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From Engagement to Retention: Conceptualizing Gamified AI Pathways through Self-Determination Theory in ESL Education

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Abstract

Retention of language skills remains a critical challenge in English as a Second Language (ESL) education. Learners often achieve short-term gains in vocabulary and grammar but struggle to sustain this over time, leading to high attrition rates. This Study proposes the Gamified AI Retention Pathway Model, a conceptual framework that uniquely integrates gamification mechanics, AI personalization, and Self-Determination Theory to explain long-term retention in ESL learning emphasizing autonomy, competence, and relatedness as fundamental psychological needs that sustain motivation over time. Gamification contributes mechanics such as points, badges, challenges, and leaderboards, which are strategically aligned with these needs. AI adds adaptive and personalized feedback that ensure learners receive timely, individualized guidance while maintaining control over their learning pathways.

The Study synthesizes existing research to construct a conceptual framework that explains how learners move from short-term engagement to sustained participation and ultimately long-term retention. The framework contributes theoretically by connecting gamification and AI to retention through motivational alignment, practically by offering design principles for educators and developers, and politically by informing policy on

evidence-based EdTech adoption. At its core, the framework recognizes retention as an active process supported by motivational scaffolding. By satisfying autonomy, competence, and relatedness through gamified AI environments, learners can internalize language skills and sustain their learning efforts. Future research should empirically validate this model through longitudinal qualitative studies, capturing learner experiences and teacher perspectives.

Keywords: Gamification, Artificial Intelligence, Self-Determination Theory, ESL retention, motivation, educational technology.

Introduction

Retention of language skills is one of the biggest challenges in English as a Second Language (ESL) education. Learners often demonstrate short-term gains in vocabulary acquisition, grammar accuracy, or oral fluency, but sustaining these gains over time proves far more difficult. Attrition rates in ESL programs remain high, with learners disengaging once initial motivation fades. This problem is particularly acute in contexts where English proficiency is tied to academic success, employability, and social mobility.

In recent years, educational technology has been heralded as a solution to the challenges in language learning. Artificial Intelligence (AI) and gamification, in particular, have emerged as powerful tools for enhancing engagement and personalization. AI offers adaptive feedback, tailoring learning experiences to individual needs, while gamification introduces motivational scaffolding through points, badges, challenges, and leaderboards. Yet despite their promise, these two innovations are rarely integrated into a unified framework that explicitly addresses retention.

The Study connects gamification mechanics with AI-driven personalization, interpreted by incorporating Self-Determination Theory (SDT). By mapping technological features with the psychological needs of autonomy, competence, and relatedness, the framework seeks to explain how gamified AI environments can enhance sustained participation and long-term retention in ESL learning. Rather than presenting new empirical data, this paper synthesizes existing research to build a theoretical model that can guide educators, developers, and policymakers in designing effective language learning platforms.

Literature Review

Self-Determination Theory and Retention

Self-Determination Theory (SDT), developed by Deci and Ryan (1985, 2000), provides a foundational lens for understanding learner motivation and persistence. SDT posits that autonomy, competence, and relatedness are core psychological needs that, when satisfied, foster intrinsic motivation and sustained engagement. In the context of English as a Second Language (ESL) learning, autonomy refers to learners' ability to make meaningful choices in their learning pathways, competence reflects their sense of mastery over language tasks, and relatedness captures the social connections they build with peers and teachers.

Reeve (2018) emphasizes that retention is closely tied to intrinsic motivation, while Schunk et al. (2014) argue that motivation theories are critical for explaining why learners persist or disengage. Despite its relevance, SDT has rarely been operationalized through technology-enhanced environments that explicitly scaffold these needs for long-term retention.

Gamification and Motivation

Gamification has been widely studied as a tool for enhancing learner motivation. Kapp (2012) defines gamification as the application of game mechanics such as points, levels, and badges to non-game contexts to increase engagement. Gee (2003) highlights how video games balance challenge and reward to create immersive learning environments, a principle transferable to education. Deterding et al. (2011) argue that gamification is most effective when aligned with learner goals rather than functioning as superficial entertainment.

Empirical studies reinforce these claims: Hamari et al. (2014) found that gamification is most effective when tailored to learner needs, while Domínguez et al. (2013) demonstrated improved motivation and performance among ESL learners in Spain. Similarly, Celasun and Kaya (2025) reported positive outcomes in Turkey. These cross-cultural findings underscore the universal appeal of gamification, though they also highlight the need for contextual adaptation. Importantly, most gamification studies emphasize short-term engagement rather than sustained retention, leaving a gap in understanding how game mechanics can support long-term persistence.

Artificial Intelligence in Language Learning

Artificial Intelligence (AI) has emerged as a transformative force in education, offering adaptive feedback and personalized learning pathways. Bachiri et al. (2023) demonstrate how AI-driven gamification can tailor learning experiences to individual progress, while Liu (2025) shows that adaptive feedback supports persistence in English as a Foreign Language (EFL) contexts. Alenezi (2024) highlights teacher perspectives on AI-driven gamification, noting both opportunities and challenges in classroom implementation.

Luckin (2018) argues that AI can augment human intelligence by providing real-time insights into learner performance, while Papert (1980) and Vygotsky (1978) stress the importance of learner-centered and socially supported learning, principles that AI can operationalize. In India, Soni (2023) demonstrates how Natural Language Processing (NLP) integrated with gamification enhances grammar, vocabulary, and pronunciation learning in multilingual classrooms. While AI clearly contributes to personalization and persistence, its integration with gamification and motivational theory remains underexplored.

Research Gap

Existing studies have examined gamification as a tool for engagement and AI as a mechanism for personalization, while SDT has explained motivation and persistence. However, these strands remain largely independent. Few frameworks systematically integrate gamification mechanics, AI-driven personalization, and SDT principles to explain retention as a long-term outcome in ESL learning. Current research tends to emphasize short-term participation, overlooking the sustained processes by which learners internalize language skills.

This study addresses that gap by proposing the Gamified AI Retention Pathway Model, a conceptual framework that uniquely aligns gamification mechanics and AI features with SDT's psychological needs of autonomy, competence, and relatedness. By focusing explicitly on retention rather than engagement, this model contributes a novel theoretical synthesis that can guide educators, developers, and policymakers in designing inclusive and sustainable ESL learning environments.

Conceptual Framework

Retention in ESL learning is not simply the continuation of engagement but the sustained ability of learners to recall, apply, and expand language skills over time. To address this challenge, this study introduces the Gamified AI Retention Pathway Model (GARPM), a conceptual framework that integrates Self-Determination Theory (SDT) with gamification mechanics and AI-driven personalization. Unlike prior models that emphasize short-term motivation, GARPM explicitly focuses on long-term retention by aligning technological features with the psychological needs of autonomy, competence, and relatedness.

Autonomy and Adaptive Pathways

Autonomy refers to learners' ability to make meaningful choices in their learning journey. In gamified AI environments, autonomy is supported through adaptive pathways that allow learners to select tasks, challenges, or modules based on their interests and proficiency levels. For example, an AI-powered platform may recommend vocabulary challenges tailored to learner progress, while still allowing choice between grammar drills, pronunciation practice, or interactive storytelling.

- **Gamification mechanics:** quests, branching challenges, customizable avatars.
- **AI features:** adaptive recommendations, personalized task sequencing. Together, these elements foster ownership of learning, which is critical for persistence and retention.

Competence and Feedback Loops

Competence reflects learners' perception of mastery and progress. AI-driven feedback loops reinforce competence by providing immediate, specific, and adaptive guidance. For instance, when a learner makes a grammatical error, the system can offer instant correction, explain the rule, and provide a follow-up exercise.

- **Gamification mechanics:** points, levels, badges, mastery unlocks.
- **AI features:** instant corrective feedback, progress dashboards, adaptive scaffolding. This cycle of reinforcement builds confidence and persistence, ensuring learners continue practicing until mastery is achieved.

Relatedness and Community Engagement

Relatedness refers to the social connections learners build with peers, teachers, and the broader learning community. Gamification supports relatedness through leaderboards, team challenges, and collaborative quests, while AI enhances it by facilitating peer feedback and group learning.

- **Gamification mechanics:** leaderboards, cooperative missions, social badges.
- **AI features:** peer pairing algorithms, collaborative problem-solving tasks, community dashboards. These interactions foster belonging, motivating learners to remain engaged over time.

Retention Pathways

The GARPM proposes three interconnected pathways through which gamified AI environments support retention:

- **Short-term engagement:** learners are initially motivated by points, badges, and novelty.
- **Sustained participation:** adaptive feedback and autonomy keep learners engaged beyond the novelty phase.
- **Long-term retention:** social connections and competence reinforcement ensure learners persist and retain skills over months or years.

As illustrated in Figure 1, the Gamified AI Retention Pathway Model (GARPM) demonstrates how gamification mechanics and AI features align with SDT pillars to scaffold retention outcomes

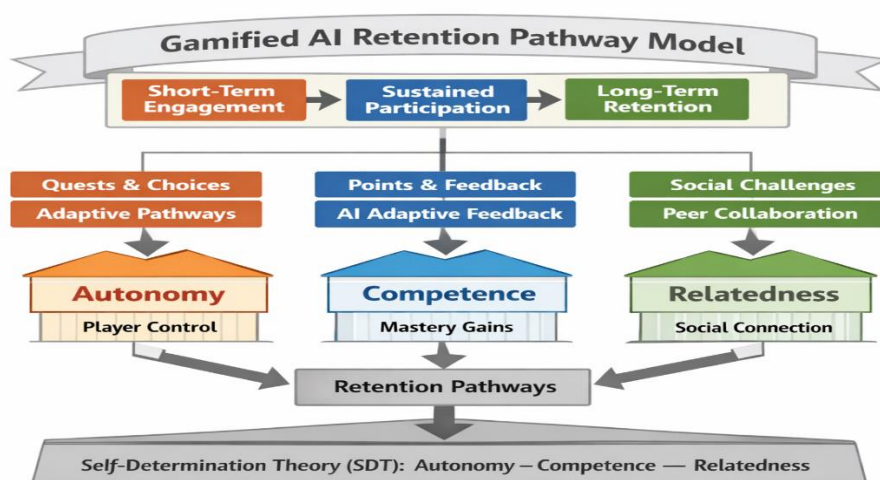


Figure 1. The Gamified AI Retention Pathway Model (GARPM) integrates Self-Determination Theory with gamification mechanics and AI-driven personalization.

The Gamified AI Retention Pathway Model (GARPM) visually integrates Self-Determination Theory (SDT) with gamification mechanics and AI-driven personalization to explain how learners progress from short-term engagement to long-term retention. The three foundational pillars such as autonomy, competence, and relatedness represent SDT's psychological needs. Each pillar is supported by corresponding gamification and AI features: adaptive pathways and quests for autonomy, feedback loops and mastery rewards for competence, and social challenges with peer collaboration for relatedness. These pillars converge into retention pathways, illustrating how technological design can scaffold motivation and sustain participation over time. The model thus provides a clear theoretical map for educators and developers to design ESL environments that transform engagement into enduring learning outcomes.

Testable Propositions

Within the Gamified AI Retention Pathway Model (GARPM), three propositions illustrate how gamification mechanics and AI personalization operationalize Self-Determination Theory to achieve long-term retention in ESL learning.

Autonomy

When learners are given meaningful choices, such as selecting quests, customizing learning pathways, or deciding which challenges to pursue, they experience a sense of control over their progress. AI strengthens this autonomy by offering adaptive pathways that recommend tasks aligned with learner proficiency while still preserving freedom of choice. Environments that scaffold autonomy are expected to produce higher retention rates than those that limit learner agency, because ownership of learning fosters resilience against disengagement.

Competence

Competence is reinforced through immediate and adaptive feedback loops. AI systems provide instant corrections, explanations, and tailored follow-up exercises, while gamification rewards mastery through points, badges, and level progression. Together, these mechanisms create a cycle of reinforcement: learners attempt a task, receive corrective guidance, apply it successfully, and are rewarded for improvement. Environments embedding adaptive AI feedback alongside gamification rewards are expected to significantly enhance learners' perception of competence, thereby increasing persistence and retention.

Relatedness

Relatedness is cultivated through socially embedded gamification mechanics and AI-enabled collaboration. Leaderboards, team challenges, and cooperative quests create opportunities for learners to connect, compete, and celebrate achievements together. AI further supports relatedness by pairing learners with similar proficiency levels for peer review or generating collaborative problem-solving tasks. Environments embedding social mechanics and AI-facilitated collaboration are expected to strengthen relatedness, thereby reducing attrition and sustaining retention across months or years.

Taken together, these propositions demonstrate how GARPM moves beyond short-term engagement to provide a structured pathway toward sustained participation and long-term retention. They also lay the groundwork for empirical validation, offering clear directions for future research designs that can test and refine the model.

Discussions

The Gamified AI Retention Pathway Model (GARPM) advances the discourse on technology-enhanced language learning by explicitly connecting gamification mechanics and AI personalization to the motivational principles of Self-Determination Theory. While previous studies have examined gamification as a tool for engagement (Kapp, 2012; Hamari et al., 2014) and AI as a mechanism for personalization (Bachiri et al., 2023; Liu, 2025), few have integrated these strands into a unified framework that foregrounds retention as a deliberate design outcome. As shown in *Figure 1*, the GARPM provides a structured pathway from engagement to retention, distinguishing it from prior models that focused only on short-term motivation. GARPM demonstrates that retention is not incidental but can be systematically scaffolded through autonomy, competence, and relatedness.

Theoretical Implications

The framework contributes to theory by clarifying how gamification and AI operationalize SDT principles. Autonomy is supported through adaptive pathways and learner choice, competence through immediate feedback and mastery rewards, and relatedness through collaborative mechanics and peer interaction. By advancing testable propositions (P1–P3), GARPM provides a structured basis for empirical validation, moving beyond descriptive accounts of engagement toward a researchable model of retention.

Practical Implications

For educators, GARPM offers actionable design principles. Teachers can integrate gamified platforms that allow learners to choose tasks, receive instant AI-driven feedback, and collaborate with peers. Developers can design systems that balance personalization with motivational mechanics, ensuring that autonomy, competence, and relatedness are embedded in platform architecture. Policymakers can use GARPM to guide investments in EdTech initiatives that prioritize retention outcomes, particularly in contexts where English proficiency is tied to academic success and social mobility.

Cross-Cultural Considerations

Retention is influenced by cultural contexts, and GARPM must be adapted accordingly. Studies from Spain (Domínguez et al., 2013) and Turkey (Celasun & Kaya, 2025) show that gamification improves motivation, but the mechanics that resonate with learners vary across cultures. In India, Soni (2023) emphasizes the importance of culturally relevant content and multilingual interfaces. GARPM can be localized by embedding culturally significant symbols in badges, designing challenges around local contexts, and offering AI feedback in multiple languages. Such adaptations ensure inclusivity and effectiveness across diverse learner populations.

Limitations

As a conceptual framework, GARPM does not present empirical data and requires validation through longitudinal studies. Its effectiveness depends on access to technology, which may not be available in all contexts. Additionally, the balance between extrinsic rewards (points, badges) and intrinsic motivation must be carefully managed to avoid overreliance on superficial incentives. These limitations highlight the need for cautious implementation and rigorous testing.

Future Research Direction

The Gamified AI Retention Pathway Model (GARPM) advances a conceptual synthesis of gamification, AI, and Self-Determination Theory, but its effectiveness must be validated through empirical inquiry. Future research should therefore focus on testing the three propositions outlined in this framework.

First, studies can examine how autonomy-supportive environments influence retention. Longitudinal classroom experiments could compare learners using adaptive gamified AI platforms with those following fixed curricula, measuring persistence, dropout rates, and learner satisfaction over time.

Second, competence can be investigated through controlled trials that evaluate the impact of immediate, adaptive AI feedback on mastery gains. Researchers might track grammar accuracy, vocabulary acquisition,

and learner confidence across several months, assessing whether gamification rewards amplify the effects of AI feedback loops.

Third, relatedness requires exploration in collaborative and cross-cultural contexts. Surveys, peer-interaction analytics, and ethnographic studies can reveal how leaderboards, team challenges, and AI-facilitated peer collaboration foster belonging and reduce attrition. Comparative studies across diverse cultural settings would clarify how social mechanics resonate differently with learners in multilingual environments.

Together, these directions provide a roadmap for refining GARPM into a validated model. By empirically testing autonomy, competence, and relatedness in gamified AI environments, future research can establish whether retention outcomes are consistently achieved across contexts, thereby strengthening both the theoretical and practical contributions of this framework.

Conclusion

Retention in ESL learning remains one of the most persistent challenges in language education, requiring more than short-term engagement strategies. This study has introduced the Gamified AI Retention Pathway Model (GARPM), a conceptual framework that integrates Self-Determination Theory with gamification mechanics and AI-driven personalization. By aligning the psychological needs of autonomy, competence, and relatedness with specific technological features, the model demonstrates how learners can move from initial engagement to sustained participation and ultimately long-term retention.

The originality of GARPM lies in its explicit focus on retention as a designed outcome, rather than a byproduct of engagement. While prior studies have examined gamification for motivation and AI for personalization, few have systematically integrated these strands into a unified framework grounded in motivational theory. GARPM advances this discourse by offering a structured pathway supported by testable propositions, thereby bridging theory and practice.

The framework contributes at three levels. Theoretically, it clarifies how gamification and AI operationalize SDT principles to sustain learning. Practically, it provides design principles for educators and developers to create inclusive, adaptive, and socially engaging ESL environments. Politically, it informs policymakers about the importance of investing in EdTech solutions that prioritize retention outcomes, particularly in contexts where English proficiency is tied to academic success and social mobility.

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