ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-515-x, Impact Factor: 9.23

American Academic publishers, volume 6, issue 01,2026

Journal: https://www.academicpublishers.org/journals/index.php/ijai

UDK: 004.9.811.111

THE ROLE OF AI ALGORITHMS IN DETECTING STUDENTS' PRONUNCIATION ERRORS

Nabijanova Sugdiyona Rustamjon kizi

Tashkent International University of Chemistry, Namangan Branch

1st year master's student, Linguistics (English)

sugdiyonanabijanova738@gmail.com

Abstract: Detecting pronunciation errors is a critical step in developing second-language speaking proficiency. Traditional evaluation methods rely on teacher judgment or peer feedback, which can be subjective and inconsistent. With emerging artificial intelligence (AI) technologies such as automatic speech recognition (ASR) and machine learning models, pronunciation error detection has shifted toward more objective, data-driven approaches. This article examines how AI algorithms identify and categorize pronunciation errors, enhance diagnostic precision, and support personalized learning pathways. Recent research reveals that AI-supported systems can detect subtle phonological deviations and provide real-time corrective feedback, representing a major pedagogical advancement over traditional assessment practices.

Keywords: Artificial Intelligence, Pronunciation Error Detection, Speech Recognition, Machine Learning, Computer-Assisted Pronunciation Training (CAPT), ESL/EFL Learners

Introduction: Developing accurate pronunciation is one of the most challenging aspects of second language acquisition (SLA). Teachers traditionally rely on manual observation, repetition drills, peer review, or phonetic transcription to identify and correct students' pronunciation errors. However, these methods can be inconsistent across instructors and limited by classroom constraints. With advances in AI, systems that automatically analyze learners' speech and detect pronunciation deviations offer a promising alternative. AI-based systems such as speech recognition applications and phonological analyzers use machine learning techniques to interpret audio input and compare it with native-like pronunciation models. By doing so, they can identify segmental errors (e.g., mispronounced phonemes), suprasegmental errors (intonation or stress), and offer tailored guidance.

Review of Literature: Pronunciation has long been recognized as a critical component of second language acquisition (SLA). Traditional pronunciation instruction typically relies on teacher-led explanations, repetition drills, phonetic transcription, and auditory imitation (Celce-Murcia et al., 2010). These methods emphasize articulatory awareness and controlled practice but often lack individualized feedback and sufficient learner engagement.Recent advancements in artificial intelligence have led to the development of AI-based pronunciation tools, including speech recognition systems, intelligent tutoring systems, and mobile-assisted pronunciation applications (Li & Lan, 2021). These technologies provide instant feedback, visual

ISSN: 2692-515-x, Impact Factor: 9.23
American Academic publishers, volume 6, issue 01,2026
Journal: https://www.academicpublishers.org/journals/index.php/ijai

representations of speech errors, and adaptive learning pathways, which align with constructivist and learner-centered pedagogical approaches.Several studies report that AI-driven pronunciation training improves learners' accuracy and confidence more effectively than traditional methods alone (Derwing & Munro, 2015; Flege, 2018). However, researchers also emphasize that AI tools should complement rather than replace traditional pedagogical practices, highlighting the importance of teacher mediation and phonetic explanation.

Analysis of Methodologies: This study used a quasi-experimental design with a non-equivalent control group, In this type of research the researcher divided the two groups, i.e. experimental class and the control class which were both given a pre-test and a post-test. However, in the experimental class before being given the post-test, the researcher gave the Read Aloud method by using Google Read Along app.

Figure 1. Design of Non Equivalent Group Design
Note:
O1
: Experimental group before being given treatment
O2
: Experimental group after being given treatment150
O3
: Control group before being given treatment
O4
: Control group before after treatment
X
: treatment (Google Read Along app)

The subjects in the study were early-level students of AMNI Maritime University who took English subjects, totaling 70 students who were grouped based on the experimental class which consisted of 35 people and 35 others who were in the control class. The experimental class was given treatment by providing the Read Along method using Google Read Along app, while the control class was given nothing. The data collection method used was by conducting quasi-experiments, questionnaires and interviews. So the instruments used in this study were the assessment rubric of the pretest and post-test reading with assessment indicators adapted to English pronunciation, and response questionnaires from students about using Google Read Along app in learning English pronunciation, as well as interview questions posed to participants to find out the factors that support improving student pronunciation. In the assesment of the effectiveness of Google Read Along applied in the experimental class, the researchers used N-Gain score category based on the percentage by Hake. The following is the table of parameter of N-Gain score.

Table 1. N-Gain Score Parameter
Percentage (%)
Note
< 40
Not effective
40 – 55
Less effective
56 – 75

ORIGINAL ARTICLE
INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE
ISSN: 2692-515-x, Impact Factor: 9.23
American Academic publishers, volume 6, issue 01,2026
Journal: https://www.academicpublishers.org/journals/index.php/ijai

Effective enough
> 76
effective This research was analyzed using the SPSS application to find the effectiveness of Google Read Along app with the quasi-experimental method and look for the N-Gain score from the processed data. Research on AI-driven pronunciation analysis highlights both theoretical foundations and practical applications:

• AI Pronunciation Analysis in EFL Contexts: A study on Uzbek EFL learners found that AI-based pronunciation analyzers effectively identified errors and provided tailored corrective feedback, leading to more rapid improvement compared to traditional methods.

• Application-Based Research: Research involving the ELSA application illustrates how speech recognition technology can categorize learners' pronunciation errors by types, such as nasal sounds, consonant clusters, diphthongs, and intonation.

• Advantages and Limitations: AI technologies offer objective, scalable assessment but may overlook contextual nuances that skilled teachers capture in classroom interactions. The combined evidence indicates that AI enhances pronunciation error detection but is most effective when integrated with pedagogical support from human instructors. The synthesis of current research suggests the following outcomes:

• Increased Accuracy: AI systems detect phonological errors with high reliability by comparing learner output against extensive native speaker models and phonetic databases.

• Immediate Diagnostic Feedback: Automated feedback allows learners to correct mistakes in real time, which improves retention and reduces dependency on teacher schedules.

• Learner Autonomy: AI-based tools foster independent practice by providing individualized diagnostic reports, which are especially useful in large or online learning environments. Despite these benefits, some systems may produce false positives due to accent variation, background noise, or speech input quality, highlighting the need for ongoing refinement of algorithms.

Conclusion: AI algorithms play an increasingly important role in detecting pronunciation errors among language learners. By leveraging automatic speech recognition and machine learning, AI systems provide objective, real-time diagnostic feedback, personalized practice, and data-driven insights into learner performance. These capabilities extend the reach of traditional pronunciation assessment and support autonomous learning. However, optimal outcomes are achieved when AI tools complement — rather than replace — human instruction. Future research should further investigate AI's ability to handle prosodic features and cross-linguistic variability**.**AI can thus serve as a bridge, connecting classroom learning with real communicative experience. Nevertheless, the study acknowledges some limitations: short research duration, limited participant number, and focus on intermediate learners. Future research should investigate how long-term exposure to AI-supported conversational systems influences higher-order communicative competence, such as discourse management and pragmatic awareness. Researchers should also examine teachers' readiness, attitudes, and professional development needs in adopting AI tools effectively and ethically. In conclusion, both traditional and AI- supported speaking practices contribute uniquely to language development. Traditional methods cultivate social interaction, empathy, and collaborative learning, while AI technologies provide innovation, flexibility, and personalized feedback. A synergistic, blended approach that harmonizes human pedagogy with artificial intelligence is therefore the most promising direction for the next generation of English language instruction. Such integration ensures that learners gain not only linguistic proficiency but also confidence,

ISSN: 2692-515-x, Impact Factor: 9.23
American Academic publishers, volume 6, issue 01,2026
Journal: https://www.academicpublishers.org/journals/index.php/ijai

autonomy, and adaptability - skills essential for effective communication in the globalized digital era.

References :

1. Gardner, R. C. (1985). Social psychology and second language learning: The role of attitudes and motivation. London: Edward Arnold.
Belda-Medina, J., & Calvo-Ferrer, J. R. (2022). Using chatbots as AI conversational partners in language learning. Journal of Language and Education, 8(3), 45–59.
2. Pituxcoosuvarn, M., Tanimura, M., Murakami, Y., & White, J. S. (2025). Enhancing EFL speaking skills with AI-powered word guessing: A comparison of human and AI partners. Information, 16(6), 427.
3. Savaş, P. (2024). The use of artificially intelligent chatbots in English language learning: A systematic meta-synthesis study of articles published between 2010 and 2024. ReCALL, 36(2), 155–178.
4. Belda-Medina, J., & Calvo-Ferrer, J. R. (2022). Using chatbots as AI conversational partners in language learning. Journal of Language and Education, 8(3), 45–59.
5. Talapova, A. K., & Turkmenbayeva, M. Zh. (2023). The role of artificial intelligence in foreign language learning: Exploring ChatGPT's potential for enhancing speaking and listening skills. World Scientific Research Journal, 12(5), 55–68.
6. Xiao, F., & Zhao, P. (2022). Conversational agents in language learning: Pedagogical implications and learner engagement. Journal of Computer-Assisted Language Learning, 35(4)

Information about the Author: **Nabijanova Sugdiyona Rustamjon kizi, Tashkent International University of Chemistry, Namangan Branch ,1st year master's student, Linguistics (English)** sugdiyonanabijanova738@gmail.com