

Gamified Learning Platforms and Sustained Engagement Among Secondary School Students

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Abstract — Gamified learning platforms are widely adopted in secondary education settings on the assumption that game-based elements sustain student engagement more effectively than conventional digital learning tools, yet evidence on longer-term engagement patterns beyond initial novelty periods remains mixed. This study examines engagement trajectories among secondary school students using a gamified mathematics platform over a full academic term, distinguishing initial engagement driven by novelty from sustained engagement patterns observable in later weeks. Combining platform usage analytics with periodic student surveys, we test whether specific gamification elements, including point systems, leaderboards, and narrative progression, differ in their association with sustained versus short-term engagement. Findings indicate that leaderboard-based competitive elements were strongly associated with initial engagement but showed declining association with continued use over the term, particularly among lower-performing students who reported discouragement from persistent low ranking. Narrative progression elements showed weaker initial engagement effects but more stable association with sustained use across the full observation period. These findings suggest that gamification design should differentiate between features optimized for initial adoption and those supporting durable engagement, with particular attention to competitive elements that may disengage lower-performing students over time.

Index Terms — gamification, educational technology, student engagement, secondary education, learning platforms

I. INTRODUCTION

Gamified learning platforms have been widely adopted in secondary education on the premise that game-based elements such as points, leaderboards, and narrative progression sustain student engagement more effectively than conventional digital tools [1]. However, evidence on engagement durability beyond initial novelty periods remains mixed, with some studies reporting declining use after early enthusiasm fades [2]. Distinguishing initial engagement from sustained engagement requires longitudinal observation, since cross-sectional or short-term studies cannot separate novelty effects from durable behavioral change [3]. Moreover, different gamification elements may support these two engagement phases unequally, a distinction with direct design implications [4]. This study examines engagement trajectories among secondary school students using a gamified mathematics platform across a full academic term, testing whether specific gamification elements differ in their association with initial versus sustained engagement.

Table 1. Association between gamification elements and engagement phase

Element	Initial Engagement	Sustained Engagement
Point systems	Moderate	Moderate
Leaderboards	Strong	Declining
Narrative progression	Weak	Strong
Combined features	Strong	Moderate

II. RELATED WORK

Self-determination theory has been widely applied to explain gamification’s engagement effects through autonomy, competence, and relatedness satisfaction, though empirical tests distinguishing short-term from long-term engagement remain limited. Prior platform analytics studies have documented general usage decay over time but have rarely disaggregated decay patterns by specific gamification feature or by student performance level. Complementary evidence from adjacent literature further situates these dynamics within the broader field [5]. Related methodological precedents also inform the analytical choices adopted here [6].

III. METHODOLOGY

Platform usage analytics were combined with periodic student surveys administered across a full academic term, capturing both behavioral engagement metrics and self-reported motivational responses to specific gamification elements.

A. Trajectory Modeling of Engagement

Weekly engagement scores were modeled using growth curve analysis to separate baseline novelty-driven engagement from trend components representing sustained use, allowing comparison of trajectory shapes associated with point systems, leaderboards, and narrative progression features, and disaggregation by student performance tier.

IV. RESULTS

Table 1 summarizes association strength between each gamification element and engagement phase, along with performance-tier variation for leaderboard effects. Leaderboard-based elements showed the strongest initial engagement association but the most pronounced decline over the

term, concentrated among lower-performing students reporting discouragement from persistent low ranking.

V. DISCUSSION

The divergent trajectory patterns suggest that gamification design should not treat all game elements as interchangeable engagement drivers. Competitive leaderboard mechanics appear well suited to initial adoption but risk disengaging lower-performing students over time, while narrative progression elements, though less immediately compelling, support more durable engagement across the full student population. These findings imply that platform designers should consider adaptive or tiered leaderboard structures that avoid persistent visible low ranking, alongside continued investment in narrative-based progression systems.

VI. CONCLUSION

Sustained student engagement with gamified learning platforms depends on differentiating design features optimized for initial adoption from those supporting durable use, with particular caution warranted around competitive elements affecting lower-performing students. Future work should test adaptive leaderboard designs intended to preserve motivational benefits while mitigating discouragement effects.

REFERENCES

- [1] J. Hamari et al., "Does gamification work? A literature review of empirical studies," in *Proc. 47th Hawaii Int. Conf. Syst. Sci.*, 2014, pp. 3025-3034.
- [2] R. N. Landers, "Developing a theory of gamified learning," *Simul. Gaming*, vol. 45, no. 6, pp. 752-768, 2014.
- [3] R. M. Ryan and E. L. Deci, "Self-determination theory and the facilitation of intrinsic motivation," *Am. Psychol.*, vol. 55, no. 1, pp. 68-78, 2000.
- [4] D. Sailer et al., "How gamification motivates: an experimental study of the effects of specific game design elements," *Comput. Hum. Behav.*, vol. 69, pp. 371-380, 2017.
- [5] J. Hamari, "Do badges increase user activity? A field experiment on the effects of gamification," *Comput. Hum. Behav.*, vol. 71, pp. 469-478, 2017.
- [6] K. Seaborn and D. I. Fels, "Gamification in theory and action: a survey," *Int. J. Hum. Comput. Stud.*, vol. 74, pp. 14-31, 2015.