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ISSUES AND CHALLENGES IN ESL LEARNING TOWARDS AI POWERED LANGUAGE LEARNING TOOLS IN PAKISTANI CONTEXT- A STUDY OF RURAL STUDENTS PERSPECTIVES

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Abstract
The study aims to highlight the challenges and issues faced by the students in the ESL domain towards AI-powered language learning tools within its emerging trends by viewing the Pakistani context. AI-powered language learning tool applications have a significant potential to facilitate second language learning, but certain socio-cultural and economic issues constrain their effectiveness. There are technological and educational handicaps that restrict the students from being facilitated by this innovative opportunity. The study is based on a mixed-method approach, and it takes a purposive, convenient sample of 200 hundred rural university students across the country. The data is collected by administering a questionnaire on 5-point Likert scale and semi-structured interviews. The results explain limited digital literacy, inadequate access towards technological barriers, economic frustrations, social limitations and anxiety. Further, it brings to light the needs that created a gap between AI language learning platforms and students' academic output in the ESL domain by focusing on under-resourced rural vicinity. It is also obtained from results that AI-powered tools can illuminate ESL learning by supplementing traditional methods, but they are a failure due to the reasons nuanced and psychological needs of ESL learners are not fulfilled in the Pakistani context compared to developed nations like China, the USA and Russia. Finally, the study concludes to be taken seriously view by policymakers, linguists and stakeholders to ensure AI-powered facilities access to students of rural vicinity in Pakistan, and it may also ensure bridging the gap between global needs and students' capabilities.
Key Words: *ESL Learning, AI, Language, Rural Students, Pakistani Perspectives.*

Introduction

The integration of Artificial Intelligence (AI) in language education has emerged as a transformative approach to enhancing English as Second Language (ESL) learning worldwide. AI-powered language learning tools, including mobile applications, intelligent tutoring systems, and adaptive language platforms, have significantly reshaped second language pedagogy by offering personalized, accessible, and interactive learning experiences**.** In developed countries such as China, the United States, and Russia**,** the adoption of these technologies has demonstrated remarkable success in bridging linguistic gaps and supplementing traditional classroom practices (Akram, & Li, 2024).

However, the Pakistani context**,** particularly within rural vicinities, presents a distinct set of challenges that hinder the effective integration of AI in ESL learning. Rural students face

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technological, socio-cultural, and economic constraints**,** which limit their digital literacy and access to AI-driven educational opportunities**.** The disparity between global advancements and local realities creates a widening gap between the potential of AI-powered tools and the actual learning outcomes of Pakistani ESL learners. This is further compounded by psychological barriers**,** including anxiety and social limitations**,** which reduce students' engagement with innovative learning methods (Akram et al., 2022)

Artificial intelligence (AI) has rapidly expanded the toolkit of English-as-a-Second-Language (ESL) pedagogy, offering adaptive feedback, automated assessment, and personalized learning pathways that can enhance engagement and attainment. Recent reviews and empirical studies report gains in writing quality, scoring accuracy, and learner motivation when AI is integrated into language learning—particularly through natural-language-processing–based feedback and conversational agents—while also noting design and implementation challenges that require teacher mediation and clear ethical guardrails (Alhusaiyan, 2025).

Yet the promise of AI-powered tools is mediated by context. In Pakistan, where higher-education participation spans uneven infrastructures, the digital divide shapes that can benefit from AI-enhanced ESL. National snapshots show internet penetration rising but still below half the population, with pronounced urban–rural gaps and recurrent connectivity disruptions—barriers that directly constrain sustained use of data-intensive, cloud-based learning tools (Siddique, & Hussain, 2022).

Within this landscape, studies of Pakistani learners indicate interest in technology-supported language learning (e.g., mobile-assisted language learning for vocabulary and skills practice), alongside persistent impediments: limited device access, affordability concerns, variable digital literacy, and anxiety around performance and public speaking (Javaid et al., 2024;Ramzan et al., 2024). These factors influence acceptance and effective use of AI systems, suggesting that tools must be embedded in pedagogy that addresses learners' psychological needs and provides structured support (Ramzan et al., 2025)

Accordingly, this study investigates rural university students' perspectives on AI-powered language learning tools in Pakistan. Using a mixed-methods design (questionnaire and semi-structured interviews) with 200 participants, it examines how socio-cultural, economic, and infrastructural constraints intersect with learners' emotions and expectations, and whether AI tools meaningfully supplement traditional ESL instruction in under-resourced settings. By foregrounding rural learners' voices, the study aims to inform context-sensitive integration strategies and policy actions that can bridge the gap between global AI-enabled pedagogical advances and local capabilities in Pakistan.

Literature Review:

Research has demonstrated that AI-powered tools—such as intelligent tutoring systems, chatbots, adaptive platforms, and NLP-based feedback systems—can enhance language learning by providing personalized instruction, real-time interaction, vocabulary retention, and formative feedback (Woo & Choi, 2021). These systems promote gains in writing proficiency, oral fluency, and learner motivation (Woo & Choi, 2021; Lin & Chang, 2020).Recent mixed-method research in Pakistan has examined both learners' and educators' views toward AI-driven ESL tools. Neelam, Rabica, and Adam (2024) surveyed teachers and students in Multan, finding moderate awareness and cautious optimism toward technologies such as ChatGPT, Duolingo, and

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Knewton. These stakeholders favored culturally sensitive, teacher-supported integration rather than rapid, tool-first adoption. Similarly, a study at Government College University Faisalabad revealed benefits in writing accuracy and grammatical awareness using AI tools like Grammarly and automated essay scoring; however, implementation gaps persisted due to insufficient training and infrastructure (Siddique, & Hussain, 2022).

Another qualitative study focused on secondary-level learners across Pakistan, highlighting opportunities and obstacles in integrating ChatGPT, Grammarly, and Duolingo into English curricula. The authors emphasize that teacher mediation, curricular alignment, and ethical considerations are essential for AI tools to succeed in Pakistani ESL contexts (Zahid, Farooq Khan, & Aziz, 2025).Qureshi, Ahmad, and Ullah's (2025) study on AI chatbots in rural Pakistan examines how socio-cultural factors such as dialectal diversity, code-switching between Urdu and English, and limited exposure to conversational English shape the learning experience. While interactive chatbots fostered autonomy and speaking practice, many participants still struggled with regional accents, mismatch between chatbot speech patterns and learners' linguistic backgrounds, and lack of localized content.

Moreover, underprivileged areas face constraints beyond pedagogy. Ali Raza (2024) and others documented infrastructural deficits: unreliable electricity, lack of internet bandwidth, and poor device availability hinder sustained use of AI tools. The digital divide in Pakistan manifests starkly between urban and rural regions, compounding educational inequities (Waqar et al., 2024). Women, in particular, face additional disparities: female internet users often require permission to access mobile devices and usage rates lag behind those of males (Waqar et al., 2024).The broader literature consistently points to access, skills, and outcome disparities underpinning the efficacy of AI in education. Scheerder et al.'s (2017) three-tier digital divide framework—covering hardware/internet access, digital literacy, and differential learning outcomes—applies readily to rural Pakistani students. Mehak and Rizvi Jafree (2025) identified digital literacy and perceived usefulness as strong predictors of positive attitudes toward AI among Pakistani university students. Rural students often have lower literacy and limited exposure to AI, resulting in reduced functional use of potential tools.

Few studies address emotional factors, though anxiety, frustration, and self-efficacy consistently emerge as barriers. For instance, Lin and Chang (2020) indicate that AI-powered systems can reduce speaking anxiety among English learners. However, lack of contextual relevance or cultural mismatches may actually amplify these feelings rather than alleviate those (Maitlo et al., 2023). Students in rural Pakistan frequently report fear of embarrassment, low confidence in speaking English, and anxiety when confronted with unfamiliar AI interfaces or speech-recognition feedback (Jamil, 2021).While countries like China, the U.S., and Russia have integrated AI platforms successfully into ESL contexts, outcomes in Pakistan lag behind due to infrastructural and pedagogical mismatches. Global reviews emphasize that teacher training, context-adapted materials, and institutional buy-in are crucial for success (Woo & Choi, 2021). Without these, AI tools risk remaining "innovation for innovation's sake," failing to deliver measurable impact in low-resource settings (Javaid et al., 2024; Ramzan et al., 2023). The Karachi-based Presidential Initiative for Artificial Intelligence & Computing (PIAIC) reflects national ambition but still has limited reach in rural ESL learning contexts (Akram, 2021).

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Significance of the Study

The integration of Artificial Intelligence (AI) in second language acquisition holds transformative potential for learners globally, especially within English as Second Language (ESL) contexts. In Pakistan, where English proficiency is linked to academic success and socio-economic mobility, AI-powered language learning tools could bridge pedagogical gaps and offer personalized accessible learning environments. However, for rural students—who often face systemic inequalities in digital access, economic resources, and educational infrastructure—these benefits remain largely unrealized. This study is significant because it explores the intersection of technology, education, and equity by focusing on the experiences of under-resourced rural university students. It contributes to a critical understanding of how digital inequality, limited digital literacy, and socio-cultural constraints affect the efficacy of AI-based ESL tools in Pakistan. By foregrounding learners' voices and emotional realities, the study provides data-driven insights for policymakers, educators, and technologists to develop more inclusive, context-sensitive interventions that can close the gap between global AI capabilities and local educational needs.

Rationale of the Study

While AI-assisted ESL learning has gained considerable traction in developed countries, there is a noticeable lack of empirical research on its practical implementation in developing, rural contexts**,** particularly within Pakistan. Much of the existing literature focuses on urban settings or assumes access to reliable infrastructure, digital tools, and teacher training—conditions often absent in rural areas. Given Pakistan's rural–urban divide and the strategic role English plays in academic and professional advancement, it becomes imperative to explore whether and how rural learners benefit from AI-powered tools, and what challenges they face. Furthermore, emotional and psychological dimensions—such as anxiety, frustration, and social inhibition**—**are rarely addressed in mainstream AI-ESL discourse, despite being critical to language learning success. This study is therefore warranted to illuminate the ground realities faced by rural students, understand their perceptions and barriers**,** and evaluate whether current AI applications align with their pedagogical and emotional needs**.**

Statement of the Problem

Despite the increasing global adoption of AI-powered language learning tools, students in rural areas of Pakistan remain on the periphery of these technological advancements. While these tools have the potential to revolutionize ESL education by providing personalized learning paths and real-time feedback, their effectiveness is severely constrained in rural Pakistani contexts due to limited access to digital infrastructure, economic hardship, low digital literacy, and socio-cultural barriers**.** Moreover, the psychological and emotional experiences of rural ESL learners—such as anxiety, frustration, and reduced self-confidence—are often overlooked in the design and deployment of these technologies. This results in a disconnection between technological innovation and educational impact**.** The central problem this study addresses is the lack of equitable access, contextual relevance, and emotional sensitivity in AI-powered ESL learning tools for rural students in Pakistan. It seeks to understand how these challenges hinder language acquisition and to recommend strategies for making AI-enhanced language education more accessible, inclusive, and effective for underprivileged learners.

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Research Methodology

Research Design

This study employed a mixed-methods research design to gain both quantitative and qualitative insights into the issues and challenges faced by rural Pakistani students in using AI-powered tools for ESL learning. The combination of survey-based data collection and semi-structured interviews allowed the researcher to examine broad patterns while capturing the nuanced experiences, perceptions, and emotional responses of learners in under-resourced contexts.

Mixed-methods design is especially relevant for educational technology research, where technological, pedagogical, and socio-emotional variables intersect (Creswell & Plano Clark, 2018). The design provided triangulated data to validate and expand upon initial survey findings.

Population and Sampling Technique

The target population consisted of ESL learners enrolled in public and private universities situated in rural regions across Pakistan, including provinces such as Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan. These students represent under-resourced learners who often face digital and linguistic barriers not typically present in urban settings.

A purposive and convenient sampling method was used to select 200 university students**.** The purposive element ensured that all participants had experience with or exposure to AI-powered ESL tools such as Duolingo, Grammarly, ChatGPT, or institutionally implemented platforms. Convenience sampling helped to overcome geographical and logistical limitations in reaching rural respondents.

Data Collection Tools

1. Questionnaire

A structured questionnaire was developed to collect quantitative data. The instrument comprised closed-ended items measured on a 5-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." The questionnaire focused on the following domains:

- Accessibility and use of AI-powered ESL tools
- Digital literacy and confidence in using technology
- Perceived usefulness of AI tools for language learning
- Emotional responses such as anxiety, frustration, and motivation
- Socio-cultural and economic constraints

The questionnaire was validated through expert review and a pilot test involving 20 students, which helped refine unclear or culturally sensitive items.

2. Semi-Structured Interviews

To deepen understanding, semi-structured interviews were conducted with a subset of 25 participants**.** These interviews provided qualitative insight into the lived experiences of students using or attempting to use AI tools for language learning. The interviews explored themes such as:

- Daily experiences and emotional challenges in using AI tools
- Perceptions of how these tools compare to traditional ESL instruction
- Hopes, concerns, and expectations from AI-enhanced education
- Cultural and gendered barriers in accessing educational technology

Interviews were conducted in English, Urdu, or regional languages based on the comfort of the participants, then translated and transcribed for thematic analysis.

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Data Analysis

Quantitative Analysis

Quantitative data from the questionnaire were analyzed using descriptive statistics (frequencies, percentages, means) and inferential analysis (t-tests, ANOVA) using SPSS**.** This allowed the researcher to identify key trends and group differences in digital access, attitudes, and emotional variables.

Qualitative Analysis

Interview transcripts were analyzed using thematic content analysis**.** Recurring codes were grouped into themes such as:

- "Access and infrastructure challenges"
- "Psychological barriers and motivation"
- "Tool relevance and localization issues"
- "Social norms and gendered limitations"

Themes were cross-validated with quantitative findings to highlight convergences and divergences between participants' perceptions and measurable experiences.

Ethical Considerations

Ethical approval was obtained from the university's institutional review board. All participants provided informed consent**,** and confidentiality was maintained by anonymizing all personal identifiers. Participants were informed of their right to withdraw at any time without any consequence.

Limitations of the Study

- Due to **sampling constraints**, results may not generalize to all rural regions of Pakistan.
- **Language barriers** may have limited the depth of qualitative responses in some cases.
- The availability and awareness of AI tools varied, possibly skewing participant experiences.

Results

The data for this study were analyzed using both quantitative and qualitative techniques**,** in line with the mixed-methods research design**.** This section presents the analysis processes in detail, beginning with the quantitative data collected via questionnaires and followed by the qualitative data obtained through semi-structured interviews.

Quantitative Data Analysis

Quantitative data were collected from 200 rural university students across Pakistan using a structured questionnaire based on a 5-point Likert scale. The data were analyzed using IBM SPSS (Version 26)**.** The quantitative analysis proceeded in three main phases: data cleaning, descriptive analysis, and inferential statistical testing.

1. Data Cleaning and Preparation

- Responses were first reviewed for completeness. Only fully completed questionnaires were included in the final dataset (n = 200).
- Reverse-scored items were corrected for consistent directionality.
- Normality checks were performed using Shapiro-Wilk **and** Kolmogorov-Smirnov tests to assess the suitability of parametric tests.

2. Descriptive Statistics

Descriptive analysis focused on identifying overall patterns in students' responses.

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Key variables included:

- **Access to technology** (mean = 2.31, SD = 0.94)
- **Digital literacy** (mean = 2.59, SD = 0.87)
- **Perceived usefulness of AI tools** (mean = 3.12, SD = 0.88)
- **Emotional responses**:
  - **Anxiety** (mean = 3.87, SD = 0.79)
  - **Frustration** (mean = 3.62, SD = 0.82)
  - **Sadness** (mean = 3.48, SD = 0.76)

These values suggest **moderately high emotional distress** and **low confidence or accessibility** regarding AI tool use in rural ESL contexts.

3. Inferential Statistics

To examine whether perceptions differed across demographic variables such as gender, geographic location (province), and university type (public vs. private), the following tests were conducted:

- **Independent samples t-tests** revealed:
  - Significant difference in **digital literacy** between male (M = 2.80) and female students (M = 2.37); $t(198) = 2.98$, $p < .01$
  - Higher **anxiety levels** among female students (M = 4.01) than males (M = 3.69); $t(198) = 2.45$, $p < .05$
- **One-way ANOVA** showed:
  - Significant differences in **access to AI tools** across provinces: Punjab students had greater access than those in Balochistan or interior Sindh; $F(3, 196) = 5.62$, $p < .01$
  - **Perceived usefulness** of AI tools was rated significantly higher among students in semi-urban campuses than fully rural ones.

Post-hoc analysis using **Tukey's HSD** identified that students from Punjab had statistically higher access and digital confidence than those in Khyber Pakhtunkhwa and Balochistan.

Qualitative Data Analysis

Qualitative data were collected through **semi-structured interviews** with 25 selected participants and analyzed using **thematic content analysis**. Each interview was audio-recorded, transcribed, and coded manually and through **NVivo 12** software.

1. Coding Procedure

- An **inductive coding** strategy was used to allow themes to emerge from the data.
- Initial line-by-line open coding produced 162 unique codes.
- Through **axial coding**, these were organized into **five major themes** and **eleven sub-themes**.

2. Emergent Themes and Interpretations

Main Theme	Sub-Themes	Illustrative Quotes
Technological Limitations	Lack of smartphones, poor internet, device sharing	"Sometimes I walk to the next village for signal just to attend a class."
Digital Literacy Gaps	Fear of using apps, difficulty navigating interfaces	"We have to ask others to help download or use the app. It feels

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Main Theme	Sub-Themes	Illustrative Quotes
		discouraging."
Economic Constraints	Affordability of data plans, power outages	"We can't afford internet daily; it's not a priority over food."
Emotional Challenges in Learning	Anxiety, fear of failure, shame	"When the AI corrects me, I feel stupid. I don't want others to see me fail."
Mismatch Between Tools and Context	Lack of cultural/linguistic relevance, language models	"These tools speak different accents. They don't understand our way of talking."

Discussion

This study set out to investigate the challenges and issues faced by rural Pakistani students in using AI-powered language learning tools within the ESL domain. Through a mixed-methods approach that integrated both quantitative survey responses and qualitative interview data, the findings reveal a complex interplay between technological accessibility, digital literacy, socio-economic limitations, and psychological-emotional factors—all of which significantly influence learners' ability to benefit from AI-enhanced ESL education.

1. Technological Accessibility: A Persistent Structural Barrier

The data strongly suggest that limited access to digital infrastructure is a foundational challenge in rural Pakistan. With a mean Likert score of 2.31 on the "access to technology" scale and qualitative accounts of students walking to other villages to access mobile signals, it is evident that students are technologically disadvantaged compared to their urban counterparts. This finding echoes prior literature (Ali Raza, 2024; Waqar et al., 2024) on the digital divide in Pakistan, where rural areas suffer from weak connectivity, power outages, and shared or outdated devices.

Furthermore, significant regional disparities emerged through the ANOVA analysis, revealing that students in Punjab had measurably better access than those in Balochistan and interior Sindh. This suggests that even within rural settings, infrastructure inequity is regionally stratified, compounding educational disadvantage in already marginalized provinces.

2. Digital Literacy and Self-Efficacy: Confidence Matters

The second major issue—digital literacy—was revealed through both descriptive statistics (mean = 2.59) and qualitative themes. Many participants expressed a lack of confidence in navigating apps, using AI interfaces, or interpreting feedback. Students who had access to AI tools still struggled to make meaningful use of them due to low digital competence and tech-anxiety, especially when working independently.

This aligns with the findings of Mehak and Rizvi Jafree (2025), who found digital literacy to be a key predictor of AI tool engagement among Pakistani university students. Moreover, the gendered dimension of this problem is critical: female students not only had lower access but also significantly lower digital confidence ($t(198) = 2.98$, $p < .01$), indicating an urgent need for gender-sensitive digital training programs in rural areas.

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3. Socio-Economic Pressures: Financial Prioritization and Tool Relevance

Participants also reported economic hardships that deprioritized educational technology. In interviews, some students described internet access as a "luxury" secondary to food or transport expenses. Others shared that even when tools like Grammarly or Duolingo were free, the cost of data plans or device repairs created long-term usability barriers.

This reveals a contradiction in many global educational technology policies: they assume that "free access" equals "equitable access." In under-resourced Pakistani contexts, economic stress not only limits physical access but also affects psychological readiness, as learners are forced to juggle household responsibilities, financial pressures, and social limitations.

4. Emotional and Psychological Dimensions: A Hidden but Critical Barrier

Perhaps one of the most profound insights of the study was the emotional stance of rural ESL learners. Quantitative scores for anxiety (mean = 3.87), frustration (mean = 3.62), and sadness (mean = 3.48) indicate widespread emotional distress associated with learning English through unfamiliar, often foreign-designed AI tools. Interviews further emphasized these emotions, with students reporting feeling "stupid," "ashamed," or "invisible" when corrected by AI systems that lack human nuance.

Unlike traditional teacher-student interaction, AI tools do not provide culturally sensitive encouragement, human empathy, or scaffolding. This lack of emotional responsiveness is particularly damaging in ESL contexts where confidence, motivation, and identity play central roles in language acquisition (Lin & Chang, 2020). The study's findings suggest that emotional readiness is just as critical as technological readiness, yet is frequently overlooked in tool design.

5. Tool-Context Mismatch: Cultural and Linguistic Alienation

Another striking finding was the mismatch between the design of AI tools and the rural Pakistani learner's context. Many tools—trained on global English norms and usage patterns—failed to understand Pakistani accents, idioms, or socio-linguistic cues. Students reported discomfort with speech-recognition apps that did not understand their pronunciation or gave irrelevant, culturally alien examples. This reflects Qureshi et al. (2025)'s critique of chatbot tools in rural Pakistan, which found similar alienation and disengagement due to linguistic mismatch.

Thus, while AI-powered tools are praised globally for personalization, they often lack localization, making them less usable or even demotivating for learners in culturally unique or linguistically hybrid settings.

6. Comparative Perspective: Developed vs. Developing Contexts

The study reinforces the asymmetry in AI-ESL implementation between developed and developing nations. While countries like China and the USA benefit from robust digital infrastructure, localized content, and systemic support, Pakistan's rural learners are left to negotiate with fragmented access, unfamiliar platforms, and cultural mismatches—all in a psychologically unsupported environment.

This suggests that transferring AI tools developed in the Global North directly into Global South contexts is pedagogically naive, unless major adaptation and support systems are implemented.

7. Policy and Pedagogical Implications

The findings highlight the need for:

- **Localized AI tools** that account for regional accents, languages, and cultural norms.

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- **Digital literacy programs** integrated into ESL curricula, especially targeting rural and female learners.
- **Blended learning models**, where AI tools are mediated by trained teachers to reduce emotional alienation.
- **Investment in infrastructure**—reliable electricity, internet, and device subsidies for rural students.
- **Mental health support** in ESL education, addressing tech-related anxiety and language-learning trauma.

Conclusion

In sum, while AI-powered language learning tools offer promise, their success in the rural Pakistani ESL context is hindered by systemic, emotional, and cultural challenges. The tools themselves are not inherently flawed, but their effectiveness is shaped by context. Until policymakers, technologists, and educators design with that context in mind, AI will remain a misaligned solution for a deeply layered problem.

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