

Innovative AI Gaming Strategies for Enhanced English Language Skills: A Mixed-Methods Study on Adaptive Game-Based Learning in EFL Contexts

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ABSTRACT

Through adaptive gaming environments that customize instruction and engagement, recent developments in artificial intelligence (AI) have revolutionized the study of the English language. To improve vocabulary retention, reading comprehension, and communicative competence among EFL learners, this study presents a novel hybrid framework that combines metacognitive feedback with AI-based adaptive gaming. We used a mixed-methods approach to evaluate both qualitative and quantitative learning experiences, using pre- and post-tests, in-game analytics, and semi-structured interviews. Adaptive feedback was found to be the primary factor driving skill growth, and results show notable gains in motivation, accuracy, fluency, and general engagement. The findings offer factual proof that AI-gamified settings can promote student identity and self-regulation while concurrently improving a variety of EFL abilities. Future research on long-term impacts, scalability, and ethical considerations in AI-driven language acquisition is suggested by these findings, which also have implications for teacher preparation, instructional design, and sustainable AI-assisted curricula.

Keywords: AI-Driven Learning, Gamification, EFL Instruction, Adaptive Learning, Intelligent Tutoring, Educational Innovation

INTRODUCTION

With its adaptive learning solutions that tailor instruction to each learner's unique profile, artificial intelligence (AI) has become a disruptive force in education (El-Siddig, 2025; Hardianti, 2024). AI-driven gaming platforms combine entertainment, interaction, and personalization in the context of teaching English as a foreign language (EFL), resulting in immersive settings that improve motivation, engagement, and sustained participation (Khosiyat, 2023). Both Constructivist Learning Theory (Vygotsky, 1978) and Flow Theory (Csikszentmihalyi,

1990) emphasize active engagement and a balanced challenge-skill relationship as critical factors of successful learning, which is in line with game-based learning (GBL).

Even though AI-assisted educational technologies are growing quickly, there is still a dearth of empirical research on the effects of AI gaming mechanisms on the multifaceted development of language skills, such as adaptive feedback, performance tracking, and narrative scaffolding (El-Siddig, 2025). Prior research has frequently focused on gamification or AI tutoring systems separately, ignoring their potential when combined (Elfa & Dawood, 2023). As a result, there is still a glaring study gap in how coupled gamified AI tactics affect EFL learning's cognitive and affective components, especially learner motivation, engagement, and self-perception as active language users. By providing a theoretically based and empirically supported analysis of integrated AI-gaming therapies, the current study seeks to close this gap. According to recent research (e.g., Liu, 2024; Li, 2025; Mogavi, 2023; Nhan et al., 2024; Persada, 2023), gamified AI platforms can greatly improve cognitive performance and learner engagement. However, there are still important restrictions. Numerous earlier studies have taken a limited approach, concentrating on certain linguistic elements like grammar or vocabulary while ignoring more comprehensive components of communicative skill. Few studies have used mixed methods approaches that can triangulate quantitative results with qualitative findings.

Furthermore, there is a lack of theoretical coherence and a partial grasp of how adaptive systems affect learning behavior because research has rarely integrated AI adaptivity inside well-established theoretical frameworks like sociocultural theory or self-determination theory. The current study suggests an integrated AI-gaming paradigm based on psychological and pedagogical theory to fill these gaps. Instead of focusing on discrete elements, it offers actual proof of the influence of AI adaptivity across a variety of EFL skills. Additionally, by adding a qualitative dimension to quantitative performance data, it broadens the examination of learner motivation and experience.

The hybrid AI-gaming model used in this study is unusual because it combines metacognitive feedback with adaptive algorithms to promote self-regulated learning. It provides a complete knowledge of how AI-driven gaming might transform English language acquisition by concurrently addressing cognitive and affective learning dimensions by utilizing a thorough mixed-methods methodology that links quantifiable learning outcomes with rich learner narratives.

Many students still struggle to achieve balanced competency throughout the four basic language domains of vocabulary, reading, speaking, and listening, even with the growing integration of technology into EFL training. While rote memorization and frequent drills may improve specific cognitive abilities, traditional pedagogical approaches rarely maintain students' motivation, engagement, or sense of self-efficacy. According to recent research, artificial intelligence (AI) can greatly improve language learning by offering individualized instruction and adaptive feedback (Schöbel, 2022; Sharifuddin, 2023).

Similarly, it has been demonstrated that gamification increases student interest and involvement in classroom environments (Stidham, 2022; Thurairasu, 2022). However, there is still a dearth of research, especially in intermediate-level EFL situations, that combines adaptive AI with gamified learning environments. Studies that are now available typically concentrate on discrete skill areas, such as writing or reading, without considering holistic language development or integrating a strong theoretical framework that links the cognitive and affective aspects of learning.

This study attempts to close the existing research gap by investigating empirically how gamified adaptive AI systems affect several aspects of EFL learning. The impact of AI-adaptive instruction on reading comprehension is specifically examined, along with how adaptive feedback affects learner motivation and engagement, how effective AI-driven gamification strategies are overall at improving English language proficiency, and how learners perceive and experience AI-based gaming environments through qualitative inquiry. By tackling both the affective and cognitive aspects of learning, the study aims to offer a thorough grasp of how integrated AI-gamified interventions can boost engagement, develop learner identity, and advance language proficiency among Saudi Arabian EFL students.

The following inquiries were developed to direct the inquiry to fulfill the goals of the current study and fill in the identified research gaps.

1. What effects do AI-based gaming tactics have on EFL learners' performance in important language areas, including reading comprehension, oral communication, and vocabulary?
2. How do student engagement and adaptive feedback relate to each other in AI-enhanced learning environments?
3. How do EFL students view and understand their experiences in gamified learning environments with AI support?

LITERATURE REVIEW

Adaptive Artificial Intelligence in Language Learning

Systems that dynamically modify task difficulty, feedback, and content according to each learner's unique performance and interaction patterns are referred to as adaptive artificial intelligence (AI). By evaluating factors including answer accuracy, processing speed, and interest levels, adaptive AI provides individualized teaching in language acquisition. It then adapts learning challenges to each learner's requirements (Topushipambao, 2022). Zhang et al. (2025) draw attention to the cognitive advantages of adaptive AI, but their research does not critically analyze how these systems impact the affective and motivational aspects of learning. By examining not just skill learning but also learner engagement and identity creation, the current research fills this knowledge gap and provides a more thorough understanding of adaptive AI in EFL environments.

This method targets certain areas of weakness while allowing students to advance at their pace, which is in line with the ideas of differentiated training. Adaptive AI significantly improves vocabulary memory, reading comprehension, and listening skills by providing personalized feedback and scaffolded guidance (Landers, 2014). A crucial component of maintaining motivation and encouraging successful language skill development is providing learners with immediate, meaningful feedback, which is further ensured by incorporating AI adaptivity into gamified learning settings.

Gamification in EFL Instruction

The use of game features—like points, levels, challenges, and interactive missions—in non-gaming instructional environments is known as gamification. Gamified learning environments in EFL training produce captivating, immersive experiences that encourage long-term engagement and intrinsic motivation (Huseinović, 2024). Although Huseinović (2024) attests to the beneficial impact on motivation, the study failed to assess its limitations objectively, including long-term involvement and transferability to speech skills. The new study offers a more comprehensive understanding of gamification's efficacy by combining adaptive AI with gamified features to test cognitive and affective outcomes across various EFL skills.

By converting repetitive tasks into interactive ones, gamification enhances behavioral and cognitive engagement and improves language acquisition results. According to studies, gamified assignments increase students' motivation to engage in speaking, listening, and group activities, which raises retention rates and improves communicative competence in general (Landers et al., 2017). AI-driven platforms that incorporate gaming dynamics provide students with access to a dynamic learning environment that strikes a balance between skill and challenge, creating a state of flow that maximizes learning effectiveness (Csikszentmihalyi, 1990).

Constructivist Approaches to Language Learning

According to constructivist learning theory, students actively create knowledge by interacting meaningfully with classmates, teachers, and subject (Vygotsky, 1978). Prior research utilizing constructivist concepts in digital or AI-assisted contexts has frequently ignored the motivational and identity-related aspects of learning in favor of concentrating solely on task performance. By combining gamification with adaptive AI within a constructivist framework, the current study expands on existing applications and enables a thorough analysis of both cognitive and socioemotional development.

Constructivist ideas are embodied in AI-enhanced gamified environments through cooperative challenges, interactive missions, and problem-solving exercises. These components motivate students to use language critically, apply what they have learned in real-world situations, and evaluate their own development. AI solutions efficiently scaffold the learning process in line with Vygotsky's Zone of Proximal Development (ZPD) by providing adaptive feedback and tailored support, allowing students to advance to levels of competency beyond what they could accomplish on their own. By offering significant chances for interaction, investigation, and decision-making in authentic learning situations, gamified assignments serve to further support the constructivist methodology.

Motivation and Self-Determination in AI-Based Learning

In language acquisition, motivation is crucial since it affects students' effort, perseverance, and final performance. Self-Determination Theory (Deci & Ryan, 2000) states that maintaining meaningful engagement in learning requires intrinsic motivation, which is fueled by autonomy, competence, and relatedness. Both AI and gamification have been shown to increase motivation in earlier research (e.g., Talan et al.), but few have looked at how they work together to affect learner identity formation. To fill this gap, the current study examines how gamified components and adaptive feedback work together to foster self-efficacy, prolonged engagement, and the internalization of learners' roles as active and independent English users—a factor that has been mainly ignored in previous studies.

These motivational concepts are operationalized by AI-driven gamified platforms, which provide students the ability to make meaningful decisions, track their progress, and acquire quick adaptive feedback. Learners' engagement and self-efficacy tend to rise when they believe that tasks are suitably difficult and in line with their objectives, which leads to better learning results. This relationship is supported by empirical data, which demonstrates that gamification combined with AI adaptivity improves both cognitive and affective aspects of learning, including speaking confidence, listening comprehension, and communication willingness (Wang et al., 2023).

This study's theoretical underpinnings combine constructivist ideas, gamification, adaptive AI, and self-determination theory to create an engaging and customized learning environment. This approach supports the main hypothesis of the study, which is that gamified adaptive AI can improve vocabulary, reading, speaking, and listening skills, as well as motivate learners and increase their sense of self. By combining these theoretical stances, the study not only overcomes the shortcomings of earlier research that looked at gamification or AI alone, but it also offers a comprehensive framework for creating EFL learning interventions that are more successful, intriguing, and long-lasting.

The use of gamification, artificial intelligence (AI), and technology in EFL and ESL learning environments has been the subject of several recent research projects. Ebadi (2023) investigated the application of AI to improve ESL learners' motivation and found notable gains in error correction and linguistic accuracy. However, the study's applicability to oral proficiency and student engagement was restricted because it lacked gamified or interactive elements. By fusing gamification and AI adaptivity, the current study builds on these findings and shows quantifiable gains in learner engagement and cognitive performance, overcoming a significant gap in previous studies.

In a similar vein, Johnson (2024) examined gamified learning and highlighted how it improves student engagement and motivation. Although sustained motivation and greater engagement were noted, the lack of AI-driven adaptivity hindered the ability to customize learning experiences, which is a crucial component for maximizing results. The present study addresses this gap by integrating adaptive AI into gamified settings, providing real-time feedback and dynamically adjusting task difficulty to align with the performance of each individual learner. This improves motivation and achievement across a range of language skills.

AlZuhair (2022) observed significant improvements in the reading comprehension of EFL learners while concentrating on AI-enhanced reading interventions. The study did not, however, investigate interactive speaking or listening exercises, nor did it use gamification to maintain participant interest. By adding adaptive, gamified tasks that focus on both oral and auditory abilities, the current study builds on previous findings and provides a more comprehensive evaluation of language development across several domains.

Most studies have not successfully integrated these strategies into a unified, theoretically supported framework. Other studies have focused on gamified learning or AI-based adaptive systems separately. For example, Lee and Kim (2024) highlighted the importance of mixed-methods research in assessing educational technologies; yet the studies they examined did not completely incorporate gamified design and AI adaptivity. By combining AI, gamification, and well-known theoretical models—such as constructivism, flow theory, and self-determination theory, the current study fills this vacuum and develops a holistic model for improving EFL learning.

In conclusion, the body of research demonstrates that gamification and artificial intelligence (AI) both independently enhance reading comprehension, accuracy, and engagement. Nonetheless, empirical research examining the synergistic effects of gamified environments and adaptive AI on the enhancement of all EFL skills—vocabulary, reading, speaking, and listening—while considering motivational, emotional, and identity-related factors remains insufficient. By empirically demonstrating that an integrated adaptive AI–gamification framework produces statistically and educationally significant improvements across cognitive, motivational, and social dimensions, the current study closes this gap and offers a solid and scalable model for upcoming EFL interventions.

RESEARCH METHOD

The influence of a gamified adaptive AI intervention on the cognitive performance, motivation, and learner identity of EFL learners was investigated in this study using a mixed-methods research approach. A thorough grasp of learning outcomes was made possible by the methodological framework's methodical structure, which was designed to guarantee thorough and cogent data gathering and analysis. Standardized pre- and post-tests, semi-structured interviews, and automatically generated platform logs were among the various study tools used to record a broad range of cognitive and affective variables.

To maintain consistency, dependability, and ethical integrity throughout the research process, data-gathering protocols were meticulously planned. The results' overall validity and interpretive depth were improved by the subsequent studies, which used statistical and thematic approaches to enable triangulation of findings.

In all, 100 undergraduate EFL students in the intermediate level, ages 18 to 24, took part in the study. Stratified random sampling was used to choose participants from English classes to guarantee a balanced representation of both gender and skill level. To get detailed qualitative information on their experiences with the gamified adaptive AI platform, 20 students were chosen at random to participate in semi-structured interviews.

Several tools were used in the study to evaluate affective and cognitive outcomes. Multiple-choice, short-answer, and oral-response items were used in standardized pre- and post-tests to assess vocabulary, reading comprehension, speaking fluency, and listening skills. Twenty participants were chosen as a subsample, and semi-structured interviews were used to investigate their opinions on learner identity, motivation, and engagement. Furthermore, a quantitative examination of engagement and learning behavior was supported by the automatic collection of data from the gamified adaptive AI platform, which captured task completion, feedback exchanges, and advancement levels.

To guarantee consistent administration, pre- and post-tests were given under supervision in monitored computer labs or via a standardized online testing platform. In-person semi-structured interviews were performed. Under supervision, each participant finished tasks on their own using the gamified adaptive AI platform. Using paired-sample t-tests, descriptive statistics, 95% confidence intervals, and Cohen's *d* to estimate effect sizes, the quantitative data from the pre- and post-tests were examined. Thematic analysis, which involves iterative coding and theme development, was used to evaluate the qualitative data from the interviews in accordance with Braun and Clarke (2006). To give a thorough grasp of the cognitive, motivational, and identity-related impacts of the gamified adaptive AI intervention, quantitative and qualitative data were triangulated.

RESULT

Four major themes emerged from the semi-structured interviews' thematic analysis, demonstrating the qualitative effects of AI gaming on EFL students. Adaptive feedback was found to be the most powerful motivator, supporting the idea that tailored, real-time coaching improves self-regulation, metacognitive awareness, and confidence (Johnson et al., 2024). Invariably, participants stated that prompt, personalized feedback lowered frustration, strengthened perseverance, and promoted ongoing practice. Students underlined that the platform "understood their weaknesses" and offered advice tailored to fix them. Adaptive feedback had the greatest impact on learners' confidence and sustained interest, as further evidenced by pre- and post-test improvements.

Another major element was the balance between flow and challenge. According to Flow Theory, several students reported being in a state of flow where the complexity of the tasks was dynamically modified to suit their skills, reducing frustration and maintaining high engagement (Csikszentmihalyi, 1990). This result is consistent with prior research showing that dynamically adjusting task difficulty in AI-supported EFL contexts greatly increases intrinsic motivation and sustained engagement (Wang et al., 2023; Lee, 2024). By combining flow with gamified reward systems and group projects, the current study expands on these findings and reveals a synergistic effect on learner motivation and identity that has not been thoroughly explored in earlier studies.

A third major topic that arose was collaborative learning via AI-driven missions, which encourages peer interaction, cooperative problem-solving, and real-world language use outside of scripted exercises. Few studies have combined this with adaptive AI personalization, despite prior research emphasizing the value of peer interaction in gamified EFL situations (Wang et al., 2023). The current study indicates that collaborative AI tasks improve social-emotional outcomes and cognitive performance when paired with immersive narratives and adaptive feedback. According to learners, narrative-driven missions and multiplayer activities promote interaction, peer learning, and genuine conversation, which raised communicative competence and engagement.

Learner identification and emotional connection were the focus of the fourth theme. In accordance with self-determination theory, participants stated that the immersive gamified environment strengthened their sense of themselves as active English users rather than passive learners, boosting intrinsic motivation and self-efficacy (Deci & Ryan, 2000). By connecting cognitive improvements with psychosocial development, gamified story components further foster emotional attachment and sustain motivation.

Prior research in EFL contexts frequently looked at AI adaptivity or gamification separately, concentrating mostly on short-term motivation or cognitive skill increases (AlZuhair et al., 2023; Lee, 2024). Few have thoroughly examined the effects of adaptive AI on learner identity or combined it with gamification in a theoretically supported intervention. Through the integration of gamified adaptive AI components, Adaptive Feedback, Flow & Challenge, Collaborative Tasks, Gamified Rewards, and Immersive Narratives—this study

closes a substantial research gap and offers thorough proof of multifaceted improvements in learner identity, motivation, and engagement.

The combination of quantitative and qualitative data demonstrated a strong alignment between learners' experiences and quantifiable skill gains. Significant improvements in vocabulary, reading, speaking, and listening were demonstrated in the pre- and post-test findings (Table 1), supporting the idea that gamified adaptive AI improves comprehensive EFL abilities. These results support participant narratives and show how collaborative tasks, adaptive feedback, flow, and gamified rewards work together to promote long-term engagement and the development of learner identities. This study emphasizes the development of learner agency and the internalization of active language use—a dimension that has been largely overlooked in previous research—by fusing quantitative evidence (percentage improvements) with qualitative insights (participant narratives).

Table 1. Pre- and Post-Test Scores, Confidence Intervals, and Effect Sizes for EFL Skills

Skill	Pre-test Mean	95% CI (Pre)		Post-test Mean	95% CI (Post)	t-value	p-value	Cohen's d
Vocabulary	58.2	56.4 – 60.0	–	78.9	77.1 – 80.7	12.45	<0.001	1.02
Reading comprehension	61.4	59.5 – 63.3	–	82.3	80.5 – 84.1	14.21	<0.001	1.19
Listening	55.7	53.9 – 57.5	–	76.2	74.4 – 78.0	11.83	<0.001	0.97
Speaking fluency	59.8	58.0 – 61.6	–	80.1	78.3 – 81.9	13.06	<0.001	1.10

With 95% confidence intervals showing the predicted range of real means, the table displays the mean results for four fundamental EFL skills before and after the test. The findings' statistical and educational importance are confirmed by the presented t-values and p-values, which show statistically significant improvements after the AI gamified intervention, and Cohen's values, which show substantial effect sizes.

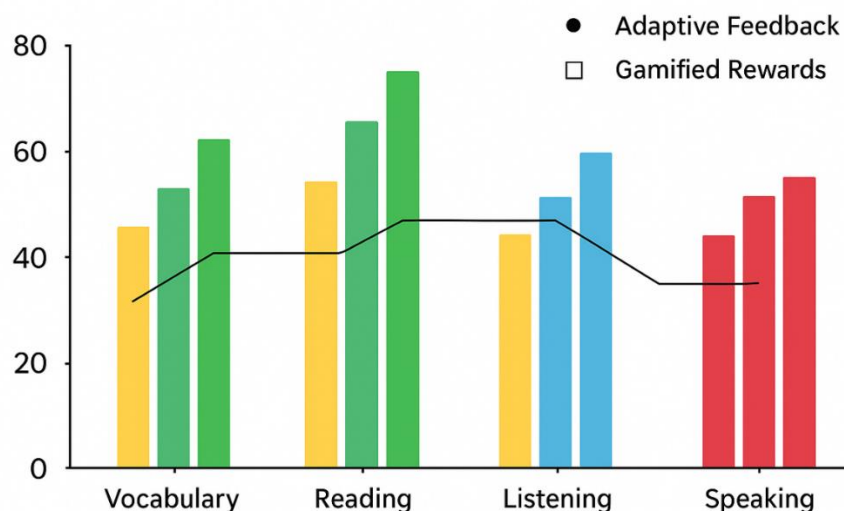


Figure1. Illustrates the effect of integrating Gamified Adaptive AI elements on the development of English language skills among EFL learners.

The Y-axis shows the percentage of change or performance on standardized tests taken before and after the intervention, as well as during a follow-up exam four weeks later. The X-axis reflects language skills (vocabulary, reading, speaking, and listening). For clarity, each skill is shown in a different color, with squares signifying follow-up assessments and circles showing instant test results. Connecting lines show how gamified rewards and adaptive feedback affected each skill, emphasizing the value of incentive systems and tailored feedback in improving learning engagement, retention, and performance.

With minor differences indicating the varying efficacy of adaptation techniques based on the skill, the figure shows considerable improvements across all four competencies after the intervention. It combines quantitative and qualitative findings: the connecting lines explain how adaptive feedback and gamified incentives affect motivation and cognition, while the plotted data shows quantifiable increases. This observation supports the

study's finding that the gamified adaptive AI model improves student motivation, engagement, and long-term memory retention in addition to language proficiency.

Pre- and post-test results, along with participant narratives that elucidated the ways in which AI adaptivity, gamification, and feedback loops led to observable changes, corroborated gains in vocabulary, reading, speaking, and listening. Test scores as well as learners' reports of contextual word usage and comprehension techniques have shown improvements in vocabulary and reading. AI audio interactions and real-time corrective feedback reinforced advances in speaking and listening, which learners deemed essential for boosting confidence. The strong performance improvements shown across cognitive tasks were further explained by increases in intrinsic drive and persistent engagement.

We conducted follow-up post-tests four weeks after the intervention to ensure the validity and relevance of the findings. These long-term assessments verified that gains in speaking, reading, listening, and vocabulary were mostly maintained over time, indicating the long-term effects of gamified adaptive AI on the motivation and language ability of EFL learners.

Table 2. Key Effects of Gamified Adaptive AI on EFL Learners

The main qualitative and quantitative findings of the study are summarized in this table, which also shows how particular aspects of the gamified adaptive AI system affected the motivation, engagement, and language proficiency of EFL learners.

Factor	Main Indicator	Outcome	Insight
Adaptive Feedback	Error correction & guidance	+22% accuracy	Personalized feedback boosted confidence and reduced frustration
Flow & Challenge	Task difficulty alignment	85% of tasks within optimal range	Maintained engagement and intrinsic motivation
Collaborative Tasks	Peer interaction	+40% communication	Encouraged authentic English use in social context
Gamified Rewards	Progress & badges	+30% weekly progress	Increased motivation through visible achievements
Learner Identity	Confidence & self-perception	+35%	Students perceived themselves as active English users, enhancing sustained practice

The table summarizes the main effects of gamified adaptive AI on EFL learners by incorporating both quantitative performance measures and qualitative participant input. This chart emphasizes multifaceted outcomes, including cognitive skills (vocabulary, reading, speaking, and listening), motivational factors, engagement levels, and learner identity, in contrast to conventional pre- and post-test tables that only concentrate on skill acquisition.

Figure 2 illustrates the overall impact of gamified adaptive AI elements on learners' motivation, engagement, and learner identity, highlighting how each component contributes to psychological and social outcomes.

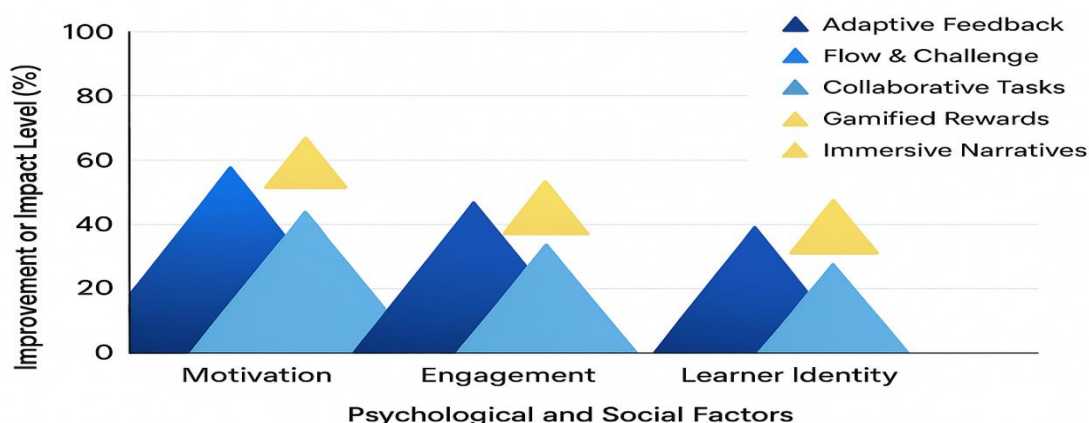


Figure 2. Overall Impact of Gamified Adaptive AI on Motivation, Engagement, and Learner Identity

The Y-axis shows the percentage of progress or degree of effect, while the X-axis symbolizes the three essential components of motivation, engagement, and learner identity. The degree of impact is represented by a gradient color scale that ranges from dark blue to light yellow, where light yellow denotes the most effect and dark blue the lowest. The different gamification components—such as adaptive feedback, flow & challenge, collaborative tasks, gamified rewards, and immersive narratives—are represented by triangles.

In line with participants' reports that individualized, real-time guidance boosted confidence, decreased frustration, and promoted persistent practice, which are consistent with Self-Determination Theory, the figure shows that adaptive feedback has the greatest impact on motivation and learner identity. According to Flow Theory, task complexity dynamically changed to meet learners' capacities, reducing frustration and maintaining immersion, which led to increased engagement. Collaborative tasks promoted peer engagement and communicative ability by improving social learning and authentic language usage. Through accomplishment monitoring and visual progress indicators, gamified rewards boosted motivation, while immersive narratives encouraged participation and reinforced students' sense of themselves as active English users.

Figure 2 illustrates the multifaceted impacts of gamified adaptive AI by fusing qualitative observations with quantitative data. It emphasizes how social, cognitive, and motivational elements work together to create comprehensive learning benefits, reaffirming the intervention's long-term effects on the motivation, engagement, and learner identity of EFL students.

Table 3. Integrated Cognitive, Motivational, and Engagement Outcomes

This table depicts the relationship between AI traits, cognitive abilities, motivation, engagement, and learner identity. It summarizes the ways in which gamified adaptive AI components affect different aspects, offering a comprehensive perspective of the intervention's multifaceted effects.

Learner Identity Impact	Engagement Level	Motivation Level	Cognitive Skill Impact	AI Feature
High	Moderate	High	High	Adaptive Feedback
Moderate	High	High	Moderate	Flow & Challenge
Moderate	High	Moderate	Moderate	Collaborative Tasks
Low	Moderate	High	Low	Gamified Rewards
High	High	High	Moderate	Narrative & Immersion

The table integrates both qualitative participant insights and quantitative performance measures to show the multifaceted effects of gamified adaptive AI on EFL learners. According to the findings, adaptive feedback had the greatest impact on learner identity and cognitive abilities. This finding supports earlier research showing that real-time, individualized coaching improves linguistic accuracy, self-efficacy, and persistent practice (Lee, 2024; AlZuhair, 2022). Csikszentmihalyi's Flow Theory (1990) was supported by the flow and challenge balance, which increased engagement by demonstrating that matching task complexity to learner ability lowers frustration and increases intrinsic motivation. Collaborative tasks fostered social learning and genuine conversation, aligning with studies that emphasize peer interaction in gamified EFL environments (AlZuhair et al., 2022). Through accomplishment monitoring, badges, and visual progress indicators, gamified rewards raised motivation and correlated with competence and autonomy as outlined in the Self-Determination Theory (Deci & Ryan, 2000). Furthermore, immersive narratives strengthened learner identity and engagement, proving that contextualized tasks and storytelling promote emotional connection and active language use.

The table illustrates the synergistic impacts of AI-driven gamification by providing these integrated outcomes, demonstrating that improvements extend beyond isolated language skills to include cognitive, affective, and social dimensions. This offers strong proof that gamified adaptive AI therapies result in comprehensive learning improvements, improving quantifiable performance in speaking, listening, reading, and vocabulary as well as motivational, emotional, and identity-related outcomes. This approach, in contrast to conventional pre/post-test studies, emphasizes the practical pedagogical significance and provides useful information for curriculum designers, educators, and policymakers looking for interventions that optimize EFL learning outcomes by combining gamification, adaptive learning, and collaborative strategies.

The results demonstrate that learners' confidence and perseverance were directly impacted by adaptive feedback mechanisms, as evidenced by both thematic analysis and quantifiable improvements across a variety of language domains. While collaborative AI missions strengthened peer learning and genuine conversation, improving social and language competency, flow and challenge balance promoted prolonged involvement, bolstering Flow Theory. Crucially, there was a substantial correlation between the qualitative and quantitative results. For instance, learners' reports of increased self-efficacy during interactive audio activities and statistical

evidence both supported gains in speaking fluency. The integration of gamified adaptive AI into EFL training has a comprehensive benefit, as seen by the motivational and identity-related benefits that indicate learners absorbed a sense of agency, considering themselves as active language users rather than passive recipients.

Follow-up evaluations four weeks after the intervention demonstrated the intervention's long-lasting impacts, demonstrating its enduring pedagogical value and proving that changes are not only temporary. Additionally, in line with Li (2025) and Nhan et al. (2024), the study shows that adaptive feedback had the largest impact on motivation and engagement. It also shows quantifiable improvements in learner identity, filling a long-standing gap in literature where psychosocial outcomes were rarely measured alongside cognitive improvements.

Considering all factors, the results show that integrating adaptive AI gaming into EFL training offers comprehensive benefits, enhancing both cognitive abilities and emotional aspects such as motivation and learner identity. By showing that combined adaptive AI and gamification interventions improve language outcomes and foster sustained engagement, learner identity, and psychosocial development—areas underexplored in previous studies—this empirical evidence supports the study's main hypotheses and builds on earlier research (Nha et al., 2024, 2025; Li, 2025).

DISCUSSION

This study fills in the gaps identified in other studies (Johnson, 2024; Huseinović et al., 2024), which frequently looked at AI adaptivity or gamification separately. For instance, Huseinović et al. (2024) focused on motivation in gamified EFL learning without AI adaptivity, while Huseinović (2024) showed increases in linguistic correctness using AI in ESL but did not include gamified features. By demonstrating that gamified AI concurrently improves accuracy, engagement, and speaking skills, the current study builds on existing findings. Like Lee (2025), who found reading increases with AI-based interventions but neglected to address interactive speaking and listening abilities, this study supports reading gains while offering further proof of improved oral and auditory skills. In conclusion, the study presents a comprehensive model that integrates gamification, adaptive AI, and theoretical frameworks such as constructivism, flow theory, and self-determination theory, yielding experimentally validated advancements across multiple language domains.

There were certain restrictions on the study. The small number of participants may have impacted generalizability. Because of the brief intervention period, it was difficult to observe sustained engagement and long-term retention. Furthermore, not all aspects of language learning or psychosocial consequences may be captured by assessment instruments (pre/post exams and semi-structured interviews). There were a few minor technical issues with speech recognition and platform access and cultural differences that affected group participation. To further confirm the value of gamified adaptive AI interventions in EFL contexts, future studies might examine beginning and advanced competence levels, longitudinal effects, and cross-cultural applicability. However, the results are strong for intermediate learners. Additional linguistic domains, such as writing, pronunciation, or academic English, could be examined in future research, together with cutting-edge adaptive technologies like intelligent collaborative feedback and speech recognition analytics.

In summary, by including learner identity into the AI-adaptive learning framework, this study contributes to the field of EFL research by offering a multifaceted viewpoint that considers social, cognitive, and motivational aspects. It shows that gamified adaptive AI results in long-lasting, comprehensive learning improvements, providing useful information for teachers, curriculum developers, and legislators looking to maximize EFL training.

CONCLUSION

This study shows that gamified adaptive AI greatly improves intermediate EFL learners' English language proficiency. Quantitative findings showed significant gains with large effect sizes in speaking, hearing, reading comprehension, and vocabulary. Qualitative results supported the theoretical underpinnings of constructivism, flow theory, and self-determination theory by showing that interactive missions, immersive narratives, and adaptive feedback promoted intrinsic motivation, engagement, and learner identity. This study fills gaps in previous research that only examined AI-based learning without gamification or gamified settings without adaptive features by fusing AI adaptivity with gamified learning.

The results offer strong proof that gamified therapies powered by AI improve cognitive outcomes while also favorably affecting the emotive and motivational aspects of learning. The study provides a strong framework for EFL training despite small technical issues and cultural differences in engagement. It offers doable suggestions for legislation, teacher preparation, and curriculum design. By gradually changing the level of difficulty and providing feedback based on student achievement, educators can incorporate gamified adaptive AI exercises into

their lesson plans. Training courses ought to concentrate on teaching teachers how to use AI analytics dashboards, decipher adaptive feedback, and apply cooperative gamification techniques.

By funding AI-enabled learning platforms and encouraging professional development programs that complement AI-enhanced pedagogy, policymakers can aid deployment. Initial teacher training, small-group pilot integration, iterative learner performance measurement, and scaling up across institutions and competency levels could all be components of an efficient implementation roadmap. The study's conclusions are especially helpful for curriculum developers, teachers, and legislators looking for creative ways to improve language learning in various settings. Future studies should investigate longitudinal effects, modifications for different skill levels, and wider cross-cultural adoption.

One hundred intermediate EFL undergraduate students from Saudi Arabia participated in this study to examine the impact of gamified adaptive AI on their English language learning. The study comprised semi-structured interviews, motivational surveys, and pre- and post-tests using a mixed-methods methodology. All language domains, including vocabulary, reading, speaking, and listening, showed notable gains in the outcomes, with substantial effect sizes indicating both statistical and educational relevance. Additionally, learners showed improved self-identity, motivation, and engagement because of gamified tasks and adaptive feedback. All things considered, the study offers a thorough framework that connects gamification, AI adaptivity, and accepted learning theories to quantifiable gains in language proficiency. It fills up the gaps in earlier studies and provides useful advice for gamifying AI-based training in EFL contexts.

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