

FEATURES OF TEACHING ENGLISH USING ARTIFICIAL INTELLIGENCE IN A MULTILINGUAL ENVIRONMENT (UZBEK-RUSSIAN-ENGLISH)

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Abstract. *Multilingual educational environments present unique challenges and opportunities for English language teaching, particularly when artificial intelligence tools are integrated into the pedagogical process. This study examines the distinctive features of AI-assisted English language instruction in the trilingual context of Uzbekistan, where students simultaneously navigate Uzbek (L1), Russian (L2), and English (L3) linguistic systems.*

Employing a sequential explanatory mixed-methods design, the research collected quantitative data from 274 undergraduate students across three universities in Bukhara and Tashkent through a purpose-designed questionnaire measuring multilingual interference patterns, AI tool usage strategies, and English proficiency gains. Qualitative data were gathered through classroom observations (48 sessions) and semi-structured interviews with 32 students and 18 instructors. Results indicate that AI tools address multilingual interference at phonological, lexical, and syntactic levels with varying degrees of effectiveness.

Keywords: *artificial intelligence, multilingualism, English language teaching, Uzbek, Russian, linguistic interference, translanguaging, higher education, Uzbekistan.*

Introduction

The integration of artificial intelligence into English language teaching has attracted considerable scholarly attention in recent years, yet the overwhelming majority of research has been conducted in monolingual or bilingual educational contexts, predominantly involving East Asian learners whose L1 is Chinese, Korean, or Japanese (Lo et al., 2024; Law, 2024).

Significantly less attention has been devoted to multilingual settings where learners bring two or more established linguistic systems to the task of acquiring English as an additional language. Uzbekistan represents a compelling case for investigating this gap, as its higher education system operates within a complex trilingual ecology where Uzbek, Russian, and English coexist in varying degrees of functional distribution (Shakib Kotamjani et al., 2023).

Uzbek serves as the state language and primary medium of instruction; Russian retains significant prestige as a language of science, technology, and inter-ethnic communication; and English is increasingly promoted as the language of international academic and professional engagement.

Literature Review

Cross-linguistic influence in third language acquisition (TLA) has been theorized through several competing models. The Typological Primacy Model (Rothman, 2011) posits that the language typologically closest to the L3 exerts the strongest transfer influence, regardless of whether it is the L1 or L2. The Cumulative Enhancement Model (Flynn et al., 2004) suggests that all previously acquired languages can positively contribute to L3 acquisition. The L2 Status Factor hypothesis (Bardel & Falk, 2007) argues that the L2 has a privileged role in L3 transfer due to shared metalinguistic processing mechanisms.

In the Uzbek-Russian-English configuration, these models generate competing predictions: the Typological Primacy Model would predict stronger transfer from Russian (an Indo-European language, like English), while the L2 Status Factor would predict that whichever language was acquired second would exert stronger influence, which varies by student depending on whether Uzbek or Russian was their primary childhood language.

Research on language teaching in Central Asian multilingual contexts remains limited.

Hasanova (2007) documented the shifting sociolinguistic landscape of English in Uzbekistan following independence, noting the tension between Russian's continuing dominance in higher education and English's rising status as a global lingua franca. More recently, analyses of Uzbekistan's education system have highlighted that teacher preparation, digital infrastructure, and AI readiness remain significant challenges, particularly in regional institutions outside Tashkent. The integration of AI technologies in Uzbekistan's education has been examined primarily through the lens of general educational technology adoption, with very few studies specifically addressing AI's interaction with the country's multilingual dynamics.

Methodology

This study employed a sequential explanatory mixed-methods design in which quantitative data collection and analysis preceded and informed qualitative investigation. The quantitative phase involved 274 undergraduate students from three higher education institutions: Bukhara State University ($n = 112$), Bukhara Innovation University ($n = 78$), and a national university in Tashkent ($n = 84$). Participants were selected through stratified sampling based on L1 background (Uzbek-dominant, $n = 168$; Russian-dominant, $n = 64$; balanced bilingual, $n = 42$), academic discipline, and English proficiency level (A2-B2 on the CEFR scale). The sample comprised 172 (62.8%) female and 102 (37.2%) male participants, with ages ranging from 18 to 26 years ($M = 20.8$, $SD = 1.9$). All participants had been using at least one AI tool for English learning for a minimum of one semester.

Three instruments were employed in the quantitative phase. The Multilingual Interference Diagnostic Test (MIDT), developed for this study and validated through pilot testing with 40 students, assessed interference at four linguistic levels: phonological (20 items), lexical (20 items), syntactic (20 items), and pragmatic (15 items). Each item was designed to elicit specific interference patterns from either Uzbek or Russian, based on contrastive analysis of the three language systems. The AI Usage and Strategy Questionnaire (AUSQ) measured the frequency, purpose, and strategic nature of AI tool engagement in English learning (24 items, 5-point Likert scale, Cronbach's $\alpha = .91$). The English Proficiency Progress Assessment (EPPA) measured gains in English proficiency over one semester through pre-test and post-test administrations of a standardized assessment aligned with CEFR descriptors.

Results

The Multilingual Interference Diagnostic Test revealed distinct patterns of cross-linguistic influence based on students' dominant language background. Uzbek-dominant students exhibited significantly higher phonological interference scores ($M = 14.2$, $SD = 3.1$) compared to Russian-dominant students ($M = 10.8$, $SD = 2.9$), $t(230) = 7.46$, $p < .001$, $d = 1.13$. This difference was primarily attributable to vowel quality distortions reflecting Uzbek vowel harmony and difficulty with English consonant clusters absent in Uzbek phonology. Conversely, Russian-dominant students demonstrated higher syntactic interference scores ($M = 13.6$, $SD = 3.4$) compared to Uzbek-dominant students ($M = 11.1$, $SD = 3.0$), $t(230) = 5.28$, $p < .001$, $d = 0.78$, reflecting transfer of Russian prepositional phrase structures, article omission patterns, and

aspect-tense conflation. At the pragmatic level, both groups showed comparable interference scores ($M = 9.4$ vs. 9.1 , $p = .42$), suggesting that pragmatic transfer draws from culturally shared norms rather than language-specific structures.

Table 1. AI Tool Effectiveness in Reducing Multilingual Interference by Linguistic Level

Linguistic Level	Pre-test M(SD)	Post-test M(SD)	Reduction %	t	d
Phonological	12.8 (3.2)	8.4 (2.6)	34.7	18.4***	1.52
Lexical	11.4 (2.9)	8.1 (2.4)	28.9	15.2***	1.24
Syntactic	12.1 (3.3)	8.7 (2.8)	28.3	14.6***	1.11
Pragmatic	9.3 (2.7)	8.1 (2.5)	12.9	5.8***	0.46

Note. *** $p < .001$. Effect sizes: $d > 0.8 = large$.

As Table 1 demonstrates, AI tools produced the largest reductions in phonological interference (34.7%, $d = 1.52$), followed by lexical (28.9%, $d = 1.24$) and syntactic levels (28.3%, $d = 1.11$). Pragmatic interference showed the smallest reduction (12.9%, $d = 0.46$), with only a small-to-medium effect size. The large effect at the phonological level is attributable to AI speech recognition tools that provided immediate, consistent pronunciation feedback, allowing students to identify and correct L1 transfer patterns in real time. At the lexical level, AI tools effectively addressed false cognates between Russian and English and helped students overcome semantic field differences between Uzbek and English. The limited effectiveness at the pragmatic level reflects AI tools' difficulty in addressing culturally embedded communication norms, such as directness conventions, politeness strategies, and discourse organization patterns that differ across the three languages.

Multiple regression analysis revealed that L1 background, AI usage frequency, metacognitive awareness, and prior technology training together predicted 52% of variance in English proficiency gains ($R^2 = .52$, $F(4, 269) = 72.8$, $p < .001$). Metacognitive awareness was the strongest predictor ($\beta = .38$, $p < .001$), followed by AI usage quality rather than quantity ($\beta = .29$, $p < .001$), prior technology training ($\beta = .21$, $p < .001$), and L1 background ($\beta = .14$, $p = .006$). The finding that AI usage quality outweighed quantity aligns with emerging research suggesting that strategic AI engagement produces superior learning outcomes compared to passive or uncritical use.

Thematic analysis of qualitative data identified three distinctive AI-mediated multilingual learning strategies. The first, contrastive AI querying, involved students deliberately prompting AI tools to explain differences among their three languages. Students reported asking ChatGPT questions such as: "What is the difference between how Uzbek, Russian, and English express the concept of obligation?" or "Why does English use articles when Uzbek and Russian do not?"

This strategy transformed AI from a simple answer provider into a metalinguistic awareness tool. One student explained: "When ChatGPT shows me how the same idea works in all three of my languages, I understand English grammar much deeper than when the teacher just explains the English rule alone."

The second strategy, translingual scaffolding, involved students using their stronger languages as bridges to English through AI mediation. Russian-dominant students frequently used AI to translate complex academic concepts from Russian to English, then analyzed the structural differences. Uzbek-dominant students employed a similar strategy, sometimes routing through Russian as an intermediary when direct Uzbek-English AI translation was inadequate.

One instructor observed: "Students are creating their own multilingual learning paths through AI. They use whichever language gives them the best understanding and then build bridges to English. This was impossible before AI because no textbook could address three languages simultaneously."

Discussion

The findings of this study illuminate several distinctive features of AI-assisted English teaching in the Uzbek-Russian-English trilingual context that have not been previously documented in the literature.

The differential effectiveness of AI tools across linguistic levels, with strong effects at phonological and lexical levels but limited impact at the pragmatic level, reflects a fundamental limitation of current AI technologies: their strength lies in pattern-based error detection and correction, which is most effective for rule-governed linguistic features, while context-dependent, culturally embedded language use remains beyond their reliable scope (Crompton et al., 2024).

This finding has important implications for curriculum design, suggesting that AI tools should be deployed strategically to address the interference patterns they can most effectively remediate, while human instruction should be prioritized for pragmatic and discourse-level competencies.

The identification of three AI-mediated multilingual learning strategies represents a novel contribution to both the AI in education and multilingual pedagogy literatures. Contrastive AI querying aligns with the principles of contrastive analysis and the language awareness approach, but extends these frameworks by introducing AI as an interactive contrastive tool that can respond to learner-initiated comparisons in real time. This capacity is particularly valuable in multilingual contexts where instructors may not command all three languages at levels sufficient for detailed contrastive explanation. Translingual scaffolding operationalizes Garcia and Wei's (2014) translanguaging theory through AI mediation, demonstrating that AI can serve as a bridge between languages in the student's repertoire rather than functioning exclusively as an English-only tool. AI-assisted code-switching regulation contributes to understanding of metacognitive processes in multilingual AI interaction.

The finding that AI usage quality predicted proficiency gains more strongly than usage quantity has significant pedagogical implications. In the multilingual context, quality AI usage was characterized by strategic, linguistically aware interactions that leveraged the student's full trilingual repertoire.

This finding challenges the assumption that more AI exposure automatically leads to better outcomes and supports the growing consensus that metacognitive engagement mediates the relationship between AI use and learning outcomes (Zhai et al., 2024). For Uzbekistan's educational context specifically, this suggests that training students in strategic AI use may be more impactful than simply increasing AI tool availability.

Conclusion

This study has provided the first systematic empirical investigation of AI-assisted English language teaching in the trilingual Uzbek-Russian-English educational context. The findings demonstrate that the multilingual environment creates both distinctive challenges and unique opportunities for AI integration. AI tools effectively address phonological, lexical, and syntactic interference from both Uzbek and Russian, but show limited capacity at the pragmatic level.

More significantly, multilingual students develop creative AI-mediated learning strategies, including contrastive querying, translingual scaffolding, and code-switching regulation, that transform AI from a monolingual correction tool into a multilingual learning resource. These strategies emerge most effectively when instructors explicitly acknowledge and leverage the trilingual context rather than treating it as an obstacle to be overcome.

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