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EFFICACY OF AI-DRIVEN GAMIFICATION ON EFL STUDENT MOTIVATION AND COMMUNICATIVE COMPETENCE

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ABSTRACT. This study investigates the effect of integrating Artificial Intelligence (AI) and gamification on English as a Foreign Language (EFL) students' motivation and communicative competence. While gamification is known to boost engagement, and AI offers adaptive personalization, their combined effect in formal EFL contexts warrants empirical evaluation.
KEY WORDS: Artificial Intelligence (AI), Gamification, Adaptive Learning, Communicative Competence, Student Motivation, Personalized Learning, Educational Technology.

INTRODUCTION

The acquisition of English as a Foreign Language (EFL) is often characterized by challenges related to sustained motivation and the difficulty of providing personalized, real-time feedback in large classroom settings. Low intrinsic motivation and anxiety are persistent barriers to achieving communicative competence (Shimizu et al., 2022). Simultaneously, recent advancements in educational technology, particularly Artificial Intelligence (AI), have created opportunities to overcome these obstacles through adaptive and individualized instruction (Ibrahim et al., 2025).

This study is grounded in two primary theoretical frameworks: Self-Determination Theory (SDT) and principles of Second Language Acquisition (SLA). SDT, as developed by Deci and Ryan (1985), posits that fulfillment of the basic psychological needs for autonomy, competence, and relatedness drives intrinsic motivation. Gamification, through elements like choice, progress tracking, and collaboration (badges, levels, leaderboards), directly addresses these needs. Furthermore, AI-driven systems provide comprehensible input and targeted feedback, key elements of SLA theory, by automatically adjusting task difficulty (competence) and providing instantaneous corrections.

LITERATURE REVIEW

The integration of gamification and AI in education represents a novel convergence built upon established pedagogical principles.

Prior research overwhelmingly confirms that standalone gamification significantly improves student engagement and persistence across various disciplines, including language learning (Hamari et al., 2014). Specifically in EFL, studies have shown that game elements like points and leaderboards lead to a reduction in foreign language anxiety and enhance extrinsic motivation (Zainuddin et al., 2020). However, the literature also warns that the effectiveness of gamification relies heavily on its design quality, distinguishing between superficial points-based systems and those that truly foster deep, intrinsic motivation (Deterding et al., 2011).

Independent of gamification, AI tools have proven highly effective in offering personalized instruction, a key component of effective SLA (Krashen, 1985). Intelligent Tutoring Systems (ITS) leverage Natural Language Processing (NLP) to assess a learner's knowledge gaps and automatically deliver relevant content, ensuring that the student is consistently operating within their Zone of Proximal Development (ZPD) (Hew et al., 2024). This adaptive capability is crucial for high-frequency practice of discrete skills such as grammar and vocabulary, providing objective and immediate corrective feedback that a single human instructor cannot sustain for numerous students (Dörnyei & Ushioda, 2023).

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While the separate benefits of AI (adaptivity) and gamification (engagement) are well-documented, there remains a critical gap in the literature regarding the synergistic effect of a purposefully integrated AI-gamification instructional model. Some studies have utilized commercial platforms that contain both elements (e.g., Duolingo), but often fail to isolate the effect of the adaptive AI engine from the motivational game mechanics (Hwang et al., 2023). Therefore, empirical evidence is needed to confirm if the combination of personalized challenge (via AI) and motivational design (via gamification) yields superior outcomes for both motivation and communicative competence compared to conventional or singular interventions.
This study sought to answer the following research questions:

1. Is there a significant difference in the change in EFL students' motivation scores between the AI-gamified instruction group and the conventional instruction group?
2. Is there a significant difference in the change in EFL students' communicative competence test scores between the AI-gamified instruction group and the conventional instruction group?

METHOD

A quasi-experimental, non-equivalent pre-test/post-test control group design was employed. The study included 80 intermediate-level EFL students (42 females, 38 males, mean age $M = 19.5, SD = 1.1$) enrolled in a university English course. Participants were divided into two groups:

- Experimental Group (EG, $n=40$): Received instruction integrating AI-driven gamified tools.
- Control Group (CG, $n=40$): Received the same curriculum content through conventional classroom methods (textbook, teacher-led drills, non-digital exercises).

The study was conducted over a 10-week period, replacing two hours of weekly contact time for the EG with the digital intervention.
The experimental group used a commercial AI-driven language learning application (e.g., a platform featuring adaptive leveling, points, streaks, badges, and AI-powered speech recognition for pronunciation correction).
The following instruments were used for data collection:
Motivation Questionnaire (Pre- and Post-test): A modified, 20-item Likert scale questionnaire based on the Attitude/Motivation Test Battery (AMTB), focusing on students' self-reported motivation toward EFL learning (e.g., enjoyment, persistence, value).
Communicative Competence Test (Pre- and Post-test): A standardized proficiency test covering four sub-skills:

- Grammar and Structure (Multiple choice)
- Vocabulary Knowledge (Matching)
- Listening Comprehension (Short answer)
- Total Score (Composite of all sections)

All data were analyzed using SPSS (Version 28). Descriptive statistics were calculated for all measures. To address the research questions, a Two-way Analysis of Variance (ANOVA) with repeated measures was used to compare the pre-test to post-test gains between the experimental and control groups for both motivation scores and communicative competence sub-skill scores. The significance level was set at $p < 0.05$.

RESULTS

The ANOVA results indicated a statistically significant interaction effect between the intervention group and time (Pre- vs. Post-test) for the motivation scores ($F(1, 78) = 8.12, p = 0.005, \eta_p^2 = 0.094$).

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Group	Motivation Score (Pre-test, M±SD)	Motivation Score (Post-test, M±SD)	Mean Gain
Experimental (AI-Gamified)	3.55 ± 0.45	4.18 ± 0.38	0.63
Control (Conventional)	3.60 ± 0.42	3.75 ± 0.40	0.15

The Experimental Group demonstrated a significantly greater mean gain in motivation scores than the Control Group, suggesting that the gamified AI environment was highly effective in boosting student engagement and persistence.

Significant differences in learning gains were observed in the total communicative competence scores ($F(1, 78) = 12.55, p < 0.001, \eta_p^2 = 0.138$).

Language Skill	Group	Pre-test Score (M±SD)	Post-test Score (M±SD)	Mean Gain
Total Score	EG	65.2 ± 5.1	74.5 ± 4.8	9.3
	CG	64.8 ± 5.3	68.1 ± 5.0	3.3
Vocabulary	EG	15.1 ± 2.0	18.9 ± 1.5	3.8
	CG	14.9 ± 1.8	15.5 ± 1.6	0.6
Grammar	EG	18.5 ± 2.1	21.2 ± 1.8	2.7
	CG	18.3 ± 2.0	19.0 ± 1.9	0.7

Post-hoc analysis revealed that the EG showed significantly higher gains in Vocabulary and Grammar sub-sections, which are skills directly supported by the AI's adaptive practice and immediate corrective feedback. No significant difference was found in the Listening Comprehension section.

DISCUSSION

The results strongly support the hypothesis that integrating AI and gamification significantly enhances EFL students' learning outcomes. The substantial increase in the Experimental Group's motivation score confirms that the game elements (points, levels, streaks) successfully provided the motivational scaffolding described by SDT, particularly fulfilling the need for competence (through observable progress) and autonomy (through personalized learning paths).

The superior gains in Vocabulary and Grammar acquisition are directly attributable to the adaptive and instantaneous feedback provided by the AI system. The AI's ability to identify specific errors and generate targeted practice, reinforced by the high-frequency practice inherent in gamified applications, allowed students to correct and internalize language rules more efficiently than their peers in the conventional setting. The lack of significant difference in the Listening Comprehension sub-skill suggests that while the tool is strong for discrete skills like vocabulary and grammar, the design may not provide enough authentic, extended conversational input required for deep listening proficiency.

These findings align with and extend existing literature. They confirm the motivational benefits observed in previous gamification studies (Hung et al., 2018) while providing empirical evidence for the added value of AI's adaptive complexity in improving concrete linguistic skills. Unlike studies on generic Computer-Assisted Language Learning (CALL), the success here is tied to the personalized difficulty adjustment, ensuring that the student is consistently working within their Zone of Proximal Development (ZPD).

CONCLUSION

The pedagogical convergence of AI and gamification represents a powerful, effective shift in EFL instruction. The evidence from this study suggests that AI-driven gamification significantly boosts student motivation and accelerates the acquisition of fundamental linguistic competence. Educators and developers should prioritize the adoption of such tools to create

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highly engaging, personalized, and data-driven learning experiences that meet the needs of modern EFL learners.

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