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AI-Mediated Oral Practice and the Dynamics of Anxiety, Performance, and Self-Regulation: A Mixed-Methods Comparison of Instructional Modes

Extended summary

This mixed-methods quasi-experimental study examined whether AI-mediated oral practice (using ELSA Speak) reduces foreign-language anxiety (FLA), improves oral performance, and fosters self-regulated learning (SRL) compared to blended and traditional human-taught instruction. Framed within an integrated affective–cognitive–interactional model that combines Positive Psychology, Self-Regulated Learning theory, and the Interaction Hypothesis, the research addresses gaps in comparative evidence and concurrent measurement of affective and performance outcomes in a North-African EFL context.

One hundred fifty third-year EFL undergraduates ($n = 150$; 50 per group) participated in a six-week intervention that standardized task progression across conditions (segmental work → prosody → connected speech → fluency → integrated speaking). The three conditions were: (1) AI-mediated (ELSA Speak: 15 min/day, 5 days/week), (2) Blended (10 min ELSA + weekly 45-min face-to-face), and (3) Human-taught (60-min weekly face-to-face). Pre- and post-measures included an adapted 20-item FLCAS ($\alpha = .91$), an analytic oral rubric (adapted from IELTS; ICC = .87) rated blind by two external raters, and an adapted Online SRL Questionnaire ($\alpha = .79-.88$). Weekly reflective journals (732 entries) were analyzed thematically (NVivo; $\kappa = .85$) to explain the mechanisms. Quantitative effects were estimated via ANCOVA with pre-test covariates and robustness checks (bootstrapping, HC3 SEs, multiple imputation). Usage logs from ELSA were used for fidelity checks and dose–response secondary analyses.

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Results show large, robust advantages for AI-mediated practice. After adjusting for baseline scores, instructional mode significantly predicted post-test FLA ($F(2,146)=32.47$, $p<.001$, partial $\eta^2=.31$), oral performance ($F(2,146)=23.68$, $p<.001$, partial $\eta^2=.25$), and SRL ($F(2,146)=31.02$, $p<.001$, partial $\eta^2=.30$). Pairwise contrasts (Bonferroni-adjusted) indicated substantial AI vs human-taught differences: FLA mean diff = -0.67 (Hedges' $g \approx 1.24$), oral mean diff = $+0.96$ ($g \approx 1.28$), SRL mean diff = $+0.57$ ($g \approx 1.12$). The blended condition produced intermediate, statistically significant gains relative to human-taught, but consistently smaller than the AI-focused condition. Sensitivity analyses (per-protocol, exclusion of influential cases) confirmed robustness.

Thematic analysis identified four interrelated mechanisms that plausibly mediate outcomes: (1) emotional regulation and confidence (reduced fear of negative evaluation and greater willingness to rehearse), (2) SRL growth (goal setting, monitoring, reflection scaffolded by app analytics), (3) pronunciation and fluency development (targeted, feedback-rich drills and shadowing), and (4) technological and motivational affordances (gamified progress indicators sustaining persistence; occasional recognition/connectivity limits). Qualitative data triangulated with quantitative gains to support an affective→behavioral→performance pathway: lowered anxiety enabled more frequent, focused practice; SRL strategies organized that practice; targeted feedback accelerated phonetic and fluency gains.

Short-term, intensive AI-mediated oral practice produced large, meaningful reductions in FLA and substantial improvements in both observable oral performance and self-regulatory behaviors compared with traditional instruction. These effects are best understood as conditional on pedagogical alignment: AI functions most effectively when practice targets are coherent, feedback is frequent and interpretable, and teachers integrate analytics into communicative lessons. Ethical and equity considerations (data privacy, algorithmic fairness, unequal access, digital literacy) and the study's limited duration and single-site sample qualify generalization and argue for longer-term, cross-contextual replication.

Institutions should consider AI-mediated tools as scalable supplements for low-stakes, feedback-rich speaking practice that can reduce affective barriers and cultivate SRL. Effective adoption requires (a) deliberate alignment of AI tasks with classroom objectives, (b) teacher training to interpret and translate AI analytics into communicative activities, (c) infrastructure and equity planning to avoid widening access gaps, and (d) safeguards for learner data and system transparency. Future research should test long-term retention, transfer to spontaneous interaction, and which specific AI features (feedback granularity, multimodal cues, motivational design) drive sustained learning.

Keywords: AI-mediated instruction; foreign-language anxiety, oral performance, self-regulated learning, computer-assisted language learning

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