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AI TOOLS IN FOREIGN LANGUAGE TEACHING: PROS AND CONS OF UKRAINIAN AND FOREIGN PRACTICES

ABSTRACT

The paper considers the pros and cons of integration of AI tools in foreign language teaching in Ukrainian and foreign higher education institutions. The author analyzes AI algorithms such as Natural Language Processing (NLP), Reinforcement Learning (RL), and Deep Learning (DL) that enhance foreign language learning through techniques like tokenization, lemmatization, speech recognition and machine translation creating personalized lessons, real-time feedback and adaptive difficulty levels, ensuring that learners remain engaged and motivated, whereas platforms like Duolingo apply these algorithms to optimize lesson plans based on user performance. Attention is also paid to Large Language Models (LLMs), such as ChatGPT, that support text generation, translation and immersive language practice facilitating development of lesson materials, simulating dialogues and providing tailored feedback. It is also pointed out that AI-based language learning systems (AIBLS) employ recommendation algorithms and digital footprint tracking to enhance learning, monitor progress and adapt content accordingly; speech processing tools improve pronunciation and engagement; smart tutors offer personalized learning environments adjusting content to individual progress, provide instant feedback, simulate real conversations and support skill development in vocabulary, grammar, and pronunciation. AIBLS apply machine learning, NLP and adaptive algorithms to create dynamic educational experiences. AIBLS also employ metacognitive scaffolding to support learners through feedback, reflection and progress tracking. Apart from the obvious benefits in education, the paper also highlights the limitations of AI tools, since their application raises concerns like data privacy, inequality, and algorithm bias. While helpful for automating basic task performance checks, AI cannot replace teachers in fostering emotional intelligence or cultural interactions. The conclusion has been drawn that effective integration of AI into language teaching is possible through adaptation of traditional methods and creation of AI-based assignments, ensuring a balanced, student-centered approach.

Keywords: foreign language learning, AI tools, Large Language Models, AI-based learning systems, natural language processing.

ІНСТРУМЕНТИ ШІ У ВИКЛАДАННІ ІНОЗЕМНИХ МОВ: ПЕРЕВАГИ І НЕДОЛІКИ В УКРАЇНСЬКІЙ ТА ЗАРУБІЖНІЙ ПРАКТИЦІ

АНОТАЦІЯ

У статті розглядаються переваги та недоліки інтеграції інструментів штучного інтелекту (ШІ) у навчання іноземних мов в українських та іноземних закладах вищої освіти. Автор аналізує алгоритми ШІ, такі як «обробка природної мови», «навчання з підкріпленням» та «глибоке навчання», які сприяють вивченню



іноземної мови за допомогою методів токенізації, лематизації, розпізнавання мовлення та машинного перекладу, розробляючи індивідуалізовані навчальні заняття, забезпечуючи зворотній зв'язок у реальному часі та пропонуючи адаптивні рівні складності для підтримки зацікавлення та мотивації студентів, тоді як платформи на зразок Duolingo застосовують ці алгоритми для оптимізації планів занять на основі продуктивності користувачів. Увага приділяється великим мовним моделям, таким як ChatGPT, які забезпечують генерацію тексту, переклад і ініціативну практику шляхом імітації діалогів, допомагають в розробці навчально-методичних матеріалів для занять та забезпечують індивідуальний зворотний зв'язок. Також зазначається, що системи навчання мови на основі ШІ використовують рекомендаційні алгоритми для сприяння ефективності навчання, моніторингу прогресу та відповідної адаптації змісту навчального матеріалу; засоби обробки природного мовлення сприяють покращенню вимови; інтелектуальні репетитори створюють індивідуалізоване навчальне середовище, коригуючи його зміст відповідно до прогресу кожного окремого студента, імітують реальні комунікативні ситуації, сприяють розвитку словникового запасу, граматичних і фонетичних навичок. Навчальні системи на основі ШІ використовують машинне навчання, обробку природної мови, адаптивні алгоритми для створення динамічних освітніх можливостей, а також так званий «метакогнітивний скаффолдинг» у формі зворотного зв'язку, рефлексії та відстеження прогресу. Крім очевидних переваг в освіті, у статті також висвітлюються недоліки інструментів ШІ, оскільки їх застосування може призвести до порушення конфіденційності інформації, нерівномірності доступу до ресурсів та упередженості алгоритмів ШІ. Незважаючи на те, що інструменти ШІ допомагають автоматизувати перевірку виконання базових навчальних завдань, вони не можуть замінити викладачів у процесі розвитку емоційного інтелекту чи міжкультурної взаємодії учасників освітнього процесу. Зроблено висновок, що ефективна інтеграція ШІ у викладання мови можлива через адаптацію традиційних методів і створення завдань на основі ШІ, забезпечуючи збалансований підхід, орієнтований на студента.

Ключові слова: навчання іноземних мов, інструменти ШІ, великі мовні моделі, системи навчання на основі ШІ, обробка природної мови.

INTRODUCTION

In today's digital era, Artificial Intelligence (AI) has transformed language education by providing learners and educators around the globe with cutting-edge digital tools and resources. Nevertheless, integration of AI into the educational process is a weak link in teaching humanities for a number of reasons. Extensive and successful implementation of AI tools is only possible with the complete digitalization of language education, which primarily implies availability of a digital educational environment, digitally skilled language teachers, and readiness of all participants to use AI technologies in the educational process.

THE AIM OF THE STUDY

The aim of our research is to describe the transformative impact of AI tools on foreign language teaching, analyze their potential, limitations, and effect on language learners and teachers in Ukraine and abroad.

THEORETICAL FRAMEWORK AND RESEARCH METHODS

The use of AI tools in education has been explored by researchers such as G. Dizon: evaluation of intelligent personal assistants for L2 listening and speaking



development (Dizon, 2020); L. K. Fryer: experimental comparison of chatbot and human task partners (Fryer et al., 2017); R. Godwin-Jones: AI bots, ambient intelligence, and the metaverse (Godwin-Jones, 2023); E. Kochmar: automated data-driven generation of personalized pedagogical interventions in intelligent tutoring systems (Kochmar, 2022); M. Marge: spoken language interaction with robots (Marge et al., 2022); S. Pokrivcakova: preparing teachers for the application of AI-powered technologies in foreign language education (Pokrivcakova, 2019); L. Tavabi: multimodal learning for identifying opportunities for empathetic responses (Tavabi et al., 2019); S. C. Tsai: statistical learning and deep learning in education (Tsai et al., 2020) and others. Drawing insights from their studies and incorporating some practical experience, we will make an attempt to analyze the ways of AI tools application in foreign language learning highlighting their advantages and limitations.

During the study a number of theoretical methods were used, such as analysis and synthesis of the processed information, interpretation of the key concepts of the study, systematization and generalization of the study results, and the descriptive method.

RESULTS

The implementation of AI tools in the Ukrainian, as well as in the foreign higher education institutions, is carried out at both institutional and systemic levels. The process includes the following main stages: data collection, data analysis, data visualization, in-depth analysis and making conclusions, projection and obtaining specific outcomes. It is important not to skip any of these stages, so that AI tools are used not only to provide information and control the routine test tasks, but also to contribute to real transformations in education.

AI algorithms play a transformative role in foreign language learning by enabling personalized, efficient, and engaging experiences. Several advanced techniques are applied across different aspects of language acquisition.

Natural Language Processing (NLP) is fundamental for analyzing text and speech. Techniques like tokenization (breaking down a text into smaller, manageable units called tokens that are the building blocks for processing and analyzing language data), lemmatization (reducing words to their base or root form called 'lemma' preserving their meaning within the given context and ensuring that the result is a valid word in the language) and part-of-speech tagging help deconstruct sentence structures, making grammar lessons more accessible. Machine translation powered by Transformer models, such as Google's BERT or OpenAI's GPT, facilitate real-time translation and comprehension. Speech recognition tools evaluate pronunciation accuracy, while named entity recognition (NER) highlights key phrases and idiomatic expressions for focused learning.

Reinforcement learning (RL) is a type of machine learning where an agent learns to make decisions by interacting with an environment to maximize a cumulative reward. Unlike supervised learning, where the model learns from labeled data, RL relies on trial-and-error to discover the optimal actions for achieving a goal. RL enables adaptive learning systems to tailor lessons based on user performance, gradually adjusting difficulty levels. This dynamic approach ensures that learners stay challenged yet not overwhelmed. For instance, platforms like Duolingo use reinforcement learning to optimize lesson plans by learning from user errors.

Deep learning (DL) further enhances language learning tools. Neural networks drive speech and text generation, while convolutional neural networks (CNNs) support image-based learning, such as recognizing text in photos or contextual language cues. Recurrent neural networks (RNNs) and Transformer models help predict word sequences, aiding sentence construction and comprehension exercises (Tsai et al., 2020).



Machine learning (ML) algorithms also play a crucial role in error detection and feedback, using methods like «random forests» and «support vector machines» (SVMs). Clustering and classification techniques group learners by proficiency and recommend vocabulary sets tailored to their needs.

Recommendation systems (RS) use collaborative filtering and content-based filtering to suggest lessons, quizzes, or vocabulary based on a learner's progress and interests. Meanwhile, sentiment analysis algorithms can detect user emotions, adjusting lesson difficulty to maintain motivation and reduce frustration (Marge et al., 2022).

Speech processing (SP) algorithms refine pronunciation tools by mapping speech signals to phonetic units, offering real-time feedback on accents. These algorithms, alongside acoustic modeling, enhance the accuracy of language-learning tools.

Gamification strategies (GS) also benefit from AI, calculating rewards and designing challenges that make learning more engaging and enjoyable. Platforms like Duolingo excel at combining gamification with NLP and reinforcement learning to create a fun, effective learning experience.

In practice, AI is seamlessly integrated into popular platforms. For example, Duolingo employs NLP and adaptive algorithms for personalized lessons, while Babbel uses speech recognition to refine pronunciation training. Google Translate's powerful Transformer-based architecture supports multilingual translation, offering learners immediate access to new languages.

A Large Language Model (LLM) is a type of AI model trained on vast amounts of text data to understand, generate, and respond to human language. It uses deep learning, often with Transformer architectures, to perform tasks like text generation, translation, summarization, and answering questions by predicting the next word or sequence of words in context. Examples include GPT, BERT, and LLaMA.

In foreign language teaching, text generation, as a core feature of LLMs, enables development of various instructional materials, such as lesson plans, exercises, quizzes and study guides. LLMs can also simulate realistic language use by generating dialogues, offering learners opportunities for interactive conversations and role-playing scenarios that foster immersive language practice.

LLMs' translation tool empowers learners to access foreign language content in their native language, improving comprehension and making resources more accessible. For educators LLMs facilitate creation of bilingual teaching materials and adaptation of curriculum content to meet the needs of learners from diverse linguistic backgrounds. These AI models provide advanced tools for automated comprehension assessment, including generation of questions, evaluation of answers and proficiency testing.

Through adaptive learning algorithms that assess learners' preferences, interactions, and performance LLMs enable personalized tutoring. These systems customize instructional content and delivery methods offering targeted feedback, tailored practice activities and remedial support. This approach allows learners to progress at their own pace fostering greater linguistic proficiency and confidence.

Language modeling is a fundamental capability of LLMs, enabling them to predict and generate word sequences based on contextual information. In language education, these models assist learners in constructing grammatically accurate sentences, expanding their vocabulary and enhancing writing skills. Through their speech recognition and synthesis features they offer feedback on pronunciation, intonation and fluency helping learners refine their speaking abilities. LLMs can also generate audio samples featuring native



speakers' speech patterns and accents, supporting listening comprehension practice and enabling learners to simulate authentic pronunciation effectively.

Chatbots are being developed using LLMs, significantly enhancing their knowledge and ability to engage in conversations (Fryer et al., 2017). Chatbots are commonly accessed through popular messaging platforms like Facebook Messenger or WeChat typically via mobile apps on smartphones. This trend is a key reason supporting the use of Intelligent Personal Assistants (IPAs), as their availability on personal mobile devices shifts language learning interactions from formal academic environments to more integrated, everyday experiences. This increased accessibility makes the services more relatable to foreign language learners' daily lives, boosting motivation and encouraging more frequent use. Moreover, AI-powered tools, including IPAs, search engines, and machine translation, are also expanding to other devices such as wearables (smartwatches, glasses), in-car systems (like Apple CarPlay), and home gadgets (smart speakers, wall-mounted devices). The Internet of Things (IoT) significantly extends the reach of AI tools, especially when combined with faster cellular networks like 5G and widespread Wi-Fi. This development promises nearly constant access to digital services, often voice-activated, whether commuting (car), exercising (smart earbuds), relaxing at home (smart speakers), or cooking (networked appliances) (Dizon, 2020; Godwin-Jones, 2023).

The development of neural networks capable of creating recommendation systems, designing AI tools and smart adaptive tutor models is a complex process that includes the development of a methodological model and pre-training of neural networks based on this model within the framework of a particular professional specialization.

The smart tutor model is built on the principles of adaptive learning, which involves formation of individual development trajectories for each student. Smart tutors differ from non-adaptive, simple social agents (bots) in that they perform various functions, such as information storage, social interaction, emotional interaction, certification, knowledge diagnostics, and individual adaptation of educational material (Dizon, 2020). There are many terms in the literature to describe this AI-based technological solution: smart tutor, intelligent agent, digital tutor, adaptive tutor, smart assistant, smart companion, adaptive learning system, and others (Godwin-Jones, 2023).

A smart tutor can be a partner, a mentor, and in some cases, completely replace a teacher. It has a wide range of skills, including modeling the cognitive and emotional state of students, engaging in the learning process through dialogue, encouraging reflection and self-study through accessible statistics, increasing the level of motivation through the use of narratives, contextual clues, etc. A smart tutor can also automatically gather groups of students, help with grading, search for additional materials, track the progress of students and identify their emotional state. There is experience in developing and using smart tutors in foreign universities.

The smart tutor RIPPLE (Responsive Intelligent Personalized Language Learning Environment) created at the University of Queensland (Australia) refers to intelligent agents for creating a dynamic and adaptive foreign language learning environment. The didactic potential of RIPPLE lies in its ability to provide students with instant feedback on vocabulary, pronunciation and grammar offering personalized learning recommendations based on the students' progress and needs to help them improve basic language skills (The University of Queensland, Australia, 2024).

In this context, it is necessary to mention the technological solutions that can detect an interlocutor's emotional state. The researchers from University of Southern



California have proven that Interactive Agents with emotional intelligence can recognize a user's sentiments and offer appropriate responses. They explore behavioral cues that signal the need for empathetic responses, with emotional tone in language and facial expressions being key indicators of sentiments. To automate this process, the authors have designed a multimodal deep neural network to detect moments when an agent should respond empathetically. This neural network is trained using audio, video, and language from human-agent interactions in the Wizard of Oz setting (Tavabi et al., 2019). Embodied virtual agents and social robots that can emotionally engage their users have a huge potential in multiple domains including education.

Smart tutors often possess the following didactic capabilities:

- adaptability: they can adapt educational content to the level of knowledge and needs of each individual student; analyze data on the student's previous achievements and problems in order to offer the most relevant and effective material;
- interactivity: they provide the opportunity to interact with educational content through various formats, such as text, sound, video, animation and tasks;
- feedback: they provide personalized feedback analyzing the so-called digital footprint of each student to identify their strengths and weaknesses and offer individual recommendations for further learning;
- monitoring learning progress: track students' progress and provide teachers with information about each student's achievements. This helps teachers adapt their teaching techniques and provide additional support to those students who need it (Kochmar et al., 2022).

As noted in the analytical work of UNESCO, AI will play a key role in “implementing personalized learning – adapting learning, its content, and pace to the specific needs of each learner” (Pedró et al., 2019). In other words, today's AI-based technological solutions are no longer expected to simply perform routine instruction tasks and provide feedback, but to create unified recommendation systems and develop adaptive learning environments that will help achieve impressive educational results, personalize the educational process, and increase motivation and engagement of learners. Contemporary literature uses various terms to describe such systems: AI-Based Learning Systems, Intelligent Learning Environments, etc.

AI-based learning systems (AIBLS) are educational platforms that use artificial intelligence technologies, such as machine learning, natural language processing and adaptive algorithms, to personalize and optimize the learning experience. They analyze individual learner data to provide tailored content, real-time feedback and dynamic learning paths, enhancing engagement and improving learning outcomes. Examples include intelligent tutoring systems, personalized recommendation engines and adaptive learning platforms such as DeelEngage, Absorb LMS, EdApp, Docebo, etc.

Thus, the peculiarities of AIBLS are the following:

- they are developed using AI algorithms, such as machine learning with and without a teacher, deep learning, natural language semantics processing, speech recognition and synthesis, large data analysis, multimodal clustering and recommendation systems;
- they combine all the above-mentioned AI-based technological solutions that are used in teaching foreign languages, from didactic chatbots to smart tutors;
- they can not only create specific recommendations for students and provide additional consultations with a tutor if necessary, but also design training courses in various fields of knowledge taking into account the target audience, level of proficiency in the foreign language, professional and educational goals.



To develop a methodological model of AIBLS, it is necessary to determine the tasks and learning outcomes, taking into account the goals that users want to achieve while learning a foreign language. It is also important to study various approaches to foreign language teaching and determine techniques, most effective for the target audience. By creating sample topics for training, setting task formats, providing control and assessment materials, evaluating students' progress and analyzing learning data AIBLS help users track their achievements and motivate them to further study the language. One more important aspect is the so-called metacognitive scaffolding or support for learners, including feedback on assignment completion, midterm and final assessment, considering learners' reflection on the course, modeling and offering various prompts.

Thus, AI algorithms process the data from these modules and produce the results in the form of adaptive learning content, which is usually presented in a multimodal format. Knowledge bases in many disciplines are constantly changing and expanding, which makes it difficult to keep course content up to date. However, AI provides the ability to receive data from various sources, verify this data and analyze it so that the learning content can be constantly updated.

Like any new technology, alongside with its obvious benefits, AI can also raise certain issues, such as maintaining data privacy, increasing digital inequality in the educational environment, and the impartiality of algorithms. K. Crawford, a researcher in the field of ethics and AI technologies, states that teachers need to be careful in using AI in education so as not to exacerbate inequalities and violate students' rights (Crawford, 2022). In this context, many foreign language teachers highlight the negative impact of AI on the educational process due to the rapid learning ability of chatbots in the process of creating oral and written texts of any genre and in any language (Marche, 2022). This creates certain difficulties in the process of forming and developing foreign language productive skills, their control and assessment. That is why teachers should reconsider traditional approaches to the formation, development and control of productive written and communicative skills, find effective ways to integrate popular AI tools into teaching foreign languages, develop AI-based assignments, since prohibiting the use of AI tools is extremely short-sighted (Pokrivcakova, 2019).

The integration of AI tools into the educational process is a challenging task in increasing the efficiency of training. However, it is necessary to consider the fact that teaching foreign languages requires a special approach that takes into account students' personal qualities, their psychotypes, emotional state, worldview and many other factors. Many researchers emphasize that AI tools can help automate some processes, such as checking spelling, orthography or grammar, but so far, they cannot replace a teacher in developing students' emotional intelligence, their ability to interact with representatives of different cultures. Nowadays, unlike in technical and natural sciences, a methodological basis for the effective implementation of AI in teaching humanities has not been properly developed.

CONCLUSIONS AND PROSPECTS OF FURTHER RESEARCH

The integration of AI in foreign language teaching and learning is transforming education by providing personalized and adaptive learning experiences. AI tools follow systematic stages including data collection, analysis, visualization, and outcome projection, not only automating tasks, but also driving significant changes in educational practices. Algorithms in natural language processing, machine learning, reinforcement learning and deep learning enhance the learning process by offering personalized lessons, real-time feedback and adaptive difficulty levels. Techniques like tokenization, lemmatization and



speech recognition improve grammar, pronunciation and contextual understanding. AI systems tailor content to learners' progress boosting motivation and engagement.

AI-based learning systems, which incorporate advanced AI methods, create more dynamic, personalized learning environments than traditional approaches. These systems analyze data to optimize lessons, support skills like vocabulary and grammar and offer recommendations based on learners' progress. They also monitor learners' achievement and adapt to individual needs through metacognitive scaffolding strategies such as feedback and prompts. AIBLS ensure that educational content remains up-to-date and aligned with learners' needs by continuously analyzing and updating learning materials.

AI tools like chatbots and smart tutors provide immersive, interactive learning experiences. These systems, integrated into mobile devices and wearables, move language learning from formal settings to everyday environments, making it more accessible and engaging.

Along with these opportunities, there are also important ethical concerns and challenges. Issues like data privacy, bias in algorithms and unequal access to technology highlight the need for careful and responsible development of AI-based solutions. Furthermore, the potential for excessive reliance on AI tools and a decrease in human interaction stress the need for a balanced approach that combines technology with conventional language teaching methods.

Further research may be focused on integrating multimodal learning, combining text, audio, video, and interactive elements to suit various learning styles. Enhancing real-time feedback, refining speech recognition and addressing educational challenges will be crucial for ensuring these tools are effective, equitable, and accessible to all learners.

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