Fecha de presentación: noviembre, 2024 **Fecha de Aceptación**: diciembre, 2024 **Fecha de publicación**: enero, 2025

APPLICATIONS OF ARTIFICIAL INTELLIGENCE TO RAISE THE QUALITY OF EDUCATION: MASTERY OF PROFESSIONAL FOREIGN-LANGUAGE TERMINOLOGY

APLICACIONES DE LA INTELIGENCIA ARTIFICIAL PARA ELEVAR LA CALIDAD DE LA EDUCACIÓN: DOMINIO DE LA TERMINOLOGÍA PROFESIONAL DE LENGUAS EXTRANJERAS

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Suggested citation (APA, seventh ed.)

Lukina, E., Shichiyakh, R., Shvachkina, L., Rodionova, V., y Panova, E. (2025). Applications of artificial intelligence to raise the quality of education: mastery of professional foreign-language terminology. ***Revista Conrado, 21***(102), e4230.

ABSTRACT

In recent years, the artificial intelligence industry has been rapidly growing and adjusting in all spheres of science and technology. There is already a wide range of AI tools for language learning, including translators, chatbots (imitating conversations with native speakers), adaptive learning platforms (with personalized learning), and interactive exercises (providing instant feedback). These instruments offer students increasingly more convenient and effective means of learning languages. The study aims to determine AI technologies and tools effective in studying specialized English-language terminology. The paper examines key theoretical concepts pertaining to the application of AI in language education. Through a review of scientific literature, the authors identify AI technologies and tools effective in the study of specialized foreign-language terminology. The study concludes that although AI can offer educational instruments and resources, the teacher introduces a human element, including empathy and the ability to adapt to the individual needs of learners, creating an inspiring and effective foreign language learning environment.

Keywords:

Artificial intelligence, artificial intelligence technology, artificial intelligence tools, foreign language teaching, energy systems integration.

RESUMEN

En los últimos años, la industria de la inteligencia artificial ha crecido y se ha adaptado rápidamente en todos los ámbitos de la ciencia y la tecnología. Ya existe una amplia gama de herramientas de IA para el aprendizaje de idiomas, como traductores, chatbots (que imitan conversaciones con hablantes nativos), plataformas de aprendizaje adaptativo (con aprendizaje personalizado) y ejercicios interactivos (que proporcionan retroalimentación instantánea). Estos instrumentos ofrecen a los estudiantes medios cada vez más cómodos y eficaces para aprender idiomas. El estudio pretende determinar las tecnologías y herramientas de IA eficaces en el estudio de la terminología especializada de la lengua inglesa. El artículo examina conceptos teóricos clave relativos a la aplicación de la IA en la enseñanza de idiomas. Mediante una revisión de la literatura científica, los autores identifican

tecnologías y herramientas de IA eficaces en el estudio de la terminología especializada de lenguas extranjeras. El estudio concluye que, aunque la IA puede ofrecer instrumentos y recursos educativos, el profesor introduce un elemento humano, que incluye la empatía y la capacidad de adaptarse a las necesidades individuales de los alumnos, creando un entorno inspirador y eficaz para el aprendizaje de lenguas extranjeras.

Palabras clave:

Inteligencia artificial, tecnología de inteligencia artificial, herramientas de inteligencia artificial, enseñanza de lenguas extranjeras, integración de sistemas energéticos.

INTRODUCTION

Scientific progress has engulfed the livelihood of society, its most advanced manifestation being artificial intelligence. AI-assisted pattern recognition methods are used in medicine, manufacturing, diagnostics, and national security. AI systems are employed by banks in insurance activity and property management (Ilkevich et al., 2022). AI helps to simplify technological processes; it can perform dangerous tasks, help people with special needs, and facilitate the exploration of our planet (Voskresensky et al., 2024). AI also has a special place in education, which involves a personalized approach to knowledge acquisition (Akhmetshin et al., 2021a).

Today, in the context of the variability of educational institutions in the choice of technologies for work with participants in the educational process, there is a need to not only determine the substance of mastering AI systems but also to offer different variants of educational trajectories, considering the needs of the subjects in vocational training (Akhmetshin et al., 2021b).

AI is seen as a tool or program that analyzes information and solves problems in the same way a human does. AI uses algorithms that allow processing large amounts of information and finding patterns in them. Neural networks as a type of AI can write complex algorithms to solve tasks, learn from a large amount of data, and find patterns (Ivakhnenko & Nikolskii, 2023). At users' request, AI tools instantly generate the necessary pedagogical content to reduce the workload of higher education teachers in preparing for classes. Chatbots as a tool capable of simulating communication in different formats can maintain a conversation, answer questions, and comment on the work done (Garkusha & Gorodova, 2023).

The application of AI in foreign language learning through the construction of individual knowledge acquisition trajectories provides a personalized approach to training, expands the didactic possibilities of computer-based learning tools. AI allows one to align the content, forms, and methods of training with educational needs, automatically adjust to account for the dynamic changes in the learning trajectory, and adapt educational material to different types and levels of mastery, considering psychological and personal qualities (Lopukhina et al., 2024).

The use of information and communications technology in language teaching is referred to as computer-assisted language learning (CALL). Another term that has also come to be used since the advent of AI is ICALL (intelligent CALL).

Today's scientific literature describes various scenarios of the application of AI in education (Baideldinova et al., 2021). Interactive assistants and adaptive programs allow AI to personalize the educational process and simplify technical tasks. AI can perceive much more information than a human and perform tasks faster and with greater accuracy. Some developers of educational software have begun to use these advantages to create software that adapts to the characteristics of each learner (Li &, Fu, 2020). Given the active penetration of AI in the educational process, traditional methods of foreign language learning are now seen as a resource-intensive process requiring quite a lot of additional material, whereas digital tools utilizing AI can provide an individual learning plan to each student. Furthermore, the curriculum tracks students' personal learning achievements to provide material appropriate to their level of proficiency and individualized course of study.

Researchers distinguish three main categories of AI in language education:

- assisted intelligence (Assistive Intelligenz), an example of which are Moodle-type platforms with modules for knowledge testing;

- augmented intelligence, enriching analog materials with multimodal content (Areeka);

- autonomous intelligence, the so-called superintelligence that can replace humans – for example, in the form of robots that collaborate with learners, also possessing intercultural skills and the ability to conduct discourse (Riazanov, 2020).

Of all AI technologies, researchers highlight five most effective solutions for the introduction of AI in foreign language education in higher education institutions:

1. Automation tools that promote human mental productivity. They help in establishing a partnership between students and AI, in which the human factor comes first. The use of AI helps to reduce the number of mistakes in performing tasks (Eltanskaia & Arzhanovskaia, 2024).

2. Chatbots – virtual assistants; a chatbot program satisfies users' needs for communication between chatters, i.e., a human and a chatbot endowed with AI. Automated communication using chatbots is conducted via text or

voice messages (Sysoev & Filatov, 2023a). Researchers suggest that these conversations with AI create linguistic diversity, contribute to the personalization of online learning, adjust material based on learners' errors and successes, and build adaptive learning to close gaps in knowledge (Barrot, 2023).

The most frequently cited forms of AI application in language education in the reviewed literature on the topic include, among others:

1. The creation of personalized learning materials tailored to the needs of a particular student or group of students. These materials can be used as an alternative to traditional textbooks that contain standardized content often not adapted to the individual needs of students; AI generates materials based on analyzing the student's actions and reactions during the learning process (Fomin & Sadovikov, 2022). This feature is emphasized by researchers when they describe the adaptation of activities to learners' needs by means of collecting data on students' recurring errors or strengths and then generating new tasks or task modules based on these data. The student and the teacher thus receive instant individualized feedback on, for example, grammar or lexical tasks (Crompton et al., 2024).

2. The use of machine translation (MT) tools. AI technologies (such as MT based on neural networks) greatly improve the quality of MT, increasing its value in language teaching. However, many teachers see the use of MT by students as weakness, laziness, or even dishonesty and try to limit the application of these tools in the educational process.

3. The use of AI writing assistants that help in writing texts at each stage with grammatical and lexical clues, as well as content hints and possible corrections (Shefieva & Isaeva, 2020).

4. The use of platforms and applications – AI language learning software. Such instruments as Duolingo, Busuu, Speexx, Babbel, Memrise, Magiclingua, and many others are popular and allow learning languages by completing a series of digital exercises. However, these platforms and apps rely on a simple structure and mainly use close-ended tasks and outdated methods, which limit students' creative abilities and spontaneity. Humble & Mozelius (2022), are also critical of this issue. In their view, from the point of teaching psychology, a problematic aspect of this model is that learning consists in a juggling act with pre-formulated text components, which completely excludes learning to formulate one's spontaneous statements (Humble & Mozelius, 2022). On the other hand, these apps provide feedback immediately after writing a test, quiz, or even an essay. AI provides results and answers, allowing the student to correct any mistakes they may have made. It also turns out that AI tools can support shy students who are often reluctant to participate more actively in class due to their fear of failure or the teacher's evaluation. Personalized feedback from AI gives them courage and allows them to achieve better results (Bialik et al., 2022).

5. The use of intelligent tutoring systems, which are made up of specific modules and, by means of algorithms and neural networks, can make decisions regarding the learning process of a student and the selection of content for them, provide support and assistance, and engage in dialog with the student (Cawley et al., 2019).

6. The application of intelligent virtual reality (IVR). Students can practice speaking with AI avatars that simulate realistic conversations with people who speak the target language. This can be used to create highly authentic virtual reality gaming environments where virtual agents (avatars) can play the role of teachers, moderators, or peer students (Esionova, 2019).

Thus, the body of scientific literature now includes a significant number of publications demonstrating different scenarios for the application of AI in foreign language learning. Almost all these publications describe the positive perspectives of their application.

The priority area in the use of AI today is the development of students' speaking skills as part of vocational training. This involves a focus on speaking practice in real-life communication situations, the improvement of phonetics, the development of dialogic speech, and the development of writing skills. Thus, the ways in which AI can be utilized to recognize and correct pronunciation include:

- Automatic speech recognition (ASR). AI can use ASR technologies to convert the audio streamed signal into text. This allows the system to analyze the student's pronunciation and determine its accuracy.
- Phonetic analysis. AI can perform phonetic sound analysis using special algorithms. It can detect the difference between the correct and incorrect pronunciation of specific phonemes or words.
- Comparison to a standard. AI can compare the student's pronunciation against a standard or norm. This allows the AI to determine where errors occur, and which aspects of pronunciation need attention.
- Reinforced training. Systems can use reinforced training methods to gradually adjust pronunciation. Students can be offered feedback and reinforcement for each correctly pronounced phoneme or word.
- Personalized recommendations. Based on pronunciation analysis, AI can provide individualized

Vol 21 | No.102 | January-February | 2025
Continuous publication
e4230

recommendations to students to improve specific aspects of their pronunciation. This may include exercises and tasks to target specific weaknesses (Sysoev & Filatov, 2023b).

Therefore, we believe that the application of AI in the educational process remains topical and yet underexplored. Particularly important is the issue of using AI in mastering specialized foreign-language terminology.

Thus, the purpose of our study is to identify AI technologies and tools that can be effective in learning specialized foreign-language terminology.

MATERIALS AND METHODS

In accordance with the outlined approaches to the peculiarities of mastering specialized foreign-language terminology in working with AI systems, the present study employed a qualitative approach.

The study was conducted in the form of a review of literature across various academic disciplines related to the chosen topic. Its purpose was to summarize the findings related to the specific research question, namely: Which AI technologies and tools can be effective in learning specialized foreign-language terminology?

The databases used to find articles that could potentially answer the research question included Researchgate, Google Scholar, and Scopus. Only articles published after 2015 were included in the filtered results. A reverse search was also used to include articles relevant to the research goal and research question.

RESULTS AND DISCUSSION

As a result of the conducted literature review, we obtained data on various AI technologies that can be used as part of students' foreign language learning in mastering specialized foreign-language terminology (Table 1).

Table 1. AI technologies in learning specialized foreign-language terminology.

No.	AI technology	Tools	Source
1	Thematic text generation	Chat GTP, Perplexity, GigaChat	Sysoev & Filatov (2023a); Barrot (2023)
2	Telegram chatbots	@multitran_bot, @eddy_en_bot, @ EnglishSimpleBot	Fomin & Sadovikov (2022); Crompton et al. (2024)
3	Text editors	Grammarly, ProWriting Aid, Textio, AI Writer, Textly AI, Essaybot	Li & Fu (2020); Bialik et al. (2022)
4	Intelligent tutoring systems (ITS)	Word Bricks, CASTLE, I-ETER, Web Passive Voice Tutor I	Cawley et al. (2019); Riazanov (2020)

Fuente: Elaboración de autores

Let us proceed to discuss AI technologies that can be utilized by students in the process of learning specialized foreign-language terminology.

ChatGPT, a neural network tool capable of context-aware understanding and text generation, considers prior messages and responds in a context-aware manner, creating plausible and probable everyday situations for foreign language communication. This feature of ChatGPT allows instructors and students to interact with a virtual interlocutor: engage in conversations, discuss different topics, and ask and answer questions.

ChatGPT is an example of a teacher's assistant in the sphere of lesson planning and creating teaching materials. Even a teacher with little experience in writing so-called prompts (commands given in the chat) can use it to facilitate their work. ChatGPT can generate exercises with a certain level of difficulty (e.g., at A1 proficiency level) and on a specific topic, plan the course of a class on a given subject, point out mistakes made by a student in a particular paper, simplify overly complex authentic texts, prepare a text for translation, and solve proposed problems and exercises (Sysoev & Filatov, 2023a). However, the teacher should keep in mind that the tool is imperfect, and its output often requires careful analysis and possible corrections. The basic version of the chat is available for free, but in the paid version its capabilities are significantly expanded, allowing the use of many useful plug-ins.

With ChatGPT, students can benefit from additional communication practice, improve their reading, writing, and speaking skills, and expand their vocabulary. In the classroom, however, the teacher continues to be the key organizer of the educational process, acting only in the role of a consultant or expert in the foreign language, helping and creating appropriate conditions for effective learning, including in the process of vocational training and the mastery of specialized

foreign-language terminology. After all, ChatGPT has several limitations that need to be controlled, such as possible erroneous responses, dependence on the quality of input data, etc. (Sysoev & Filatov, 2023b).

Chatbots in Telegram channels, which present a mobile learning tool, can also help future professionals master specialized foreign-language terminology. Among these bots, we can note:

@multitran_bot (enables automated work with online dictionaries, provides various translation options and meanings, duplicates the main functionality of the Multiltran dictionary (an online system of bilingual dictionaries),

@eddy_en_bot (helps to learn new vocabulary, the free version allows learning five new words a day),

@EnglishSimpleBot (offers the opportunity to read English texts and mark unfamiliar words to later learn them in a special mode, to study texts on specific topics, and to improve grammar skills, including language proficiency).

In this context, an incredible finding was reached by Fomin & Sadovikov (2022). Most students like using chatbots and they typically feel more comfortable communicating with an automated partner than with a human interlocutor or the teacher. Moreover, when communicating with chatbots, students gain self-confidence, achieve better results, and are more active and interested in learning foreign languages.

There are also several effective online resources for editing foreign language texts that use AI, such as Grammarly, ProWriting Aid, Textio, AI Writer, Textly AI, and Essaybot. Grammarly is capable of fixing over 150 types of mistakes, including grammar, spelling, punctuation, writing style, and sentence structure. If mistakes are found, Grammarly gives recommendations on how to correct them, offering different options. Working with this service allows students to analyze their texts, thus developing critical thinking skills, which can be useful in the future when writing scientific papers, dissertations, research articles, annotations, and other written works.

The use of AI ITS, such as Word Bricks, CASTLE, I-ETER, and Web Passive Voice Tutor I, is referred to by researchers as deep (linguistic) learning where AI allows students to learn at a pace adapted to their needs. The teacher can create custom tasks (exercises on basic questions and thematic areas, such as repeating vocabulary). Based on the data provided by the teacher, the AI automatically generates tests, exercises, quizzes, and translations adapted for students (Cawley et al., 2019).

In conclusion, we note that tools supporting the work of translators (the so-called CAT) and applications for learning vocabulary and language learning are just a few examples of the current use of AI in education. However, owing to the appearance and accessibility of ChatGPT, the work of a foreign language teacher can change in many respects. The form of these changes will depend solely on the teacher and their motivations and competencies. Although ICT has been used in language education for a long time (albeit not that based on AI), ever since its advent, the model of language education with the use of ICT has been developing consistently but slowly because teachers were and still are somewhat unconvinced of the usefulness of new technology in daily practice. Shefieva & Isaeva (2020), consider this fact one of the most significant impediments to using AI in education.

CONCLUSIONS

Contemporary technology is gradually expanding its role in people's daily lives. This technological revolution also sweeps over education, especially foreign language teaching. AI has been one of the most innovative and controversial instruments in this sphere.

The application of AI in foreign language learning is rather new, which entails the lack of empirical research on the didactic influence of AI in language education. Limitations in AI usage may be the result of external factors (lack of equipment, lack of technical support, tight curriculum, lack of time), but often they are internal, related to the teacher's attitude.

The study demonstrates that at present, AI is unable to replace the foreign language teacher in vocational training, because AI has the potential to supplement and improve the educational process while the creative pedagogical work is performed by none other than the teacher.

The application of AI in vocational training for language learning purposes is a topical and promising problem. It should be developed further not only in the context of developing new AI tools but also in the aspect of the algorithms and mechanisms of teachers' and students' interaction with AI in a broader perspective.

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