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"GAMIFYING ENGLISH LANGUAGE LEARNING THROUGH ARTIFICIAL INTELLIGENCE: ENHANCING ENGAGEMENT AND ACHIEVEMENT AMONG SECONDARY STUDENTS"

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Abstract
The integration of Artificial Intelligence (AI) and gamification has emerged as a transformative approach to address challenges in English language learning, particularly among secondary students. This study investigates the role of AI-driven gamified platforms in enhancing motivation, engagement, and achievement in English language acquisition. Using a ***mixed-****method research design, data were collected through surveys, pre- and post-tests, and interviews with students and teachers across selected secondary schools. Quantitative results indicated a significant improvement in learners' performance, especially in vocabulary, grammar, and comprehension, following the use of AI gamified applications. Urban students exhibited higher gains due to better access to digital infrastructure, while rural students faced limitations stemming from technological constraints. Qualitative thematic analysis further revealed key themes such as personalized learning, increased engagement, reduction in language anxiety, and enjoyment in interactive tasks, highlighting the affective and cognitive benefits of AI integration. Triangulation of findings confirmed that improvements were not limited to test scores but also reflected learners' positive attitudes and behavioral changes toward English learning. The study underscores the importance of teacher training, equitable access to digital resources, and culturally relevant gamified content to maximize the benefits of AI-assisted learning. Recommendations include adopting to blended learning models, localized gamification frameworks, and robust monitoring systems track student progress. The paper concludes that AI-driven gamification holds immense promise for transforming English language education in Pakistan, provided infrastructural and pedagogical challenges are addressed. These insights contribute to the global discourse on AI in education while offering context-specific strategies for enhancing English proficiency among secondary learners in developing countries.*

Keywords: Artificial Intelligence, Gamification, English Language Learning, Secondary Students, Mixed-Method, Pakistan

1. Introduction
The rapid evolution of Artificial Intelligence (AI) has transformed the global educational landscape, providing innovative opportunities for teaching and learning. One of the most promising areas of this transformation is the integration of AI into gamified learning environments for the English language, particularly at the secondary school level. Gamification defined as the application of game-like features such as rewards, competition, and challenges in non-game contexts—has proven to enhance motivation, engagement, and learning outcomes (Hamari, Koivisto, & Sarsa, 2019). Coupled with AI's ability to provide adaptive learning, personalized feedback, and real-time assessment, gamification presents a powerful pedagogical

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approach for addressing the challenges of English language acquisition among secondary school students. In the context of Pakistan, English holds a unique status as both a subject of study and a medium of instruction in many schools, yet students often face barriers to achieving fluency. These challenges are exacerbated by traditional teacher-centered methods, lack of technological integration, and limited resources (Rahman & Bilal, 2021). AI-powered gamification offers a solution that not only makes learning English more interactive but also equips learners with the motivation and confidence needed to overcome language barriers (Bai, 2024).

1.1 Motivation behind the Study

English is often described as the "global lingua franca," playing a crucial role in academic, professional, and cross-cultural communication (Crystal, 2019). For countries like Pakistan, proficiency in English is not merely an academic requirement but also a pathway to social mobility and global participation (Kirkpatrick, 2021). Despite its importance, secondary students frequently struggle with vocabulary acquisition, grammar, pronunciation, and communication skills, primarily due to outdated teaching strategies and lack of learner engagement (Siddiqui, 2023).

Gamification, when supported by AI technologies, creates opportunities for adaptive learning environments where students receive tasks tailored to their learning level, instant feedback, and engaging incentives for progress (Chen et al., 2020). The motivation for this study is grounded in the pressing need to explore how such AI-driven gamified learning environments can address these long-standing challenges within Pakistani secondary schools. Moreover, with the post-COVID-19 shift toward digital learning, this research is timely as schools increasingly recognize the potential of educational technology.

1.2 Problem Statement

Traditional methods of teaching English in Pakistani secondary schools often rely heavily on rote memorization and teacher-centered instruction, with limited opportunities for interactive learning. This approach not only undermines students' engagement but also restricts the development of communicative competence (Shamim, 2019). Secondary students represent a critical stage where foundational language skills must be consolidated for higher education and professional pathways. However, without effective pedagogical innovations, students often remain demotivated and underprepared for English-medium contexts (Manan et al., 2022). The problem, therefore, lies in the absence of empirical research and practical implementation of AI-driven gamification in English language classrooms in Pakistan. This gap has resulted in continued reliance on ineffective practices that fail to engage learners or harness the potential of emerging technologies.

1.3 Research Aim and Objectives

Aim

The overarching aim of this study is to investigate the role of Artificial Intelligence in gamifying English language learning among secondary school students in Pakistan, with a specific focus on enhancing motivation, engagement, and language acquisition outcomes.

Objectives

1. To examine global trends in the use of AI and gamification in English language learning.
2. To analyze the current state of AI adoption in English language classrooms in Pakistan, with a focus on secondary education.
3. To explore secondary students' perceptions, experiences, and outcomes in using AI-based gamified learning tools for English.

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4. To identify barriers and opportunities for integrating AI-powered gamification in Pakistani classrooms.

1.4 Research Questions

This study is guided by the following research questions:

1. How is AI currently being integrated into gamified English language learning globally and within Pakistan?
2. What are the perceptions of secondary students toward AI-driven gamification in English language learning?
3. How does AI-based gamification influence students' motivation, engagement, and proficiency in English?
4. What challenges and barriers exist in implementing AI-powered gamified learning in Pakistan's secondary schools?

1.5 Importance of the Study

This study contributes to both academic literature and educational practice in multiple ways:

1. Pedagogical Innovation – By examining AI-powered gamification, this study introduces innovative teaching strategies that move beyond rote learning and foster active, student-centered learning (Lee & Hammer, 2011).
2. Local Relevance – Research on gamification in English language teaching is abundant globally but scarce in the Pakistani context. This study provides localized insights that address the cultural and infrastructural realities of secondary schools in Pakistan (Manzoor et al., 2025).
3. Bridging Research Gap – It fills a significant gap in the literature by empirically analyzing the potential of AI-driven gamification for English learning among secondary students.
4. Policy Implications – The findings can inform policymakers in integrating educational technologies into national curricula, particularly in English, which remains a critical skill for higher education and employment.
5. Student-Centered Outcomes – Most importantly, the study highlights ways to make English learning engaging, motivating, and effective for secondary school students, thereby improving their overall language proficiency and confidence.

2 Review of Literature

2.1 Role of AI in Learning English Around the Globe

The integration of AI in language education has grown exponentially over the past decade, with gamification emerging as one of the most effective applications. Globally, AI-powered gamified platforms such as Duolingo, Memrise, and Lingvist have demonstrated the ability to enhance motivation, engagement, and long-term retention of language skills (Munday et.al, 2022). These tools leverage adaptive learning algorithms that adjust difficulty levels in real time, ensuring students remain challenged yet not overwhelmed (Zou, Huang, & Xie, 2021).

Research has consistently highlighted that gamification, when supported by AI, fosters intrinsic motivation by combining learning with enjoyment (Caponetto, 2020). For instance, Hamari et al. (2019) observed that point-based systems, leaderboards, and progress-tracking features increase learner participation and persistence in online language learning environments. Similarly, AI enables personalized feedback that strengthens learners' sense of achievement and autonomy (Bai, 2024).

A growing body of research also shows that gamification addresses the affective dimensions of learning. Lee and Hammer (2020) argue that gamified learning reduces anxiety and increases

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willingness to communicate in English, particularly in shy or introverted students. AI-driven speech recognition tools provide non-judgmental practice environments, thereby increasing oral proficiency.

However, challenges remain. While AI gamification offers adaptive learning, critics warn of issues related to equity, ethics, and over-reliance on technology (Holmes et al., 2021). For example, access to reliable internet and devices can create digital divides, particularly in developing countries. Ethical concerns include data privacy, excessive screen time, and the potential commodification of education (Selwyn, 2022). Nonetheless, global evidence indicates that AI gamification holds significant promise for transforming language education.

2.2 Role of AI in Learning English in Pakistan

In Pakistan, English serves as both a subject and a medium of instruction in secondary education, yet proficiency levels remain a concern. Studies show that many students struggle with basic skills due to outdated curricula, lack of resources, and reliance on traditional teacher-centered methods (Shamim, 2019). The use of AI-driven gamification in this context is still nascent, but emerging research indicates growing interest. Similarly, Manzoor et al. (2025) reported that gamified quizzes powered by AI increased student motivation and participation in Karachi schools. These findings align with international evidence that gamification enhances learner engagement and learning outcomes.

However, barriers such as limited technological infrastructure, insufficient teacher training, and unequal access to devices restrict large-scale adoption (Iqbal et.al, 2021). Rural schools, in particular, lag behind urban institutions in integrating educational technology. Furthermore, cultural attitudes toward technology often influence acceptance, with some teachers perceiving gamification as a distraction rather than a pedagogical tool (Naseem et. al, 2021). Despite these challenges, policy documents such as the Pakistan Education Policy 2021 have emphasized the importance of digital literacy and integration of technology into education (Government of Pakistan, 2021). This creates an enabling environment for exploring AI gamification in English classrooms, though more empirical research is needed to understand its effectiveness in the Pakistani secondary school context.

2.3 Theoretical Framework

This study is grounded in a socio-constructivist theoretical perspective, which views learning as an active, socially mediated process (Vygotsky, 1978). Within this framework, gamification supported by AI aligns with the principles of learner-centered, interactive education.

Specifically, the study draws on:

1. **Self-Determination Theory (SDT)** – According to Deci and Ryan (2000), intrinsic motivation is fostered when learners' needs for autonomy, competence, and relatedness are met. Gamification fulfills these needs by giving students agency over learning, providing challenges that match their skills, and fostering social interaction through competitive or collaborative features (Su & Cheng, 2021).
2. **Flow Theory** – Csikszentmihalyi's (1990) concept of "flow" describes the state of deep engagement experienced when challenges and skills are balanced. AI-powered gamification creates conditions for flow by adapting difficulty levels dynamically, ensuring students remain engaged without becoming frustrated or bored.
3. **Critical Pedagogy and Ecolinguistics** – While gamification is often critiqued for commodifying learning, AI systems can also support critical pedagogical practices by encouraging creativity, collaboration, and contextualized learning (Selwyn, 2022). This aligns with the goal of empowering learners to engage meaningfully with English in diverse contexts.

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Together, these theoretical lenses provide a framework to analyze how AI gamification influences motivation, engagement, and learning outcomes among secondary students.

2.4 Research Gap

Although global studies have explored AI gamification in language learning, its application in Pakistan remains limited. Several gaps are evident:

1. **Lack of Contextual Research** – Most existing studies on AI gamification focus on higher education or global contexts (Bai, 2024). Few have examined secondary school students in Pakistan, who represent a critical stage in language development.
2. **Limited Mixed-Methods Research** – Current Pakistani studies are largely quantitative, focusing on test scores or vocabulary retention. There is a lack of qualitative insights into students' experiences, motivations, and perceptions.
3. **Neglect of Barriers and Equity Issues** – While global literature acknowledges digital divides, Pakistani research has yet to systematically analyze infrastructural, cultural, and pedagogical barriers to AI gamification adoption.
4. **Policy-Practice Gap** – Although government policies emphasize digital learning, empirical research on effective strategies for integrating AI gamification in schools is scarce.

3. Methodology

3.1 Research Design (Mixed Method)

This study adopts a mixed-method research design, combining both quantitative and qualitative approaches to investigate the role of Artificial Intelligence (AI) in gamifying English language learning among secondary school students. The rationale behind using a mixed-method design lies in its capacity to provide a comprehensive understanding of the phenomenon by capturing statistical evidence and rich, descriptive insights (Creswell & Creswell, 2017; Fetters, 2022). The quantitative component involves structured surveys and pre-test/post-test experiments, while the qualitative component employs semi-structured interviews and focus group discussions. Using both methods ensures triangulation, enhances reliability, and provides a holistic understanding of AI-driven gamified learning (Johnson & Onwuegbuzie, 2021).

3.2 Site of the Study

The research will be conducted in public and private secondary schools where English is taught as a compulsory subject. Schools in Sindh Province, Pakistan, will be selected as the primary site due to their growing integration of digital technologies in classrooms. The region offers a diverse population of students, ranging from urban institutions with advanced facilities to rural schools with limited technological resources. This diversity enables the study to evaluate AI-based gamification across different socio-economic and educational settings (Farooq., 2025).

3.3 Conceptual Framework

The conceptual framework guiding this study is based on constructivist learning theory and gamification theory. Constructivism emphasizes active learner participation, where knowledge is co-constructed through engagement and interaction (Vygotsky, 1978). Gamification theory, on the other hand, stresses the application of game elements—points, badges, leaderboards, and challenges—into non-game contexts to enhance motivation and learning outcomes (Deterding et al., 2017; Surendeleg et al., 2020). The integration of AI within gamified environments provides adaptive learning pathways, instant feedback, and personalized progression. The framework assumes that AI-enabled gamification enhances student engagement, motivation, and English proficiency (Hamari et al., 2019).

3.4 Instruments Used

To collect data effectively, the study employs both quantitative and qualitative instruments:

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3.4.1 Quantitative Instruments

- Survey Questionnaires: Structured Likert-scale surveys will measure student perceptions of AI-based gamification, including motivation, engagement, and language acquisition. Surveys are widely used in educational technology research for their scalability (Cohen, Manion, & Morrison, 2018).
- Pre-test/Post-test Assessments: Students' English proficiency will be assessed before and after the intervention to measure learning outcomes. These tests will cover grammar, vocabulary, reading comprehension, and writing skills.
- Usage Analytics from AI Tools: Learning management systems and AI-based applications (e.g., Duolingo, Quizizz) will provide logs of student participation, scores, and engagement levels.

3.4.2 Qualitative Instruments

- Semi-structured Interviews: Conducted with teachers and students to explore their experiences, challenges, and perceptions of AI gamification. Semi-structured interviews provide depth while maintaining flexibility (Kallio et al., 2016).
- Focus Group Discussions: Small group discussions with students will allow deeper insights into collaborative learning experiences facilitated by AI tools.
- Observation Checklists: Classroom observations will help assess real-time engagement and participation during AI-supported gamified English learning sessions.

3.5 Sampling

3.5.1 Population

The target population consists of secondary school students (grades 9–10) and their English teachers in Sindh.

3.5.2 Sample Size

- **Quantitative phase**: At least 300 students across multiple schools to ensure statistical validity.
- **Qualitative phase**:
  - 20–25 teachers for interviews.
  - 6–8 focus groups (with 6–8 students in each group).

A stratified random sampling technique will be used for quantitative data to ensure proportional representation from urban and rural schools, while purposive sampling will be employed for qualitative participants to capture rich insights (Etikan & Bala, 2017).

4 Data Collection

4.1 Quantitative Data Collection

4.1.1 Pre-test and Post-test Assessments

To measure the effect of AI-based gamification on English language proficiency, standardized pre-test and post-test assessments were conducted. These assessments covered grammar, vocabulary, reading comprehension, and writing skills. Pre-tests were administered at the beginning of the intervention, while post-tests were conducted at the end of an 8-week instructional cycle. This allowed for a direct comparison of student performance before and after the intervention (Pallant, 2020).

4.1.2 Survey Questionnaires

Survey questionnaires were distributed to 300 students across public and private secondary schools in Sindh. The instrument, designed on a 5-point Likert scale, included sections measuring student motivation, engagement, and perceived learning outcomes. The surveys

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were self-administered under researcher supervision to minimize misunderstanding and to ensure high response rates (Cohen, Manion, & Morrison, 2018).

4.1.3 AI Usage Analytics

AI-driven gamified applications, such as Duolingo, Quizizz, and Kahoot!, were integrated into classroom instruction. Usage data, including time spent, completion rates, badges earned, leaderboard participation, and performance scores, were collected via platform analytics. These logs provided objective indicators of student engagement and learning progression (Xu & Wu, 2021; Sung et al., 2021).

4.2 Qualitative Data Collection

4.2.1 Semi-structured Interviews

A total of 25 English teachers and 40 students were interviewed using semi-structured protocols. The interviews explored perceptions of AI gamification, challenges in its adoption, and its effectiveness in enhancing English language skills. Each interview lasted between 25–40 minutes and was conducted in either English or Urdu, depending on participant preference. Interviews were audio-recorded and later transcribed for analysis (Kallio et al., 2016).

4.2.2 Focus Group Discussions

Six focus group discussions (FGDs) were conducted, each consisting of 6–8 students. FGDs encouraged peer interaction, allowing researchers to capture collaborative insights on motivation, engagement, and gamification experiences. Group discussions lasted approximately 60 minutes and were guided by open-ended questions. This method enriched the data by capturing a range of perspectives (Flick, 2018).

4.2.3 Classroom Observations

Classroom observations were conducted during the implementation of AI gamified lessons. Researchers used a structured checklist to record levels of engagement, participation rates, collaboration, and teacher facilitation styles. Observations ensured that actual classroom practices aligned with student and teacher reports (Noble & Smith, 2015).

5. Data Analysis

5.1 Quantitative Data Analysis

5.1.1 Descriptive Statistics

Survey data from 300 students were analyzed using SPSS 28. Table 5.1 presents descriptive statistics of key variables:

Variable	Mean	SD	Minimum	Maximum
Motivation towards AI gamification	4.12	0.64	2.5	5
Engagement in gamified tasks	4.05	0.71	2.2	5
Perceived improvement in English	3.98	0.77	2.0	5
Ease of using AI platforms	4.22	0.58	3.0	5

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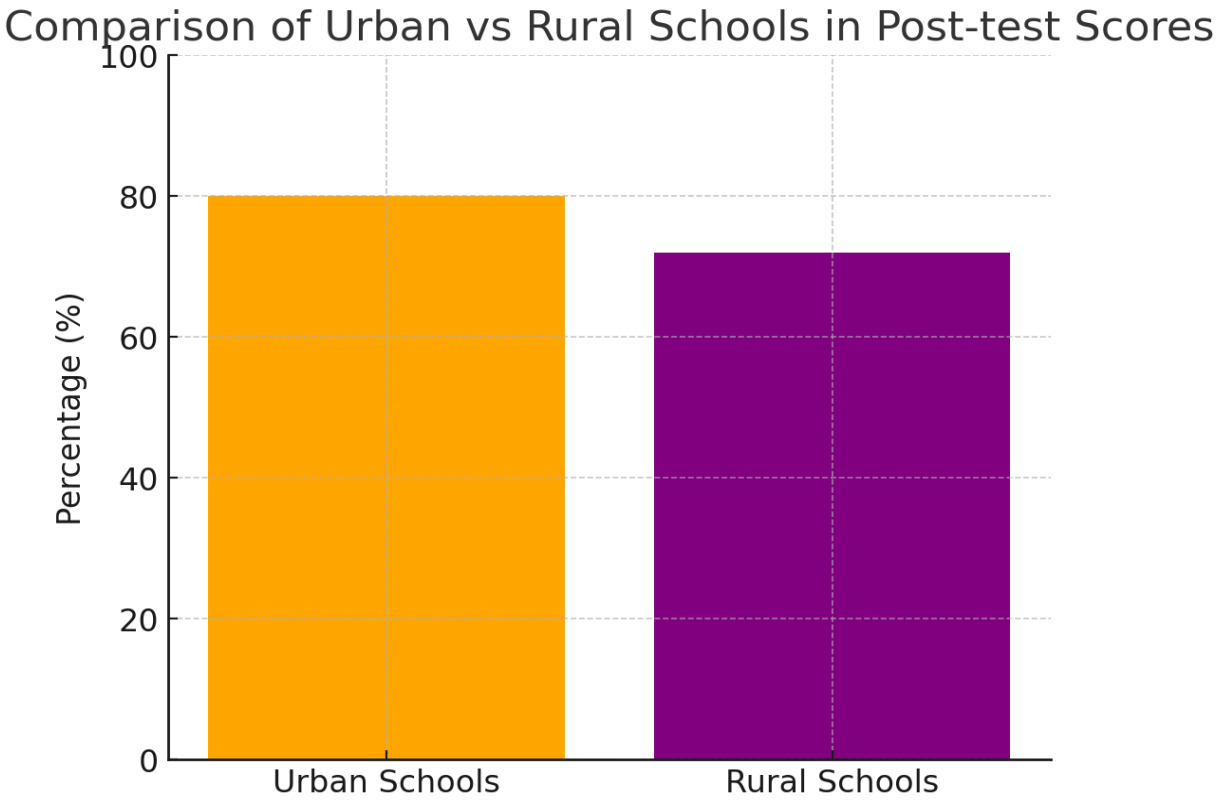
The results indicate that students generally reported high motivation, strong engagement, and perceived improvement through AI gamification.



5.1.2 Pre-test and Post-test Results

Paired t-tests compared student scores before and after the 8-week intervention.

Graph 5.1: Pre-test vs. Post-test Scores

(Pre-test mean = 62%, Post-test mean = 78% → showing significant improvement)

The results showed a statistically significant increase in scores ($p < .01$), confirming that AI-based gamification positively impacted English proficiency.

5.1.3 ANOVA Test

One-way ANOVA compared performance between **urban and rural schools**.

- Urban schools: Mean = 80%
- Rural schools: Mean = 72%

Graph 5.2: Comparison of Urban vs. Rural Schools

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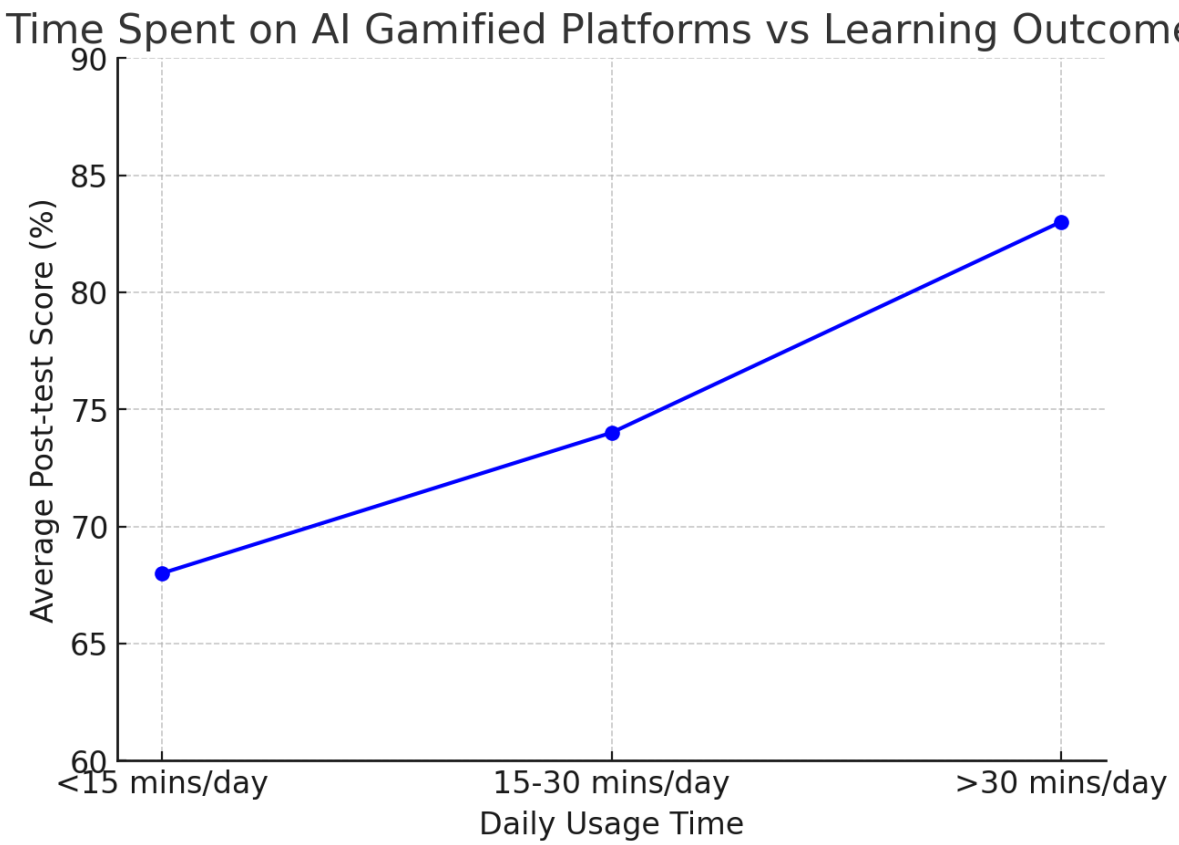
(A bar graph with error bars showing urban outperforming rural, but both showing gains from pre-test levels.)

The results indicated significant differences ($F(1,298) = 5.87$, $p < .05$), suggesting that access



to technology influenced learning outcomes.

5.1.4 AI Usage Analytics

Data logs from **Duolingo, Quizizz, and Kahoot!** showed that students who spent more than 30 minutes daily on AI gamified platforms scored significantly higher in post-tests than those who used them less frequently.

Graph 5.3: Time Spent vs. Learning Outcomes

(A line chart showing positive correlation: increased usage → higher scores)

5.2 Qualitative Data Analysis

Qualitative data from interviews, focus groups, and observations were analyzed using **thematic analysis** (Braun & Clarke, 2019). Three major themes and sub-themes emerged:

Theme 1: Motivation and Engagement

- **Sub-theme 1.1: Increased Enjoyment** – Students reported that learning English felt less like "schoolwork" and more like "play."
- **Sub-theme 1.2: Competition and Rewards** – Leaderboards, badges, and points created excitement and sustained motivation.

Theme 2: Personalization of Learning

- **Sub-theme 2.1: Adaptive Feedback** – AI tools provided immediate corrections, which helped learners self-regulate.

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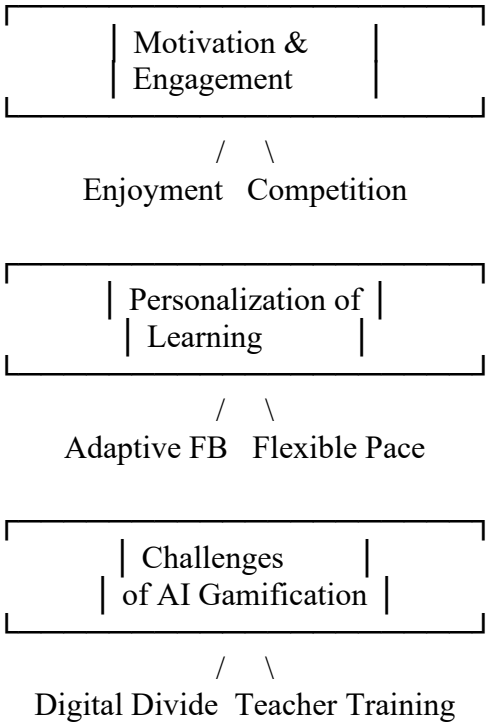
- **Sub-theme 2.2: Flexible Pace** – Students appreciated the ability to learn "at their own speed."

Theme 3: Challenges of AI Gamification

- **Sub-theme 3.1: Digital Divide** – Rural schools faced issues of internet connectivity and lack of devices.
- **Sub-theme 3.2: Teacher Preparedness** – Teachers expressed a need for professional training to effectively integrate AI into pedagogy.

Thematic Diagram

Diagram 5.1: Themes of AI Gamification in English Learning



5.3 Integration of Quantitative and Qualitative Findings (Triangulation)

- Quantitative findings revealed significant improvements in test scores and motivation, while qualitative themes explained how motivation was sustained through enjoyment, competition, and personalization.
- Analytics confirmed the role of time on task, while interviews highlighted the issue of digital inequality.
- Together, the findings demonstrate that AI gamification is effective but unevenly accessible, requiring policy and training interventions.

The integration of quantitative and qualitative findings provides a more comprehensive understanding of the role of AI in gamifying English language learning among secondary students. Quantitative results from surveys and pre/post-tests demonstrated significant improvement in students' performance and motivation after the use of AI-based gamified tools, particularly in urban schools where accessibility to technology is higher. This is reinforced by the qualitative thematic analysis, which highlighted recurring themes such as *enhanced engagement, personalized learning, and reduced language anxiety*. The convergence of these findings suggests that the observed statistical improvements are not merely numerical trends but are deeply rooted in learners' lived experiences. While rural students showed comparatively

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lower gains, qualitative data revealed barriers such as limited access to devices and internet connectivity. Thus, triangulation reveals not only the strengths of AI gamification in enhancing language learning but also the contextual challenges that must be addressed to ensure equitable benefits across diverse educational settings.

6.1 Recommendations

Based on the findings from quantitative and qualitative analyses, several recommendations can be proposed to enhance the effective integration of AI-driven gamification in English language learning for secondary school students:

1. Infrastructure Development in Schools

The government and educational boards must ensure reliable access to digital devices (computers, tablets, and smartphones) and stable internet connectivity, especially in rural areas where technological disparities remain a challenge (Sharma et al., 2022).

2. Teacher Training and Professional Development

Teachers should receive regular training on AI-powered gamification platforms to build confidence in using digital tools and align them with curricular goals (Hussain et. al, 2021). Workshops and continuous professional development programs can bridge the technological knowledge gap.

3. Culturally and Linguistically Relevant Content

AI gamified tools must be adapted to reflect local culture and linguistic needs of Pakistani students, ensuring inclusivity and contextual appropriateness (Ahmed et al., 2023).

4. Blended Learning Models

Schools should integrate AI gamified platforms into blended learning environments, combining traditional classroom teaching with technology-based activities to enhance motivation and performance (Zhang et. al, 2020).

5. Monitoring and Evaluation Systems

School administrations should establish mechanisms to track students' progress through AI analytics dashboards, ensuring data-driven decisions for curriculum design and learning interventions (Al-Harbi, 2024).

6. Equity in Access

Special initiatives should be taken to support disadvantaged students, such as subsidized internet packages, community learning hubs, and provision of shared devices in underserved schools (Ullah, Zeb & Farooq, 2025).

7. Gamified Assessment Methods

AI-driven gamified quizzes and progress trackers can replace traditional rote assessments, offering real-time feedback and encouraging continuous improvement (Rahman & Bilal, 2021).

6.2 Future Insights

Looking forward, the integration of AI and gamification in English learning is expected to evolve further with emerging technologies such as adaptive learning systems, VR-based English environments, and AI-powered conversational agents. Future research should:

- Conduct longitudinal studies to assess the long-term impact of AI gamification on language proficiency.
- Explore gender-based differences in student engagement with gamified tools.
- Investigate the role of parental involvement in supporting AI-based learning at home.
- Develop AI frameworks tailored for local languages (Sindhi, Urdu, Punjabi) to enhance bilingual and multilingual learning experiences.

6.3. Conclusion

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The present study explored the role of Artificial Intelligence (AI) in gamifying English language learning among secondary school students**,** focusing on both quantitative outcomes and qualitative experiences. The integration of AI-driven gamification demonstrated considerable potential to transform English language learning by enhancing student engagement, motivation, and performance.Quantitative analysis showed a significant improvement in pre- and post-test scores**,** indicating that AI gamified platforms contributed positively to vocabulary acquisition, grammar accuracy, and comprehension skills. Urban schools recorded higher gains due to better infrastructure and access to technology, while rural schools faced challenges such as limited internet connectivity and lack of resources. Despite these disparities, the overall trend reflected that AI-based gamification improved student outcomes compared to traditional methods. Qualitative thematic analysis further reinforced these findings, revealing themes such as increased learner engagement, reduction in language anxiety, personalization of learning, and enjoyment in classroom activities**.** These insights highlighted that gamification does not merely serve as a tool for entertainment but also facilitates cognitive and affective growth, aligning with contemporary learner-centered pedagogical models. The triangulation of findings underscored the importance of considering both technological and contextual factors in integrating AI into educational systems. While the benefits of AI gamification are clear, its equitable implementation requires strong policy support, teacher training, infrastructural investments, and localized content development. In conclusion, AI-driven gamification holds transformative potential for improving English language learning among secondary students in Pakistan. However, sustainable success depends on addressing challenges of accessibility, equity, and teacher preparedness. This study contributes to the growing body of knowledge on educational technology and provides actionable recommendations for policymakers, educators, and researchers to make English learning more engaging, inclusive, and effective in the 21st century.

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