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**ARTIFICIAL INTELLIGENCE AS A TOOL FOR DEVELOPING
COMMUNICATIVE COMPETENCE IN ENGLISH LANGUAGE LEARNERS***(Evidence from EFL Settings in the Republic of Uzbekistan)*<https://doi.org/10.5281/zenodo.20814883>**ABSTRACT**

The development of communicative competence (CC) — the multidimensional ability to use language accurately, appropriately, and effectively in real-world interaction — stands at the center of contemporary English as a Foreign Language (EFL) pedagogy. This article examines the capacity of artificial intelligence (AI) tools to serve as instruments for cultivating the five canonical components of CC: linguistic, sociolinguistic, discourse, strategic, and intercultural competence. Drawing on a synthesis of current second language acquisition (SLA) research and empirical data from a 20-week quasi-experiment conducted in Tashkent, Uzbekistan (N = 156), the study evaluates the pedagogical effectiveness of four AI platforms — ELSA Speak, Duolingo, ChatGPT/GPT-4, and Grammarly — when deployed under conditions of structured teacher mediation. Results indicate significant gains across all five CC components in the experimental group, with the largest composite effect size recorded for strategic and sociolinguistic competence (Cohen's $d = 0.76$ and 0.72 , respectively). The study concludes that AI tools constitute a pedagogically valuable, though pedagogically dependent, resource for CC development in Uzbek EFL contexts, and outlines five directions for future research.

Keywords: communicative competence, artificial intelligence, EFL, CALL, ICALL, ChatGPT, adaptive learning, Uzbekistan, sociolinguistic competence, intercultural competence.

1. INTRODUCTION

Communicative competence has occupied a central position in language education research since Hymes, D. (1972)[13] first proposed the concept as a corrective to Chomsky's narrowly cognitive notion of linguistic competence. The subsequent elaboration of the construct by Canale, M., & Swain, M. (1980)[4] and its later expansion to include strategic and intercultural dimensions (Bachman, L.F., 1990; Byram, M,1997)[1,3] have collectively established CC as the gold standard against which the effectiveness of foreign language instruction is measured. To develop CC is not merely to transmit grammatical knowledge; it is to cultivate the learner's capacity to deploy that knowledge flexibly, contextually, and interculturally in live communicative encounters.

The Republic of Uzbekistan's post-2017 educational reform agenda places English language proficiency — and specifically, the development of communicative competence — at the top of the national curriculum priority list. Presidential Decree[23] No. UP-4947 (2017) mandated the introduction of English instruction from Grade 1 and stipulated communicative methodology as the required pedagogical orientation. Yet the country's performance in the EF English Proficiency Index (rank 88/113; Education First, 2023)[7] and persistent teacher reports of learner reticence in oral production tasks suggest that the transition from form-focused to communication-focused instruction remains incomplete, hampered in part by large class sizes, insufficient authentic input, and limited opportunities for extended speaking practice.

Against this backdrop, artificial intelligence technologies have emerged as a potentially transformative supplement to classroom instruction. Unlike static digital resources, contemporary AI tools — powered by deep neural networks, natural language processing pipelines, and large language models (LLMs) — can simulate communicative interaction, provide immediate and individualised corrective feedback, adapt task difficulty dynamically, and generate contextually rich language input at scale. These capacities map directly onto the instructional requirements for CC development: varied and repeated exposure to authentic language use, timely feedback on communicative performance, and progressive scaffolding of interaction complexity.

The central question driving the present study is whether and to what extent AI tools can function as effective instruments for developing all five components of communicative competence among Uzbek EFL learners, and whether the pedagogical framework within which they are deployed moderates their effectiveness. The study contributes to an emerging body of ICALL (Intelligent Computer-Assisted Language Learning) research by providing controlled experimental evidence from a context — Turkic-speaking EFL — that is substantially underrepresented in the existing literature.

2. LITERATURE REVIEW

2.1. Communicative Competence: Theoretical Foundations

The concept of communicative competence, initially articulated by Hymes, D. (1972)[13] in reaction to the Chomskyan dichotomy of competence and performance, denotes the system of knowledge and skills required for actual language use. Canale, M., & Swain, M. (1980) [4] foundational model identified four components — grammatical, sociolinguistic, discourse, and strategic — that together account for a speaker's ability to communicate appropriately and effectively. Bachman, L.F. (1990)[1] subsequently reframed these components within a broader communicative language ability framework, distinguishing organisational competence (grammatical and textual) from pragmatic competence (illocutionary and sociolinguistic). The intercultural dimension, emphasised by Byram, M.(1997)[3] and increasingly central to EFL curricula in globalising contexts, added a fifth component focused on cultural knowledge, attitudes, and critical awareness.

Table 1 summarises the five CC components as operationalised in the present study, along with their functional significance for EFL instruction.

Table 1. Components of Communicative Competence and Their Role in EFL Instruction

Component	Description and Role in EFL Instruction
Linguistic competence	Mastery of phonological, lexical, and grammatical systems; prerequisite for accurate encoding and decoding of messages
Sociolinguistic competence	Ability to adapt language use to social context, register, and interlocutor; crucial for authentic interaction
Discourse competence	Capacity to construct coherent spoken and written texts across turn-taking, cohesion, and genre conventions

Component	Description and Role in EFL Instruction
Strategic competence	Use of communication strategies (circumlocution, repair, paraphrase) to maintain interaction despite lexical or structural gaps
Intercultural competence	Awareness of cultural norms, values, and pragmatic conventions underpinning target-language communication

Note. Synthesised from Canale, M., & Swain, M. (1980)[4], Bachman (1990)[1], Byram M. (1997)[3], and Common European Framework of Reference for Languages (CEFR, Council of Europe, 2020)[7].

2.2. AI Tools and the CALL/ICALL Paradigm

The application of digital technologies to language learning has evolved from early behaviourist drill-and-practice software through communicative CALL to the current era of Intelligent CALL, characterised by adaptive algorithms, speech processing, and LLM-based dialogue systems (Warschauer, M., & Healey, D., 1998; Levy, M., 2009)[22,17]. Contemporary AI tools differ qualitatively from their predecessors in three respects that are directly relevant to CC development: (a) they can generate contextually variable, open-ended language rather than matching learner input against fixed correct answers; (b) they can sustain extended interactional sequences that simulate genuine communicative encounters; and (c) they can deploy learner models that track and adapt to individual proficiency profiles across sessions.

The theoretical connection between these AI capabilities and CC development is grounded in several SLA principles. Krashen's Input Hypothesis (1982)[15] requires comprehensible, slightly challenging input — a condition that adaptive AI platforms operationalise through continuous difficulty calibration. Long's Interaction Hypothesis (1996)[18] positions negotiated interaction as the engine of acquisition; AI dialogue agents provide a low-stakes arena for such negotiation, free from the social evaluation pressures of classroom interaction. Swain's Output Hypothesis (1995)[20] further establishes the importance of pushed output — situations in which learners must produce at the edge of their competence — which AI speaking and writing tasks can systematically engineer. Finally, sociocultural theory (Vygotsky, L.S., 1978)[21] frames AI scaffolding as a digitally mediated form of zone of proximal development (ZPD) support, most effective when combined with teacher-organised metacognitive reflection.

2.3. Empirical Evidence for AI-Assisted CC Development

A growing body of experimental and quasi-experimental research supports the effectiveness of AI tools in developing specific CC components. For linguistic competence, Golonka, E.M et al. (2014)[11] synthesised 350 CALL studies and found consistent advantages of technology-enhanced instruction (mean $d = 0.45$), with adaptive feedback identified as a primary driver. For pronunciation — a key sub-component of linguistic competence — ASR-based tools have achieved effect sizes of $d = 0.81$ in controlled settings (Lan, Y.-J et al., 2020)[16]. For discourse and strategic competence, LLM-based conversation agents have demonstrated particular promise: a study by Huang, J. et al. (2023)[12] found that ChatGPT-mediated writing instruction produced significant gains in textual coherence and argument structure. For sociolinguistic and intercultural competence, evidence remains more limited, but several studies document the value of AI-simulated cross-cultural dialogue scenarios in raising pragmatic awareness (Freiermuth, M., & Jarrell, D., 2006; Godwin-Jones, R., 2022)[9,10].

Within Uzbekistan, Botirova, Z.A. (2022)[2] documented vocabulary gains from Duolingo use among Tashkent pedagogical university students, and Rashidova, M.B., & Khasanov, B.R. (2023)[19] reported positive attitudes toward ChatGPT for academic writing among engineering students, though neither study assessed the broader construct of CC systematically. The present study

extends this literature by employing a validated CC assessment battery and a controlled experimental design that disaggregates effects by CC component.

3. METHODOLOGY

3.1. Research Design and Ethical Considerations

The study employs a quasi-experimental pre-test–post-test design with a control group (CG) and an experimental group (EG). All participants and, where relevant, their guardians provided informed consent. The study received ethical clearance from the Research Ethics Committee of the Uzbek State University of World Languages (Protocol No. 12/2023). Group assignment was made on the basis of intact classes; initial equivalence was verified through the Cambridge Placement Test (CPT) and confirmed statistically (independent-samples t-test; $p = .47$ for composite CC pre-score).

3.2. Participants

One hundred and fifty-six participants were recruited from two secondary schools (Grades 10–11; $n = 78$) and two higher education institutions (first-year language programmes; $n = 78$) in Tashkent. Mean age: 17.6 years ($SD = 1.3$). Gender: 59% female, 41% male. Native language: Uzbek (91%), Karakalpak (6%), Russian (3%). English proficiency at baseline: A2–B1 (74%), B1–B2 (26%). Group allocation: CG ($n = 78$), EG ($n = 78$). Fourteen participants were excluded from final analysis due to attrition (>20% absence), yielding a retained sample of 142 (CG: $n = 71$; EG: $n = 71$).

The CG received standard EFL instruction using approved state-mandated textbooks ("Fly High" for secondary; "Smart English" for tertiary). The EG received the same instruction augmented by a structured AI enrichment programme: ELSA Speak (pronunciation; 3×20 min/week), Duolingo (vocabulary and grammar; 2×15 min/week), ChatGPT/GPT-4 via structured conversation tasks (speaking and discourse; 2×30 min/week), and Grammarly (writing feedback integration). All AI activities were aligned with the weekly instructional theme and followed by 30-minute teacher-led reflection sessions every two weeks, in which learners reviewed AI feedback, diagnosed persistent error patterns, and set personal development targets.

3.3. Assessment Instruments

Communicative competence was assessed using a purpose-built battery comprising: (a) a modified Oxford Communicative Competence Test (OCCT) for linguistic and discourse sub-scores; (b) a role-play task scored against the ACTFL OPI criteria for sociolinguistic and strategic sub-scores; (c) the Intercultural Knowledge and Competence Survey (IKCS; Fantini, A.E., 2020)[8] for intercultural sub-scores. All spoken and written performance samples were rated by two trained independent raters; inter-rater reliability (ICC) ranged from 0.83 to 0.92 across sub-scales, confirming acceptable measurement reliability (Koo, T.K., & Mae, A.Y., 2016)[14]. The battery was administered at T1 (baseline), T2 (week 10), and T3 (week 20).

3.4. Statistical Analysis

Between-group differences in CC gains ($T3 - T1$) were analysed using independent-samples t-tests (where normality held; Shapiro–Wilk $p > .05$) or Mann–Whitney U tests (where it did not). Cohen's d quantified practical significance. Repeated-measures ANOVA examined growth trajectories across T1, T2, and T3 within each group. Partial Pearson correlation, controlling for baseline proficiency, estimated the association between AI tool usage time and CC gains. Alpha was set at .05 for all tests. All analyses were conducted in R version 4.3.2.

4. RESULTS

4.1. AI Tool Coverage of CC Components

Before presenting outcome data, Table 2 maps the five AI tools considered in the study against the five CC components, indicating the degree of targeted support each tool provides for each component. This mapping informed the design of the AI enrichment programme, with ChatGPT/GPT-4 assigned the most extensive role given its cross-component applicability.

Table 2. Alignment of AI Tools with Communicative Competence Components

AI Tool	Linguistic	Sociolinguistic	Discourse	Strategic
ELSA Speak	High (phonology)	Low	Low	Low
Duolingo	High	Moderate	Low	Low
ChatGPT / GPT-4	High	High	High	High
Grammarly	High	Moderate	Moderate	Low
Google Assistant	Moderate	High	Moderate	Moderate

Note. Coverage ratings (High / Moderate / Low) based on tool design features and review of published empirical evidence. Intercultural competence is not separately listed; none of the five tools provide dedicated intercultural instruction, though ChatGPT culturally contextualised conversation prompts partially address this component.

4.2. CC Sub-Score Outcomes

Table 3 presents mean CC sub-scores (on a 0–100 point scale) at pre-test and post-test for both groups across all five components. Asterisks indicate statistically significant between-group post-test differences.

Table 3. Mean CC Sub-Scores at Pre-Test and Post-Test: Control Group (CG) and Experimental Group (EG)

CC Component	CG Pre	CG Post	EG Pre	EG Post
Linguistic	52.1	58.6	51.9	67.4 *
Sociolinguistic	44.3	49.7	43.8	61.2 *
Discourse	41.6	46.9	40.7	58.3 *
Strategic	38.2	43.1	37.4	56.8 *
Intercultural	35.4	39.8	34.6	49.1 *
Composite CC	42.3	47.6	41.7	58.6 *

Note. * Between-group post-test difference statistically significant at $p < .05$. CG: $n = 71$; EG: $n = 71$. All scores on a 0–100 scale. Pre-test scores verified as equivalent across groups ($p > .40$ for all sub-scales).

The composite CC score showed the largest between-group contrast: EG post-test $M = 58.6$ vs. CG post-test $M = 47.6$, yielding Cohen's $d = 0.79$ (large effect). At the sub-component level, strategic competence exhibited the largest effect ($d = 0.76$), followed by sociolinguistic ($d = 0.72$) and discourse ($d = 0.65$). Linguistic competence showed a moderate effect ($d = 0.53$), consistent with the shorter time-on-task for phonological and grammatical drill relative to extended communicative practice. Intercultural competence, while significant, showed the smallest effect ($d = 0.44$), reflecting the limited explicit intercultural content in the AI tool suite deployed.

4.3. Growth Trajectories

Repeated-measures ANOVA revealed a significant Group \times Time interaction for the composite CC score: $F(2, 280) = 34.7, p < .001, \text{partial } \eta^2 = .20$, indicating that the EG grew at a substantially faster rate than the CG across the three measurement points. The EG's steepest growth occurred between T1 and T2 (weeks 1–10), with growth moderating between T2 and T3 — a pattern consistent with initial rapid gains from AI-mediated practice followed by consolidation.

4.4. Usage Frequency and CC Gains

Within the EG, partial correlation between weekly AI tool usage time (hours, as recorded by platform logs) and composite CC gain ($T3 - T1$), controlling for $T1$ proficiency, yielded $r = .43$ ($p < .001$). Usage below one hour per week showed no significant advantage over the CG; peak gains were associated with 2–4 hours per week. Usage exceeding five hours per week was associated with diminishing returns, a pattern attributable to cognitive overload and loss of strategic self-regulation, corroborated by qualitative data from learner journals.

5. DISCUSSION

5.1. AI as a Multi-Component CC Instrument

The results provide robust empirical support for the proposition that AI tools, when pedagogically integrated, can serve as instruments for developing all five components of communicative competence — not merely the linguistic sub-component targeted by traditional grammar-and-vocabulary software. The particularly large effects for strategic and sociolinguistic competence are theoretically significant. Strategic competence gains are plausibly attributable to the GPT-4 conversational interaction tasks, which systematically placed learners in situations requiring the deployment of communication strategies (circumlocution, clarification requests, reformulation) to maintain meaning despite lexical or structural limitations. Sociolinguistic gains likely reflect exposure to contextually varied AI-generated discourse, including register shifts, polite request forms, and genre-specific language that the standard textbook curriculum underrepresents.

These findings extend the existing ICALL literature, which has largely focused on linguistic competence (Golanka, E.M et al., 2014)[11], by demonstrating significant and practically meaningful effects on higher-order communicative dimensions. They also align with Godwin-Jones, R. (2022)[10] theoretical argument that LLM-based tools, by virtue of their generative and contextually adaptive nature, possess a qualitatively different relationship to CC development than earlier CALL systems.

5.2. The Role of Teacher Mediation

A central interpretive claim of the present study is that the observed gains were not the product of AI tool access per se, but of AI tool access embedded within a structured framework of teacher-mediated reflection. This claim rests on three strands of evidence. First, within-EG usage-outcome correlations were stronger for learners who reported active engagement with the reflection sessions ($r = .54$) compared with those who attended but disengaged ($r = .29$). Second, qualitative data from learner journals consistently attributed strategy development to moments of teacher-facilitated metacognitive discussion rather than to AI feedback alone. Third, the CG, which received no AI access, showed non-trivial gains in linguistic competence (+6.5 points), while EG gains in intercultural competence — the component least addressed by the reflection sessions — were the smallest recorded ($d = 0.44$).

This pattern strongly suggests that the teacher's role as organiser of reflective practice is not peripheral but constitutive of the AI tool's pedagogical effect. This conclusion has direct implications for teacher professional development in Uzbekistan, where the national curriculum increasingly references AI integration without specifying the pedagogical infrastructure required for it to be effective.

5.3. Context-Specific Considerations

Several aspects of the Uzbek EFL context deserve particular emphasis. The relatively modest intercultural competence gains reflect a structural limitation: none of the AI tools deployed provided content specifically designed to address Uzbek learners' cultural distance from English-speaking speech communities. This gap represents both a finding and a research priority. Additionally, the exclusion of ChatGPT from the tool suite for approximately 18% of EG participants (due to access restrictions requiring a VPN) introduced a partial-treatment confound that future studies should control for by using locally hosted open-source LLMs. The agglutinative morphology of Uzbek, which has no direct structural parallel in English, produced a distinct grammatical error profile — primarily in articles, prepositions, and verb-phrase complexity — that none of the AI tools addressed

with culturally calibrated diagnostic precision. Developing language-specific error taxonomies for Uzbek-English interlanguage would significantly enhance the pedagogical value of NLP-based feedback tools in this context.

5.4. Limitations

The study's limitations include the geographic restriction to Tashkent, the heterogeneous AI tool bundle (which precludes component-specific attribution), the relatively brief intervention duration relative to the developmental timescale of sociolinguistic and intercultural competence, and the use of a purpose-built assessment battery without full external validation. The non-random group assignment, while addressed through baseline equivalence testing, remains a potential source of unmeasured confounding.

6. CONCLUSION

This study has demonstrated that artificial intelligence tools, when deployed within a structured pedagogical framework that includes regular teacher-mediated reflection, can function as effective instruments for developing all five components of communicative competence in Uzbek EFL learners. The largest effects were recorded for strategic competence ($d = 0.76$) and sociolinguistic competence ($d = 0.72$) — the dimensions most responsive to AI-simulated communicative interaction — while intercultural competence showed the smallest gain ($d = 0.44$), signalling the current limits of AI-based cultural instruction.

The central practical implication is that the pedagogical value of AI tools in CC development is not intrinsic but contingent: it depends critically on the quality of the instructional context within which they are embedded. Deploying AI tools without accompanying metacognitive scaffolding is likely to produce gains that are narrower and smaller than the present study documents. This finding should inform both institutional AI adoption strategies and pre-service and in-service teacher education programmes in Uzbekistan, which must equip teachers not only with tool literacy but with the pedagogical competence to orchestrate AI-supported CC instruction.

The aggregate evidence suggests that AI-mediated CC instruction is not a silver bullet but a pedagogically powerful resource whose potential is realised through design. In the context of Uzbekistan's ambitious language education reform agenda, leveraging this resource — intelligently, equitably, and under rigorous pedagogical oversight — represents both an opportunity and a responsibility.

DIRECTIONS FOR FURTHER RESEARCH

The present study identifies five priority directions for future investigation. (1) Longitudinal research spanning a minimum of two academic years is required to determine whether the CC gains reported here are retained and whether intercultural competence development — which unfolds on a longer developmental timeline — shows greater effects with extended AI exposure. (2) Randomised controlled trials, feasible at the university level where class scheduling permits individual randomisation, would provide stronger causal evidence than the quasi-experimental design employed here. (3) Dismantling studies that isolate the individual contributions of each AI tool — and specifically compare LLM-based conversational agents with adaptive drill-and-practice platforms — would provide the granular evidence needed for evidence-based tool selection. (4) The development of Uzbek-English interlanguage-informed NLP models, capable of diagnosing morphosyntactic errors specific to Uzbek L1 transfer, represents a technically demanding but practically high-impact research and development priority. (5) Investigation of AI-assisted intercultural competence development, through culturally contextualised scenario-based conversation tasks and cross-cultural simulation games, is needed to close the gap between AI's demonstrated effectiveness for linguistic and strategic CC and its as-yet-limited capacity for intercultural development.

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