УДК 372.881.1

ЭВОЛЮЦИЯ КОМПЬЮТЕРНОГО ОБУЧЕНИЯ ЯЗЫКАМ: ОТ ЯЗЫКОВЫХ ЛАБОРАТОРИЙ К НЕЙРОСЕТЕВЫМ МОДЕЛЯМ НА БАЗЕ ИИ

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В статье анализируется эволюция использования компьютерных технологий в обучении иностранным языкам – от ранних языковых лабораторий и мейнфреймов до современных нейросетевых моделей. Рассматривается методический потенциал технологий NLP и NLG для автоматизации подготовки контента, анализа произношения (системы CAPT) и использования корпусной лингвистики в рамках подхода Data-Driven Learning. Автор исследует возможности мультимодальных моделей и систем адаптивного обучения в создании безопасной образовательной среды. Особое внимание уделяется рискам «галлюцинаций» ИИ, проблеме атрофии когнитивных навыков и необходимости сохранения социальной роли педагога как верификатора и наставника в условиях системной цифровизации.

Ключевые слова: компьютерная лингвистика; искусственный интеллект; NLP; генерация текстов; методика преподавания; нейросети; компьютерная лингводидактика.

The integration of technological tools into the process of foreign language teaching is not a phenomenon exclusive to the 21st century. The initial attempts to utilize computer technology–known as the mainframe era–began as early as the 1960s and 70s. The introduction of computer-based language laboratories, while met with great fervor by pioneering enthusiasts, nevertheless sparked justifiable skepticism among the more conservative members of the pedagogical community [3, p. 2]. Early systems, such as PLATO, were rooted in a behaviorist approach: they offered endless "drill and practice"

exercises which, despite being effective for rote memorization, did little to foster the development of communicative competence.

However, the global proliferation of personal computers at the end of the 20th century stimulated the emergence of new scientific disciplines that were previously unimaginable. Bionics arose at the intersection of biology and engineering, while the symbiosis of computing and philology gave birth to computational linguistics. This discipline radically transformed approaches to foreign language study. Many linguists already recognized then that the computer was not merely a device for arithmetic calculations, but a powerful tool for automating work with massive text corpora, capable of identifying patterns invisible to the human eye.

Today, the advancements in computational linguistics have become an integral part of everyday life. Machine Translation (MT) systems include giants such as Google Translate and Yandex Translate, which process billions of characters daily. The DeepL service deserves particular attention; it operates on the basis of convolutional neural networks, ensuring high stylistic accuracy in translation. Voice assistants–such as Siri, Alexa, and Alisa–have become the first mass-market conduits for Artificial Intelligence (AI) technologies in everyday communication.

As researcher K.K. Boyarsky notes, the primary vectors of computational linguistics are natural language text analysis (comprising both surface and deep syntactic analysis) and speech synthesis. While early programs were restricted by rigid rule-based approaches, today's landscape is dominated by probabilistic models [1, p. 5].

Computational linguistics today is the "engine" that transforms soulless program code into an empathetic interlocutor. At the heart of this process lie two fundamental technologies:

NLP (Natural Language Processing): These are the "ears" and "eyes" of artificial intelligence. This technology is responsible for converting chaotic human language into structured data. When an email service sends a message to "Spam" or a banking app recognizes a fund transfer command, NLP is at work. The algorithm performs tokenization and lemmatization, identifies parts of speech and word relationships, and transforms text into mathematical vectors within a multidimensional space. **NLG (Natural Language Generation)**: This is the "voice" of the machine. The technology works in reverse, converting data into coherent text. Modern NLG systems, such as those based on transformer architectures (GPT-4, Gemini), have moved far beyond canned responses. They are capable of constructing complex narrative logic, maintaining a conversation's context window, and adapting their style to the user.

The real breakthrough occurs when these two are combined. Within a chatbot, NLP deconstructs the request to extract the "intent," while NLG constructs a unique response. It is precisely this tandem that blurs the line between human and machine.

At the beginning of the 21st century, with the advancement of generative AI, the digitalization of education reached a qualitatively new level, often referred to as the "Intelligent CALL" (Computer-Assisted Language Learning) stage. AI assistants process millions of requests daily, continuously improving through Reinforcement Learning from Human Feedback (RLHF) mechanisms.

The use of computational linguistics in education is not a matter of replacing the teacher; rather, it is about the emergence of a universal digital assistant that serves as both a native speaker and a methodologist simultaneously. Let us examine the key scenarios for the application of these technologies by educators. Lesson preparation often takes more time than the actual teaching. AI allows for the optimization of this

process. A teacher can take a current article from the BBC or CNN that is too difficult for students to digest and prompt the neural network: *"Rewrite this text for an A2 (Elementary) level, preserving the core meaning but using high-frequency vocabulary and simplified grammatical structures.* Instead of relying on outdated textbooks, an educator can generate exercises to practice the *Present Perfect* that are thematically aligned with the class's interests (e.g., "Harry Potter" or "Esports"). A prompt might look like this: *"Compose 10 sentences about 'Travel' using the Present Perfect and format them as a gap-fill exercise."*

When discussing computer technology, one cannot ignore corpus linguistics. While generative AI creates new texts, corpus tools analyze existing bodies of real-world speech (corpora) numbering in the billions of words. Using corpus managers (like Sketch Engine) or open corpora (BNC, COCA) opens the door to evidence-based pedagogy. Instead of relying on intuition, a teacher can verify word compatibility (**collocations**). For example, concordance technology allows a user to see a word in hundreds of real contexts. This shifts the paradigm: the student becomes a language researcher (**Data-Driven Learning**), independently deriving rules based on examples rather than rote memorization.

The development of **CAPT** (Computer-Assisted Pronunciation Training) systems has been a revolutionary step. These are based on **ASR** (Automatic Speech Recognition) technologies. Modern algorithms do not just "hear" speech; they perform phonemic analysis, comparing the student’s pronunciation with reference models. Platforms like ELSA Speak or built-in functions in language apps provide instant feedback. They visualize errors, showing exactly where intonation was off or vowel length was incorrect. This is critically important for developing phonetic skills, as a teacher in a class of 20 people cannot physically correct every student’s pronunciation every minute.

The most recent significant breakthrough in the field of AI is the **multimodality** of neural networks. Modern models (GPT-4o, Gemini) are capable of simultaneously perceiving text, audio, and images. This opens new methodological horizons:

Visual Learning: A student can take a photo of an object (for example, the contents of their refrigerator) and ask the AI to draft a recipe in the target language.

Video Interaction: AI is capable of analyzing video clips, identifying idioms, explaining cultural references, and generating **comprehension check** questions in real time.

The use of computer technology in the 21st century has become a mandatory requirement, as modern students quickly lose interest in a subject without audiovisual materials. AI helps solve one of the main problems of traditional learning: the language barrier and the fear of making mistakes. When interacting with a chatbot, a student does not experience the psychological pressure inherent in human communication. A bot will not judge an error, nor will it tire of explaining the same rule for the tenth time. This lowers the so-called "affective filter" (according to S. Krashen), creating a safe environment for linguistic experimentation.

By analyzing task results, AI assistants are capable of accounting for individual learning styles. Adaptive Learning Systems build personal trajectories: if a student has not mastered the topic of "Articles," the system will discreetly return them to this material through new contexts, utilizing spaced repetition algorithms.

Despite the obvious advantages, techno-optimism should remain tempered. The use of AI is associated with several serious challenges.

Firstly, there is the issue of reliability. Language models are probabilistic rather than factual knowledge bases. The phenomenon where a chatbot generates plausible but false information is known as "hallucination." A bot can invent a non-existent rule, idiom, or historical fact while remaining absolutely confident in its accuracy. In the context of language learning, this is dangerous: beginner students (A1-B1) are unable to critically evaluate the machine's response due to its grammatical coherence and persuasiveness. Here, the teacher's role becomes that of a filter and verifier.

Secondly, there is a risk of cognitive skill atrophy. If a student uses AI to write essays or translate texts without attempting independent comprehension, the learning process grinds to a halt. The educator's task is to shift the focus of assignments from the result (the written essay) to the process (discussing arguments, editing AI-generated text).

Thirdly, the complete replacement of the educator is impossible, as language is a social tool. A foreign language lesson requires the creation of an empathetic environment and emotional contact in which the student feels comfortable developing [3, p. 18]. Irony, humor, cultural nuances, and support in moments of failure are things that remain inaccessible even to the most advanced algorithms.

In conclusion, it can be stated that the primary vector for the development of the modern educational system is the systemic integration of digital technologies into the learning process [2, p. 22]. We have moved from the stage of using the computer as a "typewriter" to a stage of partnership with artificial intelligence.

Computational linguistics has provided educators with a powerful toolkit: from NLP text analyzers to multimodal generative models. These technologies allow for personalized learning, provide instant feedback, and remove psychological barriers. However, the teacher today is not merely a transmitter of textbook knowledge, but a mentor possessing digital literacy. They must teach not only the language itself but also how to use AI for self-development, how to verify information, and how to maintain critical thinking in the era of digital surrogates. The future of linguistic education lies not in the competition between human and machine, but in their competent, synergistic interaction.

The classroom configuration, consisting of desks where students sit before an instructor writing on a chalkboard, is now an outdated image of the past. Nevertheless, there is no doubt that the presence of a physical teacher and students in direct contact remains vital to the educational process, as briefly discussed above [2 c. 22]. It is within the classroom setting that students and teachers collaboratively facilitate the understanding of ideas, tasks, and skills presented in a specific lesson through an interactive format. In such a learning environment, students practice active listening, the interpretation of meaning, and the identification of common ground while engaging in dialogue or collaborative exercises. These objectives cannot be achieved through a machine alone, regardless of its level of intelligence.

To put it simply, humans are inherently social beings, whereas machines are not; consequently, social interaction remains a prerequisite for authentic learning to occur.

With the emergence of language laboratories, foreign language instruction first converged with technology in an attempt to resolve the dilemma of language acquisition within a formal environment. This was followed by Computer-Assisted Language Learning (CALL) pedagogy, which integrated computers into foreign language teaching. With the advent of AI, a third revolution is well underway. The question of

whether AI can truly ensure successful foreign language acquisition in a formal setting remains, ultimately, a subject of debate.

Technology augments human capabilities in various ways: physically (the wheel extends the foot's capacity for mobility), intellectually (the alphabet enhances the effective collection of knowledge), symbolically (numerical systems expand counting capabilities), mechanically (the printing press scaled the use of writing), and mnemonically (the computer allows for the storage of more information than a single brain can contain), among others. As new and more powerful technologies are invented, we simultaneously transform the ways in which we acquire knowledge, perceive the world, transmit information, and engage in social interaction. In previous eras, the printed book served as the primary tool for commerce and education–an instrument that individuals learned to use effectively and efficiently for a variety of reasons. It also formed the foundation of how information was accessed and knowledge was internalized. As the Gutenberg era gave way to the electronic age, and now to the age of artificial intelligence, the tools for knowledge production and communication have shifted, as has our self-perception and, notably, our conception of the physical body.

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EVOLUTION OF COMPUTER-ASSISTED LANGUAGE LEARNING: FROM LANGUAGE LABS TO AI-POWERED NEURAL MODELS

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The article analyzes the evolution of computer technology in foreign language teaching– from early mainframe-based language laboratories to modern generative artificial intelligence. It examines the pedagogical potential of NLP and NLG technologies for content automation, pronunciation analysis (CAPT systems), and the integration of corpus linguistics through Data-Driven Learning. The author explores the capabilities of multimodal models and adaptive learning systems in fostering a secure educational environment. Special attention is paid to the risks of AI "hallucinations," the potential atrophy of cognitive skills, and the imperative of maintaining the educator's social role as a mentor and verifier within the framework of systemic digitalization.

Keywords: computational linguistics; artificial intelligence; NLP; natural language generation; teaching methodology; neural networks; computer-assisted language learning (CALL).