

**O‘ZBEKISTON RESPUBLIKASI OLIY TA’LIM, FAN VA
INNOVATSIYALAR VAZIRLIGI**

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KOMPYUTER ILMLARI VA MUHANDISLIK TEXNOLOGIYALARI
mavzusidagi Xalqaro ilmiy-texnik anjuman materiallari to‘plami
2026-yil 25-26-sentabr

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Xalqaro miqyosidagi ilmiy-texnik anjuman materiallarida zamonaviy kompyuter ilmlari va muhandislik texnologiyalari sohasidagi innovatsion tadqiqotlar aks etgan.

Globalashuv sharoitida davlatimizni yanada barqaror va jadal sur'atlar bilan rivojlantirish bo'yicha amalga oshirilayotgan islohotlar samarasini yaxshilash sohasidagi ilmiy-tadqiqot ishlariga alohida e'tibor qaratilgan. Zero iqtisodiyotning, ijtimoiy sohalarni qamrab olgan modernizatsiya jarayonlari, hayotning barcha sohalarini liberallashtirishni talab qilmoqda.

Ushbu ilmiy ma'ruza tezislari to'plamida mamlakatimiz va xorijlik turli yo'nalishlarda faoliyat olib borayotgan mutaxassislar, olimlar, professor-o'qituvchilar, ilmiy tadqiqot institutlari va markazlarining ilmiy xodimlari, tadqiqotchilari, magistr va talabalarining ilmiy-tadqiqot ishlari natijalari mujassamlashgan.

Mas'ul muharrirlar: DSc.prof. Turakulov O.X., t.f.n., dots. Baboyev A.M.

Tahrir hay'ati a'zolari: p.f.d.(DSc), prof. Turakulov O.X., t.f.n., dots. Baboyev A.M., t.f.f.d.(PhD), prof. Abduraxmanov R.A., p.f.f.d.(PhD) Eshankulov B.S., p.f.n., dots. Aliqulov S.T., p.f.n., dots. Alimov N.N., p.f.f.d.(PhD), dots. Alibayev S.X., t.f.f.d.(PhD), dots. Abdumalikov A.A., p.f.f.d.(PhD) Hafizov E.A., f.f.f.d.(PhD) dots., Norbekova B.Sh. p.f.f.d.(PhD) dots. Sindorov L.K., t.f.f.d.(PhD), dots. Nasirov B.U., b.f.f.d. (PhD) O'ralov A.I., p.f.n., dots. Aliqulov S.T., t.f.f.d.(PhD) Kuvandikov J.T., i.f.n., dots. Tsoy M.P., Sharipova S.F., Jo'rayev M.M.

Mazkur to'plamga kiritilgan ma'ruza tezislarining mazmuni, undagi statistik ma'lumotlar va me'yoriy hujjatlarning to'g'riligi hamda tanqidiy fikr-mulohazalar, keltirilgan takliflarga mualliflarning o'zlari mas'uldirlar.

Обобщая вышеизложенное можно сделать вывод о том, что правильное планирование учебной работы с применением цифровой визуализации по дисциплинам естественно-научного цикла и системность ее выполнения способствуют повышению результатов освоения и закрепления у обучающихся новых знаний по физике, химии, информатике, биологии, географии и, соответственно, качества естественно-научного образования.

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INDEPENDENT FOREIGN LANGUAGE LEARNING IN DIGITAL ENVIRONMENTS

PhD in Ed., Assoc. Prof. Liudmila Nikolayevna Polunina
Tula State Lev Tolstoy Pedagogical University
poluninaln@mail.ru

Abstract: The rapid development of digital technologies has substantially transformed the conditions under which foreign and second-language learning takes place. Digital environments enable learners to study languages independently of formal classroom instruction. At the same time, the expansion of technological access does not automatically result in effective autonomous learning. The central problem is the discrepancy between the availability of digital resources and learners' capacity to select, organize, evaluate, and pedagogically exploit them. This article reviews recent research on independent language learning in digital environments, focusing particularly on self-regulated learning, digital resources, and generative artificial intelligence. The analysis indicates that digital technologies can increase accessibility, flexibility, learner choice, engagement, opportunities for practice, and personalization.

Keywords: independent language learning; learner autonomy; digital platforms; instructional support; scaffolding.

Digitalization has fundamentally changed the ecology of language learning. Whereas foreign-language education was traditionally organized around classrooms,

textbooks, teachers, and scheduled practice, learners can now access an almost unlimited range of linguistic resources at any time and in almost any location. Consequently, language learning increasingly extends beyond institutional boundaries and becomes a continuous activity embedded in everyday digital practices.

This transformation is particularly significant for independent language learning. Independence, however, should not be equated with the simple absence of a teacher. In educational research, learner autonomy and self-directed learning refer to learners' capacity to make decisions concerning objectives, strategies, resources, monitoring, evaluation, and subsequent modification of their learning processes. Self-regulated learning additionally emphasizes cyclical processes of planning, performance monitoring, strategy selection, and reflection. Research has demonstrated a substantial relationship between digital technologies and self-regulation, but has also emphasized the necessity of deliberate pedagogical design and graduated scaffolding [4].

Independent language learning should be understood as a process rather than as a technological format. A learner using an application for five minutes a day is not necessarily engaged in autonomous learning, just as a learner attending an online course is not necessarily dependent on a teacher. Independence concerns the degree to which the learner assumes responsibility for regulating the learning process.

Several dimensions are particularly important. First, learners must establish meaningful goals. Second, they must identify suitable resources and activities. Third, they must organize their time and sustain engagement. Fourth, they must monitor performance and interpret feedback. Finally, they must evaluate progress and modify strategies when necessary. These functions correspond closely to models of self-regulated learning.

Digital environments potentially support all of these processes. They make resources available immediately, record learning activity, generate performance data, provide automated feedback, and allow learners to select materials according to their interests. The crucial limitation is that technological affordance does not equal pedagogical effectiveness. A platform can provide thousands of exercises without teaching learners how to determine which exercises they need. It can display progress statistics without enabling learners to interpret it. It can provide immediate correction without helping learners understand why an answer is incorrect.

Digital platforms have expanded the quantity and diversity of linguistic input available to independent learners. Authentic video, podcasts, social media, digital newspapers, electronic books, online communities, and interactive applications allow learners to encounter language in contexts unavailable in many traditional classrooms. Digital resources also permit learners to construct individualized learning ecologies. One learner may combine a structured course with podcasts and spaced repetition; another may use video content, online conversation, and an AI chatbot. The resulting learning pathway is therefore increasingly non-linear and personalized [3].

However, personalization creates a new problem: the learner becomes responsible for instructional design. Traditional education provides a curriculum, sequence, progression criteria, assessment procedures, and a teacher who interprets difficulties. In open digital environments, learners frequently have to construct these elements themselves. Learners with strong metacognitive skills may benefit from this freedom, whereas less experienced learners may experience choice overload, inconsistent study patterns, or inefficient resource use.

The central paradox of independent digital learning is that autonomy requires support. Excessive control can restrict learner autonomy, whereas insufficient support can make autonomy ineffective.

The concept of scaffolding provides an appropriate theoretical framework. Instructional scaffolding refers to temporary support that enables learners to perform tasks that they could not yet perform independently. As competence increases, support should gradually be reduced. In independent language learning, scaffolding can operate at several levels. Goal scaffolding helps learners formulate specific and attainable objectives: ‘Improve my English’ is insufficient as an operational goal; ‘understand the main ideas of a ten-minute podcast without subtitles’ is more measurable. Resource scaffolding helps learners distinguish between resources according to purpose, level, reliability, and cognitive demands. Strategy scaffolding provides learners with explicit techniques for vocabulary learning, listening comprehension, speaking practice, writing, pronunciation, and review. Metacognitive scaffolding teaches learners to monitor their own performance. Digital environments can ask learners to predict difficulty, record confidence judgments, compare predictions with results, and formulate subsequent learning actions. Feedback scaffolding helps learners interpret corrections. Merely indicating that an answer is wrong does not necessarily result in learning. Feedback should support diagnosis, explanation, revision, and subsequent practice. Motivational scaffolding is necessary because independent learning lacks the external structure of classroom attendance. Reminders, progress visualization, meaningful tasks, personally relevant content can support persistence, although excessive gamification may shift attention from learning objectives to platform rewards [2].

Thus, the instructional role of technology should not be conceptualized as the replacement of teachers by automated systems. A more productive model is the redistribution of instructional functions between learners, teachers, peers, and technologies.

The most promising direction for digital independent language learning is the transition from simple automated assistance to adaptive scaffolding based on the following model: goal → task → learner response → diagnosis → feedback → reflection → revised task → reassessment. This model is closer to the logic of instructional support. The technology does not simply provide content; it helps learners understand their current state and determine the next appropriate action. AI can potentially strengthen this model. For example, after a learner writes a paragraph, an AI system could distinguish between grammatical errors, lexical limitations, organizational problems, and pragmatic issues. Rather than

automatically rewriting the entire text, it could identify one or two priority problems, explain them, provide guided questions, and require the learner to revise the original text. Such a design preserves learner agency while using AI as a scaffold.

This principle is especially important for avoiding automation dependency. If learners habitually ask AI to translate, write, correct, summarize, and answer questions for them, the technology may reduce the cognitive effort necessary for learning. Conversely, if AI is used to generate challenges, elicit explanations, provide hints, and stimulate reflection, it can increase productive cognitive engagement [1].

The reviewed evidence suggests that effective independent language learning requires a shift from a resource-centered to a learning-process-centered conception of digital education. A resource-centered model assumes that learners will benefit if they are given enough materials. A process-centered model begins with the learner's goals and asks what support is necessary for the learner to progress toward those goals.

An autonomy-supportive digital environment should therefore contain at least six interconnected components: (1) goal setting – learners formulate specific linguistic and communicative objectives; (2) diagnostic assessment – the system identifies strengths, weaknesses, and priority areas rather than merely producing a general score; (3) personalized pathways – learners receive recommendations for activities and resources appropriate to their current level and objectives; (4) graduated scaffolding – assistance is strongest when a learner encounters a new difficulty and gradually decreases as competence develops; (5) reflective monitoring – learners regularly evaluate what they have learned, which strategies were effective, and what should be changed; (6) authentic communication – digital practice is connected with meaningful interaction and real-world language use.

Within this model, the teacher remains important even when learning occurs predominantly outside the classroom. The teacher's function changes from continuous content delivery to the design of learning environments, diagnosis of difficulties, development of metacognitive competence, evaluation of resources, and provision of high-level feedback.

The major challenge for contemporary language education is therefore not to maximize the amount of technology available to independent learners, but to design supportive digital learning ecologies in which independence can progressively develop [5]. Instructional support should not disappear when learners leave the classroom; rather, it should be transformed into scaffolding, feedback, metacognitive guidance, and carefully designed technological affordances.

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ARTIFICIAL INTELLIGENCE AS A MEANS OF DEVELOPING FOREIGN LANGUAGE LISTENING SKILLS

Elizaveta Aleksandrovna Vishnyakova, PhD in Philology
Lev Tolstoy Tula State Pedagogical University
vishnyalis@yandex.ru

Abstract: The revolutionary transformation of modern education is driven by the widespread adoption of artificial intelligence (AI) technologies. More and more educators, researchers, and methodologists are recognizing that AI is not just a trendy technology, but a powerful digital assistant capable of radically changing approaches to foreign language teaching, particularly the development of foreign language listening skills.

Keywords: artificial intelligence (AI) technologies, foreign language listening skills, audio materials, effectiveness of learning.

Artificial intelligence facilitates the solution of many educational problems, including those related to the development of foreign language listening skills in foreign language (English) lessons.

Among the significant challenges is the expansion of available material. One of the pressing problems of modern textbooks designed for foreign language learning is the limited and insufficient diversity of audio materials for developing students' listening skills. Research shows that many textbooks provide audio material with limited topic coverage, an insufficient number of pronunciation options, and do not take into account a variety of difficulty levels, which impacts the effectiveness of developing students' listening comprehension and perception skills [5].

In these conditions, artificial intelligence acts as a powerful tool for expanding and enriching the content of the educational process. The functionality of artificial intelligence includes the generation of large arrays of audio and text content adapted to levels of complexity and speech patterns; the parameterization of timbre, speech rate, and articulation features; and the modeling of conditions close to the natural speech environment. Personalization and adaptability mechanisms ensure the