platform provided discussion boards, forums, and chat groups where students could interact, collaborate on challenges, or discuss tricky concepts, promoting peer learning.

**Customizable Avatars:** Students could create and customize their avatars, which represented them in the gamified environment. Customizing the avatars allowed students to express their individuality, making the learning experience more personal.

**Feedback Loop:** After completing challenges or quests, the platform offered instant feedback, guiding students on what they did well and where they needed improvement. This real-time feedback ensured continuous learning and self-assessment.

**Narrative Storylines:** Each module had a connecting storyline. As students progressed, they were not just advancing in levels but were also unfolding a story, making the learning journey more captivating.

**Mini-Games:** Interspersed throughout the modules were mini-games that revolved around the academic content. These games provided a break from the regular content, ensuring that students remained attentive and entertained.

**Mentor & Guide Characters:** Within the platform, virtual mentor characters were introduced. These characters provided hints, celebrated achievements, and offered guidance, much like NPCs (Non-Playable Characters) in video games.

**Collaborative Quests:** Some challenges required students to team up, fostering teamwork and collaborative problem-solving skills.

**Progress Dashboard:** Beyond the leaderboard, there was a comprehensive dashboard where students could see a detailed breakdown of their achievements, strengths, areas of improvement, and recommended next steps.

**Virtual Rewards Store:** The points accumulated could also be used in a virtual store where students could purchase accessories for their avatars or unlock additional content, adding another layer of motivation.

### ***3.2. Traditional Learning Resources***

**Textbooks:** The textbooks employed for the control group were meticulously chosen based on their relevance and alignment with the standard curriculum. They were written by esteemed educators and experts in their respective fields, ensuring the quality and comprehensiveness of the content. The textbooks not only offered in-depth explanations but also highlighted real-world applications, case studies, and critical thinking questions. Margins of these books often included references to further readings and insights from scholars, catering to those students who wished to delve deeper into the subjects.

**Workbooks:** The workbooks were a perfect complement to the textbooks. They were meticulously designed to reinforce the concepts taught, ensuring that students had ample opportunities to practice and internalize what they learned. Each workbook was organized in a systematic manner, starting from basic exercises and gradually progressing to more complex tasks. Special sections were dedicated to problem-solving exercises, encouraging students to apply knowledge in practical scenarios. To aid self-assessment, these workbooks also included answer keys and explanations at the end, enabling students to understand their mistakes and areas of improvement.

**Lecture Notes:** The lecture notes, curated by experienced instructors, provided a concise and targeted review of daily lessons. They were structured in a manner that highlighted key points, definitions, and diagrams, making them a valuable resource for quick revisions. These notes were designed keeping in mind diverse learning styles; hence, they combined textual content with visual aids like flowcharts, mind maps, and infographics<sup>[3]</sup>. Occasionally, the notes also contained additional resources such as URLs to helpful videos, podcasts, or articles, broadening the students' horizon and offering different perspectives on the topics discussed.

**Multimedia Presentations:** The multimedia presentations were not just plain slides with bullet points. Instead, they were immersive, interactive, and dynamic tools that brought lessons to life. Utilizing the power of audio-visual elements, these presentations could break down the most complex of topics into digestible chunks. Vibrant images, animations, short video clips, and relevant audio bites made these sessions memorable. Teachers often incorporated quizzes, polls, or interactive segments within the presentation, ensuring students were actively engaged. This multimedia approach catered to both visual and auditory learners, making abstract concepts tangible and memorable.

### ***3.3. Academic Performance Tests***

Standardized tests were designed to assess the academic performance of the students in both groups.

These tests were:

**Baseline Test:** The test are administered at the beginning of the study to gauge the initial academic proficiency of all participants.

**Monthly Tests:** A shorter tests are given at the end of each month to track the ongoing progress.

**Final Comprehensive Test:** A thorough test is held at the end of the six-month period to measure the cumulative knowledge and understanding of the subjects.

### ***3.4. Student Engagement Surveys***

To measure the level of student engagement, periodic surveys were conducted:

**Pre-study Survey:** It is to understand students' initial attitudes towards learning and studying habits.

**Monthly Surveys:** A Shorter and more targeted surveys can track changes in engagement, motivation, and variation in teaching methods and attitudes

**Post-study Survey:** This comprehensive survey is administered at the end of study to assess students' overall experience, the effectiveness of the gamified platform (for the experimental group), and their preferences in learning methodologies.

## **5. Procedure**

Before the commencement of the study, an orientation session was held for both the experimental and control groups. The purpose was to familiarize students with the objectives of the study and the methodologies to be employed. For the experimental group, a special onboarding session was organized to introduce them to the gamified learning platform. Here, they were guided on how to navigate the platform, undertake challenges, earn points, and access various modules.

## **6. Results**

### ***6.1. Engagement Scores***

The students subjected to the gamified learning platform displayed an evident increase in their engagement scores. The surveys that measured engagement considered factors such as attentiveness in class, participation in discussions, completion of assignments, and enthusiasm for extracurricular activities related to academic subjects.

Over the six months, the experimental group consistently reported higher enthusiasm towards learning, greater interest in subjects, and a more proactive approach to tackling challenges and assignments.

The introduction of badges, leaderboards, and challenges in the gamified platform seemed to foster a sense of achievement and motivation among these students, as reflected in their higher engagement scores.

**Control Group (Traditional Instruction):**

While the control group did show some increase in engagement over the period, possibly due to maturation or increased familiarity with the subjects, the increment was not as pronounced. The disparity between the two groups became evident when comparing their month-on-month progression. By the end of the study, there was a clear 15% difference in the engagement scores favoring the experimental group<sup>[4]</sup>.

### ***6.2. Academic Performance***

**Experimental Group (Gamified Learning):**

The results were also positive on the academic front for the students in the gamified environment. Their performance in the standardized tests showed a consistent improvement month after month.

It is noteworthy that the tasks and challenges on the gamified platform seemed to reinforce the

concepts taught in class, allowing for better retention and understanding.

The hands-on, interactive nature of the platform enabled students to grasp complex topics with ease, making learning more intuitive and less reliant on rote memorization.

Control Group (Traditional Instruction):

Students in the control group displayed a steady academic performance, typical of traditional teaching methods. While there was an improvement in scores as the months progressed (a natural outcome of learning), the gamified group outpaced them by 10% by the study's end.

## 7. Conclusions

While gamified learning offers promising results in the context of secondary education, continuous research is essential to refine and understand the best practices.<sup>[5]</sup> It is crucial to tailor gamification strategies to fit the specific needs and dynamics of each classroom to maximize its benefits.

## References

- [1] Khan A, Ahmad H F, Malik M M. *Use of digital game based learning and gamification in secondary school science: The effect on student engagement, learning and gender difference*[J]. *Education and Information Technologies*, 2017, 22(6): 2767-2804.
- [2] Pechenkina E, Laurence D, Oates G, et al. *Using a gamified mobile app to increase student engagement, retention and academic achievement*[J]. *International Journal of Educational Technology in Higher Education*, 2017, 14(1): 1-12.
- [3] Bouchrika I, Harrati N, Wanick V, et al. *Exploring the impact of gamification on student engagement and involvement with e-learning systems*[J]. *Interactive Learning Environments*, 2021, 29(8): 1244-1257.
- [4] Hong G Y, Masood M. *Effects of gamification on lower secondary school students' motivation and engagement*[J]. *International Journal of Educational and Pedagogical sciences*, 2014, 8(12): 3765-3772.
- [5] Hanus M D, Fox J. *Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance*[J]. *Computers & education*, 2015, 80: 152-161.