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THE EFFECT OF AI-ASSISTED SPEAKING PRACTICE ON STUDENTS' PRONUNCIATION ACCURACY

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Abstract: *this paper synthesizes empirical research on the efficacy of Artificial Intelligence (AI)-assisted speaking practice, particularly tools leveraging Automatic Speech Recognition (ASR), in improving the pronunciation accuracy of language learners. The analysis reveals a significant positive correlation between the use of AI pronunciation tools and measurable gains in learners' phonological skills. The primary mechanism driving this improvement is the technology's ability to provide instantaneous, personalized, and explicit corrective feedback at the segmental (phoneme) level—an affordance often constrained in traditional classroom settings by time and class size. Furthermore, AI tools foster a low-anxiety, non-judgmental practice environment, which enhances learner motivation, confidence, and autonomy. However, the effectiveness of these tools is not uniform. A critical review of the literature indicates that AI is substantially more effective at correcting segmental errors than suprasegmental features like intonation and stress, which are crucial for natural communication. Moreover, challenges such as technological limitations in speech recognition accuracy, the lack of contextual and pragmatic feedback, and the risk of learner over-reliance necessitate a carefully scaffolded pedagogical approach. The paper concludes that while AI-assisted tools are powerful supplements for pronunciation instruction, they cannot wholly replace the nuanced role of a human teacher. Their optimal use lies in a blended learning model where the teacher's role evolves from a primary feedback provider to a facilitator who guides students in critically interpreting AI feedback*

and integrates technology-based practice with holistic, communicative classroom activities.

Keywords: *AI in Education, Pronunciation, Automatic Speech Recognition (ASR), EFL, Language Pedagogy, Computer-Assisted Language Learning (CALL)*

Pronunciation is a cornerstone of communicative competence, yet it remains one of the most persistent challenges for learners of English as a Foreign Language (EFL).[1] Effective pronunciation is critical for intelligibility; without it, even a strong command of grammar and vocabulary may not prevent communication breakdowns.[3] Traditional classroom settings, however, often struggle to provide adequate pronunciation instruction. Systemic challenges include limited instructional time dedicated to phonology, large class sizes that preclude individualized feedback, and a lack of specialized training among teachers.[4] Furthermore, psychological barriers such as speaking anxiety and the fear of making mistakes in front of peers can severely inhibit learners' willingness to practice.[7] These limitations create a critical need for innovative pedagogical solutions that can offer consistent, personalized, and low-stakes practice opportunities.[2]

The advent of Artificial Intelligence (AI), particularly through Automatic Speech Recognition (ASR) technology, presents a transformative potential to address these long-standing pedagogical gaps.[10] AI-powered applications can analyze a learner's speech in real-time, identify specific errors, and provide immediate corrective feedback, thereby simulating the role of a personal pronunciation tutor.[9] This paper argues that AI-assisted speaking practice offers a

demonstrably effective method for improving students' pronunciation accuracy. This is achieved primarily through the provision of instantaneous, explicit feedback in a motivating, low-anxiety environment. However, the efficacy of these tools is moderated by technological limitations and the type of feedback provided, necessitating a blended pedagogical model where the technology supplements, rather than supplants, the indispensable role of the human instructor.

The primary driver of pronunciation improvement through AI-assisted practice is the technology's capacity for delivering immediate and highly personalized feedback.[9] Unlike a classroom teacher who must divide their attention among many students, an ASR-based tool can offer individualized feedback to every learner on every utterance.[12] This creates a powerful, continuous feedback loop that is crucial for skill acquisition.

Research distinguishes between several types of AI-generated feedback, with their effectiveness varying significantly.

1. **Implicit or Indirect Feedback:** This includes transcription-based feedback, where learners infer errors from discrepancies between what they said and what the ASR transcribed, or a simple "Goodness of Pronunciation" (GOP) score. While somewhat helpful, this feedback can be opaque, leaving learners to diagnose their own errors.[13]

2. **Explicit Corrective Feedback:** This is the most effective form, where the AI tool pinpoints the specific error at the phoneme or word level, explains how to correct it, and often provides visual aids like spectrograms or animations of mouth movements.[14] A meta-analysis of 15 studies by Ngo, Chen, and Lai (2021) found a medium overall effect size ($g = 0.69$) for ASR-mediated practice, with a

key finding that explicit corrective feedback was substantially more effective than indirect feedback.[14] Tools like ELSA Speak, which specialize in this type of phoneme-level analysis, have demonstrated slightly higher gains in accuracy compared to tools offering more general feedback.[16]

Beyond the cognitive benefits of targeted feedback, AI tools offer significant advantages in the affective domain. They provide a private, non-judgmental space for practice, which is critical for overcoming the speaking anxiety that plagues many language learners.[10] Students can experiment, make mistakes, and repeat exercises without fear of embarrassment, fostering greater confidence and willingness to communicate.[17] This low-pressure environment has been shown to increase motivation and promote learner autonomy, as students take control of their learning pace and focus on their specific weaknesses.[10]

A growing body of empirical evidence confirms the positive impact of AI-assisted practice on pronunciation accuracy. Numerous quasi-experimental studies have shown that experimental groups using ASR-based tools consistently outperform control groups receiving traditional instruction.[10] These improvements are evident in both comprehensibility (the ease with which a listener understands the speaker) and accentedness (the degree to which the pronunciation differs from a target norm).[20]

The effectiveness of AI, however, is more pronounced in certain areas of phonology. The research consistently shows that ASR has a large effect on **segmental** pronunciation—the accuracy of individual consonant and vowel sounds.[14] This is because phonemes are discrete units that are relatively easy for current algorithms to identify and assess. In contrast, AI tools have a much smaller

effect on **suprasegmental** features, which include stress, rhythm, and intonation.[14] These features are more nuanced, context-dependent, and carry pragmatic and emotional meaning that AI struggles to interpret.[22] While some sounds may be more resistant to ASR-based training than others, the overall trend points to significant gains, particularly for learners at an intermediate level.[13]

The duration and nature of the practice also matter. Meta-analyses suggest that medium to long-term interventions yield higher learning outcomes than short-term use, and that practicing with peers in conjunction with an ASR tool can produce a larger effect than practicing alone.[12] This highlights the importance of sustained engagement and the potential benefits of integrating AI tools within a socially interactive learning framework.[20]

Despite its proven benefits, AI-assisted pronunciation practice is not a panacea. Several critical challenges and limitations must be addressed for its effective implementation.

- **Technological Inaccuracy:** While ASR accuracy for non-native speech has improved dramatically, it is not infallible.[13] Misrecognition of learner speech can lead to incorrect feedback and user frustration, potentially undermining motivation.[11]
- **Lack of Contextual Feedback:** Current AI is largely deaf to the nuances of communication. It can correct a phoneme but cannot typically advise on whether a particular intonation pattern sounds sarcastic, polite, or enthusiastic in a given social context.[22] This limitation means AI can help learners sound more *correct*, but not necessarily more *natural* or pragmatically appropriate.

- **Risk of Over-reliance:** The convenience of AI feedback may lead to learner dependency, potentially inhibiting the development of crucial self-monitoring and self-correction skills.[22]
- **Practical Barriers:** Issues such as the cost of premium application features, the need for reliable internet and device access, and occasional technical glitches can limit equitable use.[7]

These limitations underscore that AI should be viewed as a powerful assistant, not a replacement for the human teacher.[17] The integration of AI into the classroom necessitates a redefinition of the teacher's role. As AI takes over the more mechanical aspects of drill and correction, the teacher's focus can shift to higher-order concerns.[25] The modern language educator in an AI-integrated classroom becomes a learning facilitator, a curriculum designer, and a communication coach. Their responsibilities include selecting appropriate AI tools, training students to use them effectively and critically evaluate their feedback, and designing communicative activities that bridge the gap between AI-based practice and real-world interaction.[27]

The evidence is clear: AI-assisted speaking practice, primarily through ASR technology, significantly enhances the pronunciation accuracy of language learners. By providing immediate, personalized, and explicit feedback, these tools effectively address many of the limitations inherent in traditional classroom instruction. The creation of a low-anxiety practice environment further boosts learner confidence, motivation, and autonomy, leading to more sustained engagement and measurable improvement, especially at the segmental level.

However, the technology's current limitations—particularly its difficulty with suprasegmental features and contextual understanding—mean that it cannot stand alone. The path forward lies in a balanced, blended learning approach. In this model, AI tools serve as a powerful supplement, offering scalable and individualized practice that was previously unattainable. The human teacher, freed from the burden of repetitive correction, is elevated to the indispensable role of guiding students toward communicative competence, teaching the nuances of intonation and pragmatics, and fostering the holistic language skills that remain uniquely human. The successful integration of AI in pronunciation teaching is not about replacing the teacher, but about empowering them to focus on what they do best: facilitating meaningful communication.

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