ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

JOURNAL OF APPLIED LINGUISTICS AND TESOL

Vol.8. No.4.2025

DIGITAL INTELLIGENCE AND LANGUAGE DEVELOPMENT IN MULTILINGUAL PAKISTAN

[1]Mian Haseeb Sarwar
PhD Scholar, Department of English Linguistics, University of Azad Jammun Kashmir Muzaffarabad.
Email: Haseebmian4@gmail.com
[2]Neeha Rouf
M.Phil, Riphah University Islamabad Lahore Campus.
Email: neehadhariwal129@gmail.com
[3]Dr. Nagina Kanwal
Assistant Professor, Department of English, University of the Punjab Jhelum Campus
Email: nkanwal.english@gmail.com

Abstract
This qualitative study explores the role of digital intelligence, particularly artificial intelligence (AI)–driven tools, in shaping language development within Pakistan's multilingual context. Pakistan is characterized by linguistic diversity, where Urdu, English, and multiple regional languages coexist within formal and informal educational spaces. Drawing on semi-structured interviews, classroom observations, and document analysis, the study examines how learners and educators engage with digital technologies such as language-learning applications, AI-powered translation tools, and conversational agents to support language acquisition. The findings reveal that digital intelligence facilitates increased exposure to target languages, personalized learning pathways, and learner autonomy, especially in English language development. However, the study also identifies critical challenges, including unequal access to digital resources, limited support for regional languages, and the reinforcement of existing linguistic hierarchies. Furthermore, participants' perceptions highlight tensions between technological efficiency and cultural-linguistic identity. The study argues that while digital intelligence holds significant potential to enhance language development in multilingual Pakistan, its effective integration requires context-sensitive pedagogical practices and inclusive language policies. The research contributes to ongoing debates on technology-mediated language learning by foregrounding voices from the Global South and emphasizing the sociocultural dimensions of AI-assisted language development.

Keywords:
Digital Intelligence, Artificial Intelligence, Language Development, Multilingualism, Pakistan, Qualitative Research

Introduction

The sudden explosion of digital technologies has changed education measures all over the world, especially in the field of language learning (Ma et al., 2024, 2025; Ramzan et al., 2023, 2025). Among these technologies, the digital intelligence, that encompasses artificial intelligence (AI)-driven technologies such as adaptive learning systems, automated feedback, machine translation, and conversational agents have become a powerful force transforming the way languages are taught, learned, and used (Luckin et al., 2022; Zawacki-Richter et al., 2019). While much of the existing scholarship on AI assisted language learning has been concerned with technologically advanced and monolingual or bilingual contexts (Jalalzai et al., 2025; Ramzan & Khan, 2024),

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

much less attention has been given to multilingual societies in the Global South, where linguistic diversity, sociopolitical hierarchies of language, and unequal access to digital resources intersect. Pakistan is a particularly interesting case study for analyzing the relationship of digital intelligence and language development. As a linguistically diverse nation, Urdu, the national language, English the official and academic language, and over 70 regional and indigenous languages, such as Punjabi, Sindhi, Pashto, Balochi, and Saraiki (Rahman, 2002; Mahboob and Elyas, 2014) are some of the languages spoken in Pakistan. These languages co-exist in complex educational, social and political ecosystems in which the acquisition of proficiency in English is frequently attributed to factors such as socioeconomic mobility, academic success and global participation. As a result, the language learning in Pakistan is not a simple pedagogical process but is the deep ideological and identity-loaded process.

In the past few years, the availability of artificial intelligence (AI) powered digital tools including language learning tools, automated grammar checkers, translation software, and large language models, are influencing the practices of language learning in the Pakistani classrooms and informal learning areas (Al-Adwan et al., 2022; Congman et al., 2019). These tools have potential advantages such as greater exposure to target languages, customized learning paths, instant feedback and opportunities for autonomous learning outside the normal classroom restrictions (Godwin-Jones, 2018; Kasneci et al., 2023). For ESL learners in Pakistan, such technologies may help overcome existing problems such as huge number of students, low availability of instructional resources, and varying skills of teachers in English language instruction.

However, there are challenges to integrating digital intelligence into multilingual language education. Scholars have warned of the tendency of AI technologies to be biased towards major global languages, especially English, and provide little support for less-conversant and regional languages (Joshi et al., 2020). In the Pakistani setting, this presents considerations that AI-enabled language learning might perpetuate the current linguistic hierarchies, marginalize local languages and contribute to linguistic homogenization. Moreover, the unequal access to digital infrastructure, as determined by socioeconomic status, geographic location, and institutional capacity, poses a close risk of exacerbating educational disparities (Jamil, 2021).

Beyond questions of access and pedagogy, the use of AI in language learning also touches on questions of cultural and linguistic identity. Language is an autochthonous marker of identity, and the growing dependence on algorithm-driven systems could affect how learners understand their own languages, accents as well as communication practices (Norton, 2013; Pennycook, 2017). In multilingual societies, like Pakistan, conflict between the perceived efficiency and neutrality of AI tools and the younger meanings of linguistic diversity, cultural meaning, and local systems of knowledge may arise.

Despite the increasing importance of problematizing these issues, research conducted so far has been dominated by quantitative adoption models, or an experimental design, and they provide limited understanding of the experiences, negotiations and sense-making by learners and educators about digital intelligence in multilingual settings. There is a continued need for qualitative and context-sensitive research which puts the voices of teachers and learners in the foreground and studies AI-assisted language development not just as a technological intervention, but as a sociocultural phenomenon.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Addressing this gap, the current qualitative study examines the role of digital intelligence in influencing language development in the societal educational network in Pakistan, which operates in a multilingual context. Drawing on semi-structured interviews, classroom observations and document analyses, the study focuses on the ways learners and educators relate with AI-assigned tools in the formal and informal learning contexts. By locating digital intelligence in the linguistic environment of Pakistan, this study contributes to the wider debate on technology-based language learning and emphasizes the need for inclusive, culturally responsive, and context-aware approaches to AI integration in multilingual societies.

Literature Review

Digital intelligence, in its broadest sense, the ability of digital systems, especially artificial intelligence (AI), to adapt, personalize, and interact intelligently with the user is something that has transformed language education more than ever (Holmes et al., 2022). In language learning situations, AI based technologies encompass intelligent tutoring systems, automated feedback systems, machine translation systems, adaptive language learning platforms, and conversational agents (Abdelrady et al., 2025). These technologies aim to support learners, offering individualized learning pathways, instant feedback and autonomous practice opportunities outside the classroom (Godwin-Jones, 2018; Kasneci et al., 2023).

Research in computer-assisted language learning (CALL) and mobile-assisted language learning (MALL) has shown that AI-supported tools can help increase vocabulary acquisition, grammatical accuracy, pronunciation, and engagement of the learner (especially in English as a second or foreign language) (Li et al., 2021; Ouyang & Jiao, 2021). However, much of this research has been carried out in technologically advanced settings (Akram & Abdelrady, 2023, 2025), focusing on measurable learning outcomes with less attention being paid to the sociocultural and linguistic diversity (Chen & Ramzan, 2024).

Multilingual scenarios entail both likelihoods and difficulties for AI-prompted language learning. Scholars contemplate that tools made for AI can support multilingual learners through the processes of cross-linguistic transfer, translanguaging practices, and access to target language input (Garcia & Wei, 2014; Kohnke et al., 2023). To add to this, the typical training of AI systems mainly include high resource languages - English will be a prime focus - leaving the gap for performance across languages and the support of regional or minority languages (Joshi et al., 2020).

Studies done in multilingual societies have shown that even if learners appreciate the efficiency and accessibility of AI technologies, these technologies are potentially reproducing linguistic hierarchies by favoring global dominant languages in contrast to local languages (Aslam et al., 2020; Pérez-Mamay et al., 2024). This is a particular concern in postcolonial contexts, where language choice is closely interlinked with power, identity, and access to socioeconomic opportunities (Pennycook, 2017). The language picture in Pakistan is marked by the simultaneous existence of English, Urdu and many regional languages. English is a privileged language in the sense of being the language of higher education and governance along with global mobility, Urdu being a national lingua franca and regional languages being the dominant languages of communication (Rahman, 2002; Mahboob & Elyas, 2014). This stratification has played a long role in determining educational practices (Akram & Sohail, 2024) and learner identities and English has often been seen as a gatekeeper of academic and professional success (Ahmad et al., 2022).

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Previous studies on language learning in Pakistan report ongoing issues such as teacher-centered approach, exposure to English language and limited access to quality education from urban and rural areas (Khan & Saeed, 2023; Javaid et al., 2024). Within this context, digital technologies, and more recently AI powered tools are increasingly being perceived to be possible solutions to structural constraints such as being in a large class or having limited instructional resources.

However, scholars warn that unless technology is used carefully and pedagogically, it may reproduce existing inequalities rather than ameliorate those (Jamil, 2021). Access to AI tools in Pakistan is uneven and depends on socioeconomic status, institutional capacity, and digital literacy, raising concerns about equity and inclusion in technology mediated language learning.

One of the most common advantages of digital intelligence in language learning is its ability to foster learner autonomy and personalized learning. AI - driven platforms are able to adapt content to individual levels, offer instant corrective feedback and enable learners to learn at their own pace (Ouyang & Jiao, 2021). Such features are especially useful in ESL settings where classroom time may not be sufficient to meet the needs of the individual learner.

Research has suggested that learner autonomy has substantial links to motivation and sustained language engagement, particularly when there is limited instructional support for learner autonomy (Little 2007). In certain regions of the world where exposure to the English language can be limited in the classroom (e.g., Pakistan) the use of AI tools may allow students to interact more actively with the language in terms of informal learning spaces. Nonetheless, the degree to which learners are able to use these affordances in any meaningful way depends on their digital literacy and pedagogical guidance.

Beyond that of pedagogical effectiveness, AI assisted language learning touches upon questions of cultural and linguistic identity. Language learning is not just a technical process but is a social practice, in which learners negotiate identity, belonging and legitimacy (Norton, 2013). AI tools, which are often seen as being neutral or objective, can potentially perpetuate standardized norms of language use that marginalize local varieties and accents as well as multilingual language practices. Studies have shown that learners can experience tension between NLP tools efficiency and a need to maintain the linguistic authenticity and cultural identity (Kohnke et al., 2023; Nawaz et al., 2021). In multilingual societies such as Pakistan, where language issues are so closely linked to regional and ethnic identities, such tensions deserve close examination. Qualitative approaches are especially adequate for capturing these rather nuanced experiences, in that they foreground voices, perspectives, and realities for the learner.

Although the pedagogical potential of AI assisted learning of languages is highlighted in existing literature, it leaves some gaps. First, there is a paucity of qualitative, context Bangkok scientific study looking at how digital intelligence his language ear in multilingual societies of the Global South. Second, research that focuses specifically on Pakistan has given significant importance to technology adoption or learning outcomes, thus providing less understanding of the lived experiences of learners and educators using AI tools. Third, not enough attention has been given to the interactions between AI-mediated language learning and issues of linguistic hierarchy, cultural identity and equity.

Significance of the Study

This study is significant in several important ways—theoretical, contextual, pedagogical, and policy-oriented—particularly within the multilingual and postcolonial educational landscape of Pakistan. While the global discourse on digital intelligence and AI-assisted language learning has

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

expanded rapidly, much of the existing literature remains dominated by perspectives from technologically advanced and monolingual or bilingual contexts. By foregrounding voices from Pakistan, this study contributes to the growing body of Global South scholarship that challenges universalized assumptions about technology-mediated language learning.

From a theoretical standpoint, the study advances sociocultural understandings of language learning by situating digital intelligence within learners' lived linguistic realities. Language development in multilingual contexts is not a purely cognitive or technical process; it is deeply embedded in identity, power relations, and cultural belonging (Akram & Yingxiu, 2019; Parveen & Akram, 2021). By examining how learners and educators negotiate AI-driven language tools alongside Urdu, English, and regional languages, this research highlights the complex interplay between technological affordances and sociolinguistic hierarchies. In doing so, the study extends existing research on AI-assisted language learning beyond outcome-based or acceptance-focused models to include issues of agency, identity, and linguistic equity.

Contextually, the study is significant because Pakistan represents a linguistically diverse yet under-researched setting in the field of educational technology. English occupies a privileged position in higher education and professional advancement, while regional languages often remain marginalized in formal learning spaces. The introduction of AI-powered language tools—largely designed for English and other high-resource languages—has the potential to either bridge or widen existing inequalities. By documenting learners' and educators' experiences, this study provides nuanced insight into how digital intelligence may reinforce, challenge, or reshape linguistic hierarchies within Pakistani classrooms.

Pedagogically, the findings of this research offer practical value for ESL educators and curriculum designers. Understanding how learners perceive personalization, autonomy, and feedback through AI tools can inform more context-sensitive teaching practices. Rather than positioning AI as a replacement for teachers, the study emphasizes its role as a mediating resource that must be carefully integrated to support multilingual learners' needs. The insights generated can guide professional development initiatives, helping educators critically evaluate when and how AI tools enhance language learning without undermining human interaction or cultural relevance.

At the policy level, this study holds implications for institutional and national strategies related to digital education. As Pakistan increasingly adopts digital learning initiatives, evidence-based guidance is needed to ensure inclusive and ethical integration of AI technologies. The study underscores the importance of equitable access, support for regional languages, and the development of digital literacy among both learners and teachers. By highlighting the sociocultural dimensions of digital intelligence, the research contributes to policy conversations that move beyond technological efficiency toward socially responsible and linguistically inclusive education.

Research Methodology

Research Design

This study adopted a qualitative research design to explore how digital intelligence influences language development in Pakistan's multilingual context. A qualitative approach was deemed appropriate because the study sought to understand participants' experiences, perceptions, and meanings rather than to measure predefined variables or test causal relationships. Language learning and technology use are socially situated practices, and qualitative inquiry allows for a

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

deeper examination of how learners and educators interpret and negotiate AI-driven tools within their linguistic and cultural environments.

Research Context and Participants

The research was conducted in higher education settings in Pakistan, where English functions as a second language and as the primary medium of instruction. Participants included ESL learners and language educators from diverse linguistic backgrounds, representing Urdu and various regional languages such as Punjabi, Sindhi, Pashto, and Saraiki. This diversity enabled the study to capture a wide range of perspectives on multilingualism and technology use.

Participants were selected using purposive sampling, ensuring that those included had direct experience with digital or AI-driven language learning tools, such as language-learning applications, AI-based translation tools, or conversational agents. This sampling strategy allowed the researcher to engage with information-rich cases that could provide meaningful insight into the phenomenon under investigation.

Data Collection Methods

Data were collected through multiple qualitative methods to enhance depth and credibility. Semi-structured interviews served as the primary data source, allowing participants to reflect on their experiences with AI-assisted language learning in their own words. The interview format provided flexibility to probe emerging themes while maintaining focus on key areas such as language development, learner autonomy, cultural identity, and access to digital resources.

In addition to interviews, classroom observations were conducted to examine how digital tools were used in instructional settings and how learners interacted with them during language activities. These observations offered contextual insights into the pedagogical integration of AI tools and the dynamics of multilingual classrooms. Document analysis, including institutional policies, course materials, and digital platform guidelines, further supported the triangulation of data by situating participants' experiences within broader educational frameworks.

Data Analysis

Data analysis followed a thematic approach, guided by principles of inductive qualitative analysis. Interview transcripts, observation notes, and documents were coded iteratively to identify recurring patterns and salient themes. Initial codes were generated from the data itself rather than imposed a priori, allowing participants' voices to shape the analytical framework. These codes were then refined and organized into broader themes related to digital intelligence, language development, multilingual identity, and equity. Throughout the analysis, reflexivity was maintained to acknowledge the researcher's positionality and its potential influence on interpretation. Analytical memos were used to document emerging insights and to connect individual experiences with broader sociocultural and educational contexts.

Trustworthiness and Ethical Considerations

To ensure trustworthiness, the study employed strategies aligned with qualitative rigor, including triangulation, prolonged engagement, and thick description. Using multiple data sources strengthened the credibility of the findings, while detailed contextual descriptions enhanced transferability. Ethical considerations were central to the research process. Informed consent was obtained from all participants, and confidentiality was maintained through the use of pseudonyms. Participants were informed of their right to withdraw at any stage without consequence. The study adhered to institutional ethical guidelines and respected participants' linguistic and cultural identities throughout the research process.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Research Questions

Guided by a qualitative, interpretive research design, the present study addressed the following research questions:

RQ1. How do ESL learners and educators in multilingual Pakistan perceive the role of digital intelligence in language development?

RQ2. In what ways do AI-driven digital tools influence learners' exposure to, engagement with, and acquisition of target languages, particularly English?

RQ3. How do learners and educators negotiate multilingual identities and cultural-linguistic values while using AI-assisted language learning tools?

RQ4. What challenges and inequalities shape the use of digital intelligence for language development in Pakistan's multilingual educational context?

These research questions were designed to capture participants' lived experiences, sociocultural interpretations, and contextual constraints, in line with the qualitative methodology and data collection strategies employed in this study.

Results

The qualitative analysis of semi-structured interviews, classroom observations, and document analysis yielded several interrelated themes that illuminate how digital intelligence shapes language development in multilingual Pakistan. The findings are presented thematically, with each theme aligned to the research questions.

Theme 1: Digital Intelligence as an Enabler of Language Exposure and Practice

(Aligned with RQ1 and RQ2)

Participants consistently described digital intelligence—particularly AI-powered language applications, automated feedback systems, and conversational agents—as a powerful means of increasing exposure to English. Both learners and educators emphasized that AI tools offered continuous access to language input beyond classroom boundaries, enabling practice at one's own pace and convenience. Learners reported that AI-driven platforms provided opportunities for repeated exposure to vocabulary, grammar structures, pronunciation models, and writing feedback. This constant interaction was perceived as especially valuable in contexts where classroom contact hours were limited and opportunities for authentic English use were scarce. Several students noted that AI tools functioned as "always-available tutors," allowing them to practice without fear of judgment or embarrassment, which increased their confidence and willingness to experiment with language. Educators echoed these views, observing that learners who engaged with AI tools demonstrated improved lexical awareness, greater syntactic accuracy, and increased engagement with English texts. Classroom observations further confirmed that students frequently relied on AI-based translation and paraphrasing tools to scaffold comprehension, particularly when transitioning from Urdu or regional languages to English.

Theme 2: Personalized Learning and Learner Autonomy through AI

(Aligned with RQ2)

A prominent theme emerging from the data was the role of digital intelligence in fostering personalized learning pathways and learner autonomy. Participants highlighted that AI tools adapted to individual proficiency levels, learning pace, and specific linguistic needs, which contrasted with the one-size-fits-all approach often found in traditional classrooms. Learners described how adaptive feedback, error correction, and progress tracking allowed them to take greater control over their learning process. Many participants reported developing self-directed

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

learning habits, such as setting personal language goals, monitoring improvement, and independently selecting digital resources suited to their needs. Educators perceived this autonomy as both an opportunity and a challenge. While acknowledging the motivational benefits of personalized learning, some teachers expressed concern that excessive reliance on AI could reduce collaborative learning and teacher-student interaction. Nevertheless, most participants agreed that when used strategically, digital intelligence complemented instructional practices and supported differentiated learning in linguistically diverse classrooms.

Theme 3: Tensions between Technological Efficiency and Linguistic-Cultural Identity

(Aligned with RQ3)

Despite the perceived benefits of AI-assisted language learning, participants articulated significant tensions between technological efficiency and cultural-linguistic identity. Many learners acknowledged that AI tools primarily prioritized English and, to a lesser extent, Urdu, while offering minimal support for regional languages. This imbalance reinforced existing linguistic hierarchies within Pakistan's education system. Learners from regional language backgrounds expressed concern that frequent use of AI tools contributed to the marginalization of their mother tongues. Some participants described a sense of linguistic displacement, noting that while AI facilitated academic success in English, it simultaneously distanced them from their cultural-linguistic identities. Educators similarly reflected on the cultural implications of AI integration, emphasizing that language learning is not solely about efficiency or accuracy but also about meaning-making, identity, and social belonging. Classroom observations revealed that AI tools were rarely used to validate or incorporate regional languages, highlighting a gap between technological innovation and inclusive multilingual pedagogy.

Theme 4: Digital Inequality and Unequal Access to AI Resources

(Aligned with RQ4)

Another critical theme concerned unequal access to digital resources, which significantly shaped participants' experiences with digital intelligence. Learners from urban and economically advantaged backgrounds reported consistent access to high-quality devices, stable internet connectivity, and premium AI tools. In contrast, students from rural or underserved areas faced infrastructural barriers that limited their ability to engage with AI-assisted language learning. Educators highlighted institutional constraints, including limited technological infrastructure, lack of formal training, and insufficient policy guidance on ethical and pedagogical AI use. Document analysis further revealed that institutional strategies for digital education often emphasized technological adoption without addressing issues of equity, language diversity, or contextual adaptation. These disparities contributed to uneven learning outcomes and reinforced existing educational inequalities, raising concerns about the uncritical implementation of AI in multilingual contexts.

Theme 5: Negotiating Human Agency in AI-Assisted Language Learning

(Aligned with RQ1, RQ2, and RQ3)

A cross-cutting theme across all data sources was the negotiation of human agency in AI-mediated language learning. While participants valued the efficiency and responsiveness of AI tools, they consistently emphasized the irreplaceable role of teachers in providing emotional support, cultural interpretation, and ethical guidance. Learners viewed AI as a supplementary resource rather than a substitute for human instruction. Educators stressed the importance of maintaining pedagogical control and using AI as a mediating tool that supports, rather than

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

dictates, language learning practices. This theme underscores the need for balanced integration, where digital intelligence enhances learning while preserving human-centered pedagogy.

Summary of Findings

Collectively, the findings reveal that digital intelligence plays a multifaceted role in language development within Pakistan's multilingual context. AI-driven tools enhance exposure, personalization, and learner autonomy, particularly in English language learning. However, these benefits are accompanied by significant challenges, including linguistic marginalization, cultural tensions, unequal access, and concerns about over-reliance on technology. The results emphasize that digital intelligence is not a neutral intervention; rather, its impact is shaped by sociocultural, linguistic, and institutional factors. Effective and ethical integration of AI in multilingual Pakistan therefore requires context-sensitive pedagogical practices, inclusive language policies, and sustained teacher involvement.

Discussion

This study set out to explore how digital intelligence—particularly AI-driven language tools—shapes language development in Pakistan's multilingual context. Drawing on qualitative data from interviews, classroom observations, and document analysis, the findings reveal that AI-assisted language learning is simultaneously enabling, constraining, and culturally consequential. When interpreted through sociocultural theory and postcolonial linguistics, these findings illuminate the deeper social, ideological, and power-laden dimensions of technology-mediated language learning. From a sociocultural theoretical standpoint, language learning is understood as a mediated process in which cognitive development occurs through interaction with tools, symbols, and more knowledgeable others (Vygotsky, 1978). The findings of this study strongly align with this perspective, as participants consistently described AI tools as meditational artifacts that scaffold language learning by providing feedback, modeling linguistic forms, and enabling practice beyond classroom boundaries.

AI-driven applications functioned as semiotic tools that mediated learners' engagement with English, particularly in contexts where exposure to authentic language input was limited. Learners' descriptions of AI as an "always-available tutor" resonate with the concept of scaffolding within the Zone of Proximal Development (ZPD), where learners extend their capabilities through guided support (Lantolf & Thorne, 2006). However, unlike traditional human mediation, AI mediation was perceived as emotionally neutral and efficiency-oriented, highlighting a shift in how scaffolding is experienced in digital environments.

At the same time, sociocultural theory emphasizes the importance of social interaction and co-construction of meaning. While AI facilitated individualized learning and autonomy, participants expressed concern that excessive reliance on AI could reduce dialogic interaction with teachers and peers. This finding echoes critiques in sociocultural research that caution against technologically driven learning environments that prioritize individual cognition over collaborative meaning-making (Swain, Kinnear, & Steinman, 2015). Thus, AI in this context acts as a powerful but incomplete mediator—effective for linguistic form and practice, yet limited in addressing affective, cultural, and interpersonal dimensions of language learning.

The study's findings regarding increased learner autonomy align with sociocultural interpretations of agency as socially situated rather than purely individual (Duff, 2012). Participants' use of AI tools to set goals, monitor progress, and personalize learning reflects a reconfiguration of learner agency facilitated by digital intelligence. Rather than replacing

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

teachers, AI tools redistributed agency by enabling learners to take greater responsibility for their language development. However, this autonomy was unevenly distributed. Learners with greater digital access and literacy were better positioned to benefit from AI-mediated autonomy, reinforcing sociocultural arguments that learning tools do not operate independently of social structures and material conditions (Wertsch, 1998). In Pakistan's multilingual context, where access to digital resources varies significantly, AI-enhanced autonomy risks becoming a privilege rather than a universal benefit.

The findings also strongly align with postcolonial linguistic theory, which foregrounds the role of language in reproducing historical and structural inequalities (Pennycook, 2001; Phillipson, 1992). Participants' experiences revealed that AI tools overwhelmingly prioritize English and other global languages, while regional languages remain underrepresented or unsupported. This technological bias mirrors colonial language hierarchies, where English continues to function as a gatekeeping language in education, employment, and social mobility in Pakistan.

From a postcolonial perspective, digital intelligence is not a neutral innovation but a continuation of epistemic dominance embedded in global technological design. AI systems are largely developed in Western contexts and trained on high-resource languages, reinforcing what Phillipson (2010) terms "linguistic imperialism." The marginalization of regional languages within AI platforms contributes to what participants described as linguistic displacement, where success in English comes at the cost of cultural and linguistic identity.

This tension reflects broader postcolonial concerns about modernization discourses that equate technological advancement with progress while overlooking local knowledge systems and languages (Canagarajah, 2013). Learners' ambivalence toward AI—valuing its efficiency while questioning its cultural alignment—demonstrates how multilingual individuals actively negotiate identity in digital learning spaces rather than passively accepting technological norms. The theme of unequal access to digital intelligence further underscores postcolonial critiques of globalization and technology. While AI-assisted language learning promises democratization of education, the findings reveal that structural inequalities related to geography, socioeconomic status, and institutional support significantly shape who benefits from these technologies. This aligns with research on the digital divide in Global South contexts, which emphasizes that access to technology is not merely technical but deeply political and social (Selwyn, 2016). In Pakistan, infrastructural limitations, lack of teacher training, and absence of inclusive language policies constrain the transformative potential of AI. The postcolonial scholars argue that technological interventions ignore structural inequities than resolving educational disparities (Kumaravadivelu, 2016).

Across all themes, participants emphasized the irreplaceable role of human teachers, particularly in mediating cultural meaning, emotional support, and ethical judgment. This finding resonates with both sociocultural and postcolonial traditions, which position education as a relational and value-laden practice rather than a purely technical process. From a sociocultural lens, teachers remain central as mediators who contextualize tools and guide learners' meaning-making (Johnson, 2009). From a postcolonial standpoint, teachers act as cultural agents who can resist homogenizing technological narratives by validating local languages and identities. The participants' insistence on human involvement challenges techno-solutionist views of AI and supports calls for human-centered, context-sensitive integration of digital intelligence in education (Williamson, 2021).

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Conclusion

This qualitative study examined the role of digital intelligence in shaping language development within Pakistan's multilingual educational context, with particular attention to the use of AI-driven tools in English language learning. By foregrounding the perspectives of learners and educators, the study offers a contextually grounded understanding of how digital technologies mediate language practices, learner agency, and linguistic identities in a linguistically diverse yet structurally unequal setting. The findings demonstrate that digital intelligence plays a significant mediating role in language development by expanding learners' exposure to English, enabling personalized learning pathways, and fostering greater learner autonomy. AI-powered tools function as supportive meditational resources that supplement classroom instruction and allow learners to engage with language learning beyond institutional boundaries. From a sociocultural perspective, these tools act as semiotic mediators that scaffold linguistic development and redistribute agency within the learning process. At the same time, the study reveals critical tensions associated with AI-assisted language learning in multilingual Pakistan. The dominance of English within digital platforms reinforces existing linguistic hierarchies and marginalizes regional languages, echoing long-standing postcolonial patterns of linguistic inequality. Participants' experiences highlight how technological efficiency often comes at the expense of cultural and linguistic inclusivity, creating a sense of ambivalence among learners who benefit academically from AI tools while negotiating the erosion of their linguistic identities. The findings further underscore that access to digital intelligence is uneven, shaped by socioeconomic status, geographic location, and institutional infrastructure. These disparities limit the transformative potential of AI and risk reproducing educational inequalities rather than alleviating them. Moreover, while AI enhances technical aspects of language learning, participants consistently emphasized the irreplaceable role of human educators in providing cultural interpretation, emotional support, and ethical guidance. This reinforces the view that AI should be positioned as a complementary tool rather than a replacement for human-centered pedagogy. In conclusion, the study argues that the effective integration of digital intelligence in multilingual contexts such as Pakistan requires a shift from techno-centric adoption toward pedagogically and culturally responsive implementation. Policymakers and educational institutions must prioritize inclusive language policies, teacher training, and equitable access to digital resources to ensure that AI-supported language learning benefits diverse linguistic communities. By situating AI-assisted language development within sociocultural and postcolonial frameworks, this research contributes to a more critical and context-sensitive understanding of digital intelligence in education and lays a foundation for future research in multilingual and Global South contexts.

Synthesis and Implications

Taken together, the findings suggest that digital intelligence in multilingual Pakistan functions as a double-edged phenomenon: it enhances language exposure, personalization, and autonomy while simultaneously reinforcing linguistic hierarchies and structural inequalities. Sociocultural theory helps explain how AI mediates learning practices, while postcolonial linguistics reveals whose languages, identities, and knowledge is privileged in this mediation. The study therefore argues that effective AI integration in multilingual contexts requires more than technological adoption. It necessitates pedagogical reflexivity, institutional accountability, and policy-level

commitment to linguistic inclusion. Without these, digital intelligence risks becoming another mechanism through which global inequalities are reproduced in local educational settings

References

Abdelrady, A. H., Ibrahim, D. O. O., & Akram, H. (2025). Unveiling the Role of Copilot in Enhancing EFL Learners' Writing Skills: A Content Analysis. *World Journal of English Language*, *15*(8), 174-185.

Ahmad, N., Akram, H., & Ranra, B. (2022). In quest of Language and National Identity: A Case of Urdu language in Pakistan. *International Journal of Business and Management Sciences*, *3*(2), 48-66.

Akram, H., & Abdelrady, A. H. (2023). Application of ClassPoint tool in reducing EFL learners' test anxiety: an empirical evidence from Saudi Arabia. *Journal of Computers in Education*, 1-19.

Akram, H., & Abdelrady, A. H. (2025). Examining the role of ClassPoint tool in shaping EFL studensts' perceived E-learning experiences: A social cognitive theory perspective. *Acta Psychologica, 254,104775*.

Akram, H., & Sohail, A. (2024). Role of Goal-Setting and Planning on Students' academic Performance of Computational Mathematics: A Bayesian Inference Approach. *Educational Research and Innovation,* 4(4), 13-22.

Akram, H., & Yingxiu, Y. (2019). The Academic Experience of 1st Year International Students at Northeast Normal University: A Case Study of Northeast Normal University, Changchun, China. *Education Quarterly Reviews*, *2*(1), 106-115.

Al-Adwan, A. S., Nofal, M., Akram, H., Albelbisi, N. A., & Al-Okaily, M. (2022). Towards a sustainable adoption of e-learning systems: The role of self-directed learning. *Journal of Information Technology Education: Re-search, 21,* 245-267.

Aslam, S., Akram, H., Parveen, K., & Hali, A. U. (2020). Cultural differences and problems: a case of international students studying in a normal university in north China. *Journal of Social Sciences Advancement*, *1*(1), 08-12.

Canagarajah, S. (2013). *Translingual practice: Global Englishes and cosmopolitan relations*. Routledge.

Chen, Z., & Ramzan, M. (2024). Analyzing the role of Facebook-based e-portfolio on motivation and performance in English as a second language learning. *International Journal of English Language and Literature Studies*, *13*(2), 123-138.

Congman, R., Umar, M., Bhayo, N. H., Ijaz, M. S., Sharifi, A. F., & Akram, H. (2019). Smartphone addiction and subjective well-being: A case of international students at Northeast Normal University, China. *Am J Creat Educ*, *2*, 70-80.

Duff, P. A. (2012). Identity, agency, and second language acquisition. *The Routledge handbook of second language acquisition*, 410–426.

García, O., & Wei, L. (2014). *Translanguaging: Language, bilingualism and education*. Palgrave Macmillan.

Godwin-Jones, R. (2018). Using mobile technology to develop language skills and cultural understanding. *Language Learning & Technology*, *22*(3), 3-17.

Godwin-Jones, R. (2018). Using mobile technology to develop language skills. *Language Learning & Technology, 22*(3), 1–17.

Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education*. Springer.

Jalalzai, N. N., Akram, H., Khan, M., & Kakar, A. K. (2025). Technology Readiness in Education: An Analysis of ICT Facilities in High Schools of Loralai, Balochistan. *Contemporary Journal of Social Science Review*, *3*(3), 2835-2842.

Jamil, S. (2021). From digital divide to digital inclusion: Challenges for wide-ranging digitalization in Pakistan. *Telecommunications Policy*, *45*(8), 102206.

Javaid, Z. K., Chen, Z., & Ramzan, M. (2024). Assessing stress causing factors and language related challenges among first year students in higher institutions in Pakistan. *Acta Psychologica*, *248*, 104356.

Johnson, K. E. (2009). *Second language teacher education: A sociocultural perspective*. Routledge.

Joshi, P., Santy, S., Budhiraja, A., Bali, K., & Choudhury, M. (2020). The state and fate of linguistic diversity and inclusion in the NLP world. *arXiv preprint arXiv:2004.09095*

Kasneci, E., et al. (2023). ChatGPT for good? *Learning and Individual Differences, 103*, 102274.

Khan, T. J., & Saeed, A. (2023). Technology integration in Pakistani ESL classrooms. *CALL-EJ, 24*(1), 1–18.

Kohnke, L., Zou, D., & Zhang, R. (2023). AI and language learning. *Computer Assisted Language Learning*.

Kumaravadivelu, B. (2016). *The decolonial option in English teaching*. TESOL Quarterly, 50(1), 66–85. https://doi.org/10.1002/tesq.202

Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural theory and the genesis of second language development*. Oxford University Press.

Little, D. (2007). Learner autonomy. *Language Teaching, 40*(1), 14–23.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2022). Artificial intelligence in education: Promises and implications for teaching and learning. *This book discusses various aspects of AI in education, including its role in assessment and exam proctoring*.

Ma, D., Akram, H., & Chen, I. H. (2024). Artificial Intelligence in Higher Education: A Cross-Cultural Examination of Students' Behavioral Intentions and Attitudes. *The International Review of Research in Open and Distributed Learning*, *25*(3), 134-157.

Ma, D., Akram, H., & Li, S. (2025). Assessing the role of physical activity in shaping students' academic motivation: the mediating role of mental health. *BMC Public Health*.

Mahboob, A., & Elyas, T. (2014). English in Pakistan. *World Englishes, 33*(3), 451–465.

Nawaz, S., Aqeel, M., & Ramzan, M. (2021). Listening Comprehension Problems, Corresponding Factors and Strategies for Better or Enhanced Listening Skill. *Pakistan Languages and Humanities Review*, *5*(2), 729-737.

Norton, B. (2013). *Identity and language learning* (2nd ed.). Multilingual Matters.

Ouyang, F., & Jiao, P. (2021). AI in education. *Computers and Education: Artificial Intelligence, 2*, 100020.

Parveen, K., & Akram, H. (2021). Insight of Chinese culture by viewing historical picture of Qin Dynasty. *Journal of Social Sciences Advancement*, *2*(1), 17–24.

Pennycook, A. (2001). *Critical applied linguistics: A critical introduction*. Lawrence Erlbaum.

Pennycook, A. (2017). *The cultural politics of English*. Routledge.

Phillipson, R. (1992). *Linguistic imperialism*. Oxford University Press.

Phillipson, R. (2010). *Linguistic imperialism continued*. Routledge.

Rahman, T. (2002). *Language, ideology and power*. Oxford University Press.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Ramzan, M., & Khan, M. A. (2024). Textual Coherence as Cultural Insights in Prologue of the Holy Woman and Epilogue of Unmarriageable. Contemporary Journal of Social Science Review, 2(04), 266-281.

Ramzan, M., Akram, H., & kynat Javaid, Z. (2025). Challenges and Psychological Influences in Teaching English as a Medium of Instruction in Pakistani Institutions. *Social Science Review Archives*, *3*(1), 370-379.

Ramzan, M., Mushtaq, A., & Ashraf, Z. (2023). Evacuation of difficulties and challenges for academic writing in ESL learning. *The University of Chitral Journal of Linguistics and Literature (JLL), 7*(1), 42-49.

Selwyn, N. (2016). *Education and technology: Key issues and debates*. Bloomsbury.

Swain, M., Kinnear, P., & Steinman, L. (2015). *Sociocultural theory in second language education*. Multilingual Matters.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wertsch, J. V. (1998). *Mind as action*. Oxford University Press.

Williamson, B. (2021). *Education governance and digital transformation*. Routledge.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators?. *International journal of educational technology in higher education*, *16*(1), 1-27.