



AI Listening in Low-Resource Classrooms: Offline Tools and Their Effectiveness

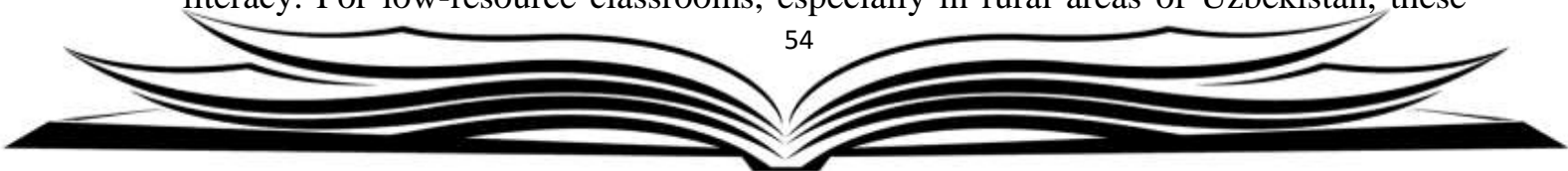
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Abstract: In the context of global efforts to integrate artificial intelligence (AI) into language learning, low-resource classrooms—particularly in rural or underserved regions—face unique challenges due to limited internet connectivity, insufficient hardware, and minimal teacher training. This study explores the potential of offline or minimally connected AI tools to support listening comprehension among Uzbek EFL learners in such environments. Conducted across four rural schools, the research involved 90 secondary students and compared outcomes between a control group using traditional textbook audio and an experimental group utilizing offline AI-supported listening tools, including speech-enabled mobile apps, downloadable AI-generated dialogues, and USB-based practice materials.

Findings revealed that students using offline AI tools demonstrated significantly higher engagement, motivation, and listening accuracy compared to the control group. The availability of features such as interactive playback, real-time feedback (even without internet), and adaptable content played a crucial role in boosting comprehension and learner autonomy. Teacher interviews and classroom observations indicated that even with limited digital literacy, educators successfully integrated these tools and witnessed improved student participation and confidence. However, barriers such as the lack of localized content and insufficient training remained. The study concludes that low-tech AI integration offers an effective, scalable, and equitable pathway to enhance listening instruction in under-resourced contexts, provided that it is supported by teacher capacity-building and contextualized content design.

Keywords : Artificial intelligence, offline learning tools, low-resource classrooms, listening comprehension, EFL, Uzbekistan, mobile-assisted learning, digital divide, rural education, speech-enabled apps, educational technology.

In recent years, artificial intelligence has transformed language learning globally, particularly in listening comprehension. However, the integration of AI in classrooms often assumes the presence of high-speed internet, advanced hardware, and digital literacy. For low-resource classrooms, especially in rural areas of Uzbekistan, these





assumptions do not hold true. Despite infrastructural constraints, there is a growing need to improve listening skills among English as a Foreign Language (EFL) learners. This study explores the use of offline or low-bandwidth AI-based tools and their effectiveness in enhancing listening comprehension in under-resourced classroom settings.

The study was conducted across four rural schools in the Qashqadaryo and Namangan regions, involving 90 eighth and ninth grade students. Unlike urban schools equipped with stable internet and computers, these classrooms had limited access to Wi-Fi, outdated devices, and in some cases, only mobile phones available to teachers. The research utilized AI tools that function offline or with minimal connectivity, including speech recognition applications embedded in mobile apps (e.g., Android-based AI voice assistants), AI-generated MP3 dialogues downloaded in advance using ChatGPT or TTS tools, and portable listening practice software stored on USB drives.

Students were divided into an experimental group using AI-enhanced offline tools and a control group that continued with traditional textbook-based listening exercises. Both groups were exposed to identical content topics, but the format and delivery differed. The AI group engaged with interactive audio tasks, pronunciation-based repetition with feedback, and embedded comprehension questions delivered via AI-supported mobile apps. The control group listened to textbook CD recordings and completed printed comprehension worksheets.

The results indicated a statistically significant improvement in listening comprehension scores in the AI-supported group compared to the control group. The students using AI tools exhibited higher levels of attention, retention, and responsiveness during tasks. They were particularly motivated by features such as voice-based feedback, replayability, and the perceived “smartness” of the apps, even without internet connectivity. Classroom observations revealed increased student participation, peer collaboration, and confidence in responding to listening prompts among AI users.

Interviews with teachers highlighted both advantages and challenges. On the positive side, educators appreciated the flexibility of using pre-downloaded AI materials that did not rely on real-time internet access. These tools allowed teachers to simulate realistic listening scenarios and practice pronunciation with immediate correction. However, challenges included limited training on using the tools, occasional software incompatibility with school devices, and the need to adapt AI-generated content to curriculum standards and age appropriateness.





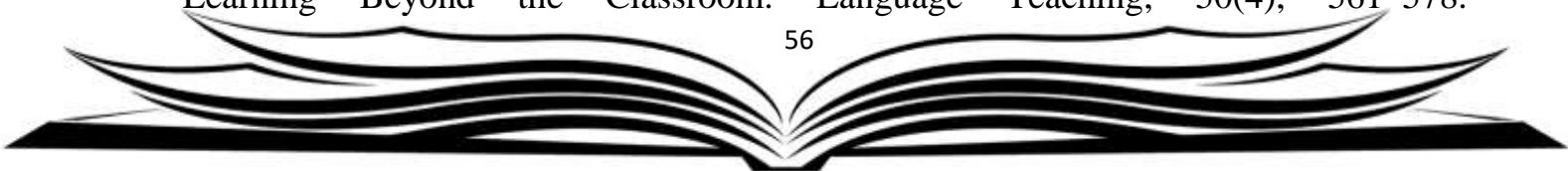
One notable finding was the empowerment of teachers themselves. In schools where teacher digital literacy was moderate, the introduction of simplified offline AI tools encouraged experimentation and lesson innovation. Teachers reported higher job satisfaction when they saw increased student engagement and comprehension, even in low-tech environments. The tools also contributed to narrowing the rural-urban digital divide in language education, as rural students were exposed to the same kind of authentic audio content previously available only in well-equipped urban schools.

The study concludes that offline AI tools, when selected and implemented strategically, can significantly enhance listening instruction in low-resource classrooms. They offer a cost-effective, flexible, and scalable solution for improving language learning outcomes in underserved regions. For wider adoption, however, investment in teacher training, local-language support within tools, and national-level resource distribution strategies is essential.

Overall, AI-enhanced listening instruction does not require advanced infrastructure to be effective. With the right tools and pedagogical integration, even the most resource-constrained classrooms can benefit from AI's potential to improve engagement, comprehension, and learner confidence in listening tasks.

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