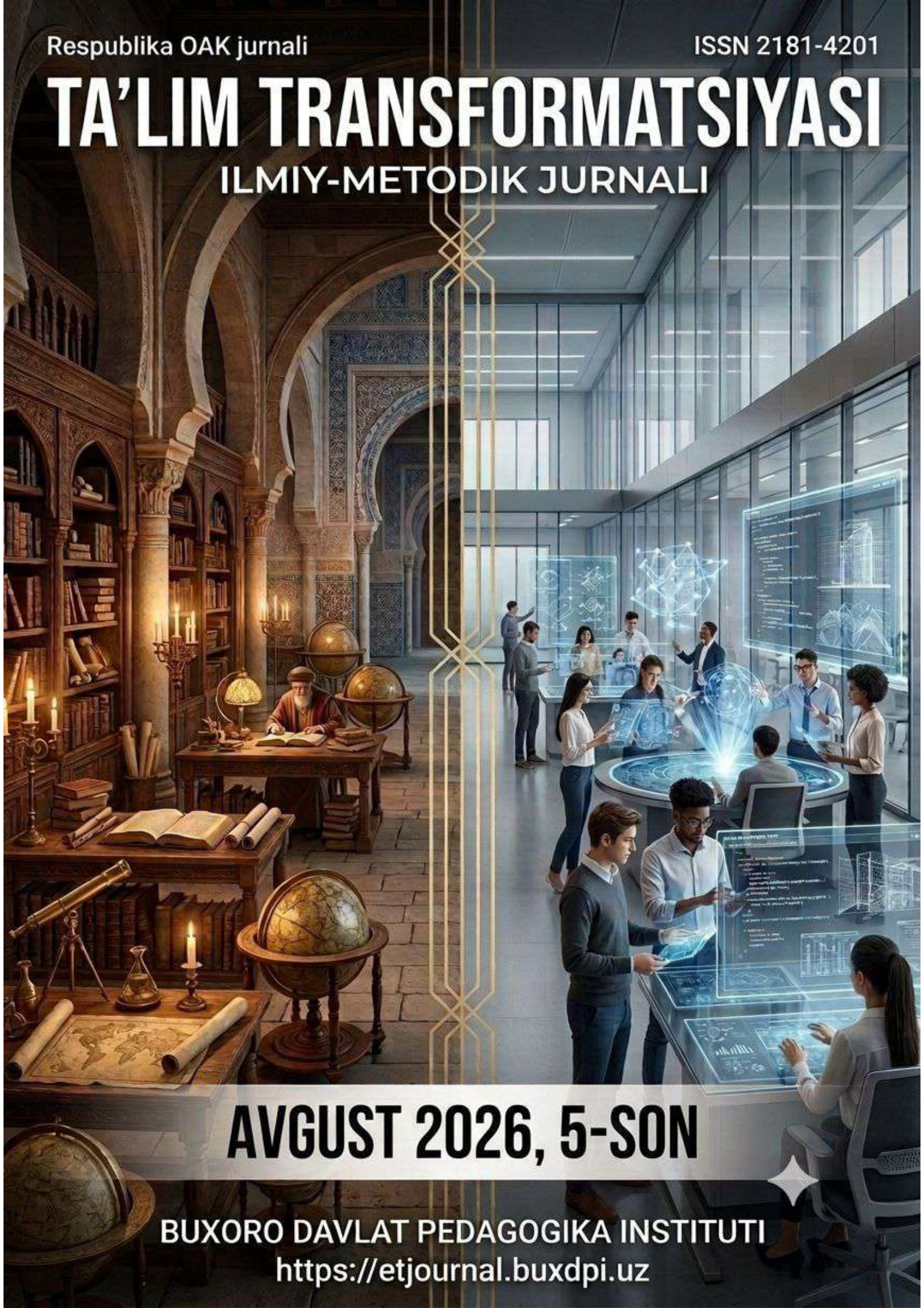


Respublika OAK jurnali

ISSN 2181-4201

TA'LIM TRANSFORMATSIYASI

ILMIY-METODIK JURNALI



AVGUST 2026, 5-SON

BUXORO DAVLAT PEDAGOGIKA INSTITUTI
<https://etjournal.buxdpi.uz>



BUXORO DAVLAT PEDAGOGIKA INSTITUTI

TA'LIM TRANSFORMATSIYASI

ILMIY – METODIK JURNAL

№. 5

BUXORO – 2026

DIGITAL TECHNOLOGY FOR L2 LISTENING DEVELOPMENT: CALL, MALL, CAPTIONS, VR, AND AI

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Abstract. In this review the ways of enhancing L2 listening skills with the help of various digital technologies is examined focusing on their pedagogical benefits and potential applications in language learning.

Key words: TALL, CALL, MALL, captions, subtitles, VR, artificial-intelligence-driven tools, chatbots, ASR

IKKINCHI TILDA (L2) TINGLAB TUSHUNISH KO'NIKMASINI RIVOJLANTIRISHDA RAQAMLI TEXNOLOGIYALAR: CALL, MALL, SUBTITRLAR, VR VA SUN'IY INTELLEKT

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Annotatsiya. Ushbu sharhda L2 (ikkinchi til) tinglab tushunish ko'nikmalarini turli raqamli texnologiyalar yordamida rivojlantirish usullari ko'rib chiqiladi hamda ularning pedagogik afzalliklari va til o'rganish jarayonidagi potensial qo'llanilish imkoniyatlariga e'tibor qaratiladi.

Kalit so'zlar: TALL, CALL, MALL, subtitrlar, sarlavhali videolar, VR, sun'iy intellektga asoslangan vositalar, chatbotlar, ASR.

ЦИФРОВЫЕ ТЕХНОЛОГИИ ДЛЯ РАЗВИТИЯ НАВЫКОВ АУДИРОВАНИЯ НА ВТОРОМ ЯЗЫКЕ (L2): CALL, MALL, СУБТИТРЫ, VR И ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ

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Аннотация. В данном обзоре рассматриваются способы развития навыков аудирования на втором языке (L2) с помощью различных цифровых технологий, при этом основное внимание уделяется их педагогическим преимуществам и потенциальным возможностям применения в процессе изучения языка.

Ключевые слова: TALL, CALL, MALL, субтитры, титры, VR, инструменты на основе искусственного интеллекта, чат-боты, ASR.

Using innovative technological tools in the process of teaching is one of the highest demands of contemporary classroom. Almost every discipline must be taught by integrating technological advancements; therefore, imagining a class without any use of technology has already become impossible.

In ESL lessons, naturally, digital resources play an important role not only for productive skills but also for receptive skills such as listening. Listening is widely regarded as one of the most demanding skills for second and foreign language (L2) learners to acquire, as it requires processing rapid, unfamiliar speech in real time without the contextual support available in reading.[1] (However, in the past there were few technological educational tools that would help learners to be able to get real-life language exposure. Today, digital technologies have transformed the process of developing listening skills in many ways. Firstly, digital tools open up the door to natural speech patterns, diverse accents, everyday slang and different speech styles. Secondly, not only do technologically advanced listening resources provide visual support but also they give the opportunity for interactive feedback. For instance, some online apps give immediate responses to check if learners understand, and some multimedia combines sound and pictures to make difficult audio easier to follow. These developments have motivated a growing body of research into how

digital technologies can restructure listening practice. This review analyzes five major areas of new and advanced technology applied to foreign language listening instruction: computer-assisted and mobile-assisted listening resources, captioned and subtitled audiovisual materials, immersive virtual reality (VR) environments, and artificial-intelligence-driven tools such as automatic speech recognition (ASR) and conversational agents.

CALL (computer-assisted language learning) and MALL (mobile-assisted language learning) -based resources for developing listening skills include using computers and smartphones that provide learners with opportunities to listen to authentic or specially designed audio materials and complete interactive listening activities. In relation to technology-assisted learning, it is asserted that the application of electronic learning tools, including personal computers (PC), tablets, desktop computers, and smartphones, has significantly improved, emerging the concept referred to as “Technology Assisted Language” (TALL). [2] **TALL** is gaining ground as it is perceived that the approach of various technology-assisted language learning such as mobile devices or computers has opened the opportunity for efficient language learning.[3] The TALL concept in the scope of those studies leverages both computer-assisted and mobile-assisted language learning. **CALL** is a means of the learning process whereby the learner employs a computer to prepare and enhance their language learning abilities (such as writing, speaking, reading, and listening skills). Numerous merits of computer-assisted learning abound, such as the availability of authentic materials, experimental learning opportunities, high motivation, improved interaction opportunities, and global understanding. On the other hand, **MALL** refers to any learning facilitated on a mobile device such as an mp3 player, tablets, eBook readers, and podcasting. [4]

CALL tools for developing listening mainly include websites which help learners to get prepared for some tests like IELTS and TOEFL. Considering the fact that, nowadays *IELTS exams are only being conducted in computer delivered format (e.g., ielts.org, 2026)*, the role of CALL has become invaluable. Besides, computer-assisted technologies can considerably improve the effectiveness of listening instruction. Teachers and learners can control the pace of listening by *pausing, replaying, or slowing down audio materials allowing them to practice listening according to their individual needs*, proficiency levels, and interests.

When it comes to MALL tools they tend to support more flexible, self-directed listening exposure. Common MALL-based listening practices include listening to podcasts and shadowing native speakers. Popular apps supporting these practices include Duolingo, YouGlish, Busuu, Babbel, and Memrise, alongside regional platforms such as Ibrat Academy. Furthermore, social media platforms, especially, Telegram posts in specific English Teaching channels also offer learning contents where a learner can gain knowledge and develop listening.

Another effective technology is considered to be captioned and subtitled audiovisual materials. Useful simplified distinction is that, *captions are on-screen text in the same language as the audio (L2 text with L2 audio) while subtitles are on-screen text in the learner's first language (L1 text with L2 audio)*. Although captions were originally developed for hearing-impaired persons in the 1980s and made accessible on television through the Teletext system, language teachers and researchers quickly discovered the benefits of captions for language learners: Captioning not only offers the learner support but also provides him with a “target language learning environment”. [5] Montero Perez, Van Den Noortgate, and Desmet (2013) conducted a meta-analysis synthesizing findings from 18 studies to examine the effectiveness of captioned video for L2 learners. Their analysis revealed that captioning produced a large positive effect on both listening comprehension and vocabulary acquisition, indicating that on-screen text substantially supports learners’ ability to process spoken input. In modern-day teaching or self-study learning processes both teachers and learners can use this technology as a pastime activity as well. [6] Because watching videos or listening to podcasts/ music with captions doesn’t always have to be done in an official learning environment people listen to them in a day-to-day life not only for educational purpose but also for entertainment purpose too.

A more recent addition to technology-assisted listening instruction is virtual reality (VR), allowing learners to access simulated environments in which they can engage with spoken language in a more embodied, interactive way than traditional audio or video materials allow. Evidence for its effectiveness, however, remains mixed. Tai and Chen (2021) randomly assigned 72 EFL learners in Taiwan to either a VR condition using head-mounted displays or a video condition presenting identical content on a screen, finding that the VR group significantly outperformed the video group on both listening comprehension and retention. Other studies complicate this picture: Pinto et al. (2019) found that while learners reported a stronger sense of presence and satisfaction in VR, their listening comprehension scores did not differ significantly from an audio-only condition, whereas Lee (2019) reported that a VR group outperformed an audio-only group and performed comparably to a video group. One possible explanation for these inconsistent findings is that the immersive, highly engaging nature of VR can sometimes overload learners cognitively, distracting them from the listening task itself rather than supporting comprehension. Taken together, these findings suggest that VR holds promise for L2 listening development, but that its effects may depend heavily on how the technology is implemented and measured, and further research is needed to clarify when and why it is effective.[7]

Being the most active research area nowadays, AI-driven tools offer numerous possibilities that hardly can be done by any other technology types. Chatbots like ChatGPT or Google Assistant play a role of low-anxiety practice partner. They have so perfect accent, grammar and fluency that they can give exemplary speeches to language learners. By listening to them and by having conversations students have access to native friend. There are a lot of AI tool types these days, but the one which can be helpful to develop listening and speaking skills is Natural Reader website which can read texts in ideal English tone and teach learner correct pronunciation and fluency. Besides, the Automatic Speech Recognition (ASR) provide convenience access with the possibilities of instant transcription for scaffolding. Learners can listen to authentic audio (podcasts, lectures, native speaker conversations) while ASR generates a transcript. This reduces the cognitive load of trying to segment continuous speech into word. Moreover, when learners see what ASR "heard" versus what was actually said, it exposes perceptual errors — e.g., mishearing "gonna" as "going to," or missing weak forms and connected speech (elision, assimilation). This is pedagogically valuable because it makes normally invisible listening breakdowns visible and analyzable.

To conclude, this review presented five main types of general technology tools to use in order to improve listening skill for teachers and learners of English as a second language. Although, the work mainly shed a light on the advantages of using these educational technologies the preference of educators and learners might differ according to their learning styles.

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