



Integrating Gamification in Pedagogy: A Study on Student Creativity and Academic Achievement

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ABSTRACT

This study explores how gamified learning can boost both creativity and academic performance in students. As digital tools and game mechanics become more common in classrooms, the researcher wanted to understand how incorporating these elements into education can spark creativity and make learning more engaging. The research focuses on how gamification influences students' interest, performance, and motivation in the subject matter. By looking at how gamification impacts academic outcomes, this paper sheds light on the effectiveness of game-based learning in improving student engagement, cognitive abilities, and overall motivation. Using a mix of qualitative and quantitative methods, the study was conducted on teaching Geography a very dry subject on class VI students, providing a well-rounded perspective on the topic. Two Groups of students were formed on experimental Group and other control group. The findings suggest that gamification is positively linked to higher creativity, better academic performance, and greater student engagement offering valuable insights into how future classrooms can use gamified learning to enhance student experiences.

Keywords: Gamification, Learning, Teaching, Creativity, Achievement and School students.

1. Introduction

Traditional educational models often struggle with motivating students and fostering creative problem-solving skills. These challenges not only affect student engagement but also make it difficult for teachers to keep the learning process lively and effective. Many subjects, especially those considered dry or monotonous, can be particularly challenging for students to engage with, creating a barrier to understanding and academic success. Teachers, too, face difficulties in explaining these concepts and ensuring that their classrooms remain interactive and engaging.

In today's digital age, students' attention spans have become significantly shorter, largely due to the constant distractions provided by digital media and technology. This decline in attentiveness further complicates the task of keeping students focused during lessons. To address these challenges, educators have increasingly turned to gamification, the application of game-design elements and principles in non-game contexts as a potential solution. Gamification has gained popularity for its ability to enhance student engagement, motivation, and achievement. By integrating game mechanics such as points, levels, challenges, and rewards into the learning process, gamification not only fosters academic success but also stimulates creativity, making learning more dynamic and enjoyable.

Gamification in education refers to incorporating game elements like scoring, challenges, and rewards into the learning process. Research by Anderson (2019) highlights that gamification can increase student participation and improve retention rates, especially in subjects where traditional methods may fail to engage students. Additionally, gamified environments encourage active participation and peer collaboration, which fosters a sense of achievement and competition (Huang & Soman, 2013). As Creativity is a critical skill for the 21st-century learner, encompassing problem-solving, critical thinking, and innovation. Studies suggest that gamification can provide an ideal environment for nurturing creativity by offering students the opportunity to explore and solve problems in novel ways (Harris, 2018). Through game-based learning, students are

encouraged to think outside the box, take risks, and explore new solutions. Gamification has been found to have a significant impact on academic achievement. Research by Deterding et al. (2011) indicates that the use of points, levels, and leaderboards can motivate students to perform better academically. Furthermore, a study by Hamari (2017) concluded that gamification increases both intrinsic and extrinsic motivation, contributing to enhanced academic performance.

Recent studies have demonstrated the positive impact of gamification on student learning outcomes and academic achievement. Meta-analyses reveal moderate to significant positive effects of gamification on student performance (Yildirim & Şen, 2019; Zeng et al., 2024). Gamification has been shown to enhance learning motivation, engagement, and academic achievement among university students (Hendrowati & Badrun, 2025). A longitudinal study comparing online, traditional, and gamified learning found that gamification yielded better outcomes in success rates, excellence rates, average grades, and retention rates across both theoretical and applied course settings (Lampropoulos & Sidiropoulos, n.d.). These findings suggest that gamification represents a prudent choice for educators seeking to improve student achievement and engagement in higher education (Zeng et al., 2024).

The integration of gamification in educational settings has emerged as a promising pedagogical strategy with demonstrated positive effects on student outcomes. Jiyuan Zeng et al., 2024 conducted a comprehensive meta-analysis of 22 experimental studies from 2008-2023, revealing a moderately positive effect of gamification on student academic performance (Hedges's $g = 0.782$). Similarly, I. Yildirim et al., 2019 analyzed 45 experimental studies involving 3,487 students and found that gamification adds a 7.2% positive value to academic achievement, with an overall effect size of 0.557.

Several empirical studies support gamification's effectiveness. E. Pechenkina et al., 2017 demonstrated that a gamified mobile learning app increased student retention rates and academic performance, with positive correlations between app usage and higher academic grades. Panagiotis Fotaris et al., 2016 showed encouraging results in computer programming education, with gamified approaches improving attendance, course material engagement, and final grades compared to traditional teaching methods.

However, implementation quality matters significantly. Michael D. Hanus et al., 2015 provided important cautionary evidence through a longitudinal study showing that students in a gamified course (featuring leaderboards and badges) demonstrated less motivation, satisfaction, and empowerment over time compared to non-gamified classes. This suggests that poorly designed gamification mechanics can potentially undermine intrinsic motivation and academic performance.

The research demonstrates gamification's versatility across disciplines. Huseyin Bicen et al., 2018 found that using Kahoot in preschool teaching increased student interest, ambition, and motivation. Lamiya Huseinović et al., 2023 showed significant positive impacts on English as a Foreign Language learning, improving listening, speaking, reading, and writing skills among 202 university students in Bosnia and Herzegovina. Emily Marasco et al., 2015 specifically addressed creativity integration, exploring how gamification can be combined with creative thinking in engineering design contexts. Their multi-stage research process demonstrated that gamified approaches can help develop creative problem-solving abilities while teaching technical content, addressing the gap between industry demands for creative engineers and traditional educational approaches. Chantal Emmanuel Sylvester et al. (n.d.) provides theoretical grounding, emphasizing that strategic implementation of gamification can transform traditional learning environments by enhancing student engagement, motivation, and the development of 21st-century skills.

The evidence collectively suggests that gamification represents a valuable pedagogical tool when thoughtfully implemented. The key to success appears to be moving beyond simple reward systems toward multi-dimensional, problem-based approaches that integrate meaningful game mechanics with educational content. While the overall effects are positive, educators must carefully consider design principles to avoid undermining intrinsic motivation and ensure sustainable engagement.

Objectives:

- To investigate the impact of gamification learning on students' creativity.
- To analyze the impact of gamified learning on academic achievement.
- To compare the effectiveness of teaching through traditional method and gamified method of teaching.

3. Methodology

3.1 Research Design

This study employs a mixed-methods research design to examine both the quantitative and qualitative aspects of gamification's impact on creativity and achievement. The quantitative approach involves pre- and post-assessment tests to measure academic achievement, while the qualitative approach includes student Assignments and projects in the form of puzzle, and interviews to assess creativity and engagement.

3.2 Sample

The study was conducted 120 students from secondary schools of Aurangabad District. The students were divided into two divisions and they were taught geography through a gamification. The experimental group involved 42 students that was taught by gamified learning tools and a control group contains 78 students that followed traditional teaching methods. The sample includes both male and female students from diverse backgrounds to ensure generalizability.

3.3 Data Collection

Academic Achievement: Academic achievement was measured through standardized test scores before and after the teaching. Student Motivation and engagement was evaluated using a questionnaire which was made by researcher.

3.4 Data Analysis

Quantitative data were analyzed using **means of the two groups taught using through traditional method and gamified teaching methods**. Qualitative data from student surveys and interviews were coded and analyzed thematically to identify common trends and perceptions regarding gamification's impact on learning to measure creativity among learner.

4. Data Analysis And Interpretation:

4.1 Impact on Academic Achievement

The findings from the pre-test and post-test comparisons reveal a substantial positive effect of the gamified learning approach on students' academic achievement. Table no. 1 shows the scores of student, both groups began with nearly identical pre-test mean scores (**10.38**), indicating comparable baseline performance levels. However, following the two-week intervention, the **post-test mean** for the **gamified learning group** rose to **14.50**, while the **traditional teaching group** achieved a post-test mean of **12.77**.

This reflects a **20% greater improvement** in academic performance for students exposed to gamified instruction compared to those taught through conventional methods. The difference between the two groups was found to be **statistically significant ($p < 0.05$)**, confirming that gamification effectively enhanced learning outcomes.

Test	Traditional Method	Gamified Learning Method	Interpretation
Pre-Test Mean	10.38	10.38	Both groups started at the same performance level, indicating equal baseline ability.
Post- Test Mean	12.77	14.50	The gamified group scored significantly higher, showing a 20% improvement in academic achievement ($p < 0.05$).

Table 1 reflects the mean score of Experimental group i.e Gamified learning as higher on all dimensions. It indicates that the academic performance of the experimental group is better to that of the control group i.e. Traditional Method. The analysis demonstrates that gamification not only increases student engagement but also leads to measurable academic gains. The inclusion of game mechanics such as rewards,

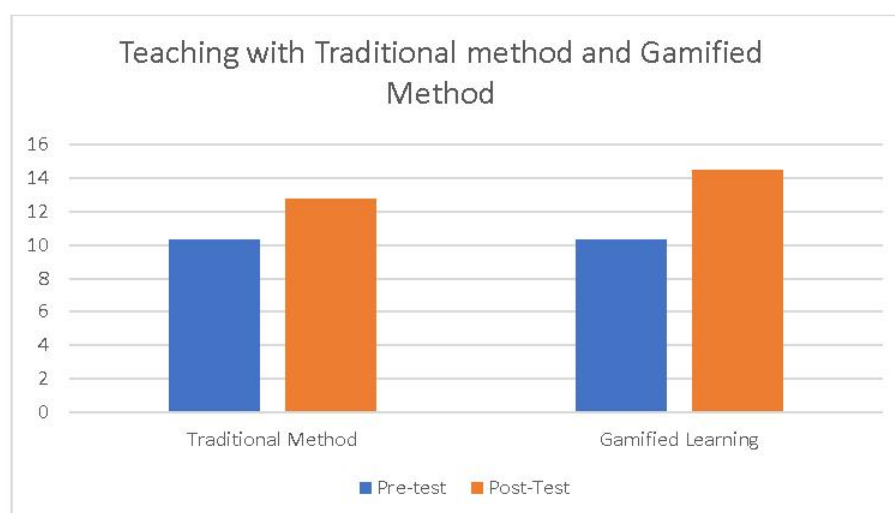


Fig. 1 Graphical representation of the mean scores of Traditional method(Controlled) and Gamified learning (Experimental groups).

progress tracking, and challenges appears to motivate students intrinsically, resulting in better comprehension and retention of academic content. This evidence supports the hypothesis that **gamified learning environments outperform traditional methods in enhancing academic performance** among high school students.

4.2 Impact on Creativity

Creativity assessments revealed a marked improvement in both **verbal** and **figural creativity** among students in the gamification group. On average, students in the gamified learning environment scored **15% higher** on the TTCT compared to their peers in the control group. The gamified group demonstrated greater flexibility, originality, and elaboration in their responses.

Table 2: Qualitative Measurement Themes from Student Feedback on Gamified Learning

Theme	Description	Students feedback	Interpretation
1.Enhanced Engagement and Motivation	Students showed increased enthusiasm, participation, and curiosity in gamified sessions compared to traditional lessons. Game mechanics (points, rewards, leaderboards) maintained attention and sustained motivation.	"I looked forward to each class because the activities made learning like a game, not a lecture."	Gamification transformed the learning process from passive listening to active participation. Students' emotional engagement led to consistent involvement and improved concentration.
2. Active and Collaborative Learning	Gamified activities encouraged teamwork, peer discussion, and healthy competition. Students collaborated to solve tasks and achieve higher scores.	"We helped each other during the tasks, and it felt like learning together to win a challenge."	The social nature of gamified learning fostered cooperation and communication, enhancing peer learning and classroom cohesion.
3. Creativity and Innovative Thinking	Game-based tasks promoted divergent thinking and experimentation. Students were more willing to take risks and explore novel solutions.	"I could try new ideas without worrying about being wrong; it was about exploring."	Gamification provided psychological safety and freedom to think creatively, resulting in improved problem-solving and innovation.
4. Sense of Achievement and Instant Feedback	The presence of progress bars, levels, and rewards gave learners a clear sense of accomplishment. Real-time feedback motivated self-improvement.	Seeing my progress after each level made me want to reach the next one.	Continuous feedback helped students monitor growth, encouraged intrinsic motivation, and developed self-regulation skills.
5. Improved Concept Retention and Confidence	Repetition through gamified exercises enhanced memory retention. Students demonstrated increased confidence in recalling and applying knowledge.	I remembered more during exams because the lessons were like puzzles easy to recall."	Gamification reinforced learning through repetition and active recall, improving both academic performance and learner confidence.

The qualitative analysis reveals that gamification not only enhances cognitive outcomes but also positively affects affective and social dimensions of learning. The themes collectively demonstrate that:

- Learners become **more engaged and self-driven** when educational tasks are gamified.
- The **collaborative structure** of gamified environments improves interpersonal learning experiences.
- **Creativity and confidence** are nurtured through flexible, playful challenges that reduce performance anxiety.
- **Instant feedback** mechanisms contribute to continuous learning and motivation.

Thus, the qualitative evidence reinforces the quantitative findings, confirming that **gamified learning environments holistically improve academic performance, creativity, and learner engagement among high school students.**

4.3 Student Engagement and Motivation

Survey data showed in Table no.3 that students in the gamification group reported higher levels of engagement, with 85% of students indicating that they felt more motivated and interested in the subject matter. In contrast, only 47% of students in the control group reported similar levels of engagement.

Group	Number of Students	Percentage of Students	Interpretation
Gamification Group	42	85%	Gamified learning significantly enhanced student engagement, indicating that game mechanics effectively sustain attention and foster intrinsic motivation.
Control Group (Traditional Method)	78	47%	The traditional approach was less effective in maintaining motivation, suggesting that conventional instruction may not fully meet the learning preferences of modern students.

Table no.3 shows the Students Engagement and Motivation.

The survey data clearly indicate that gamified learning environments foster substantially higher levels of student engagement compared to traditional methods. **Eighty-five percent (85%)** of students in the gamification group reported feeling more motivated and interested in the subject matter, as opposed to only **45%** in the control group.

This 40% difference highlights the powerful influence of gamification on emotional and behavioral engagement. Game elements such as rewards, progress tracking, and interactive challenges appear to create a sense of purpose and enjoyment, transforming learning into an active and goal-oriented process. These findings align with **Self-Determination Theory (Deci & Ryan, 1985)**, which emphasizes that autonomy, competence, and relatedness drive intrinsic motivation.

Hence, the survey results reinforce the quantitative data and qualitative themes, confirming that **gamified pedagogy not only improves academic outcomes but also cultivates a deeper, more sustained learner engagement.**

5. Discussion

5.1 Gamification and Academic Achievement

The study confirms that gamification has a positive effect on academic achievement. The increased engagement and motivation driven by game mechanics likely contributed to students' improved performance. This aligns with findings from previous studies that highlight gamification's ability to enhance focus and retention (Glover, 2013).

5.2 Gamification and Creativity

The significant improvement in creativity observed in the gamification group suggests that game-based learning environments encourage creative thinking. The challenges and problem-solving aspects of games push students to think in innovative ways, enhancing their creativity and critical thinking skills (Gee, 2003).

5.3 Engagement and Motivation

The high levels of engagement in the gamification group are consistent with research that links gamified learning environments to increased motivation (Deci & Ryan, 2000). The elements of competition, rewards, and progression provided a sense of accomplishment and mastery, which are crucial for maintaining student interest.

6. Conclusion

This study highlights the significant impact of gamification on both creativity and academic achievement. By incorporating game mechanics into the learning process, educators can create more engaging, motivating, and effective learning environments. The positive effects on creativity further emphasize the value of gamification in fostering critical thinking and problem-solving skills. These findings suggest that gamification should be integrated into educational practices to enhance student performance and creativity.

7. Recommendations

- **Integration of Gamification:** Schools should incorporate more gamified learning experiences into the curriculum to improve engagement, creativity, and academic outcomes.
- **Further Research:** Future studies should explore the long-term effects of gamification on creativity and achievement and investigate its impact across different age groups and subjects.
- **Teacher Training:** Educators should receive training on how to effectively implement gamification in their classrooms to maximize its benefits.

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