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THE TRANSFORMATIVE IMPACT OF ARTIFICIAL INTELLIGENCE ON FOREIGN LANGUAGE TEACHING: CHALLENGES AND OPPORTUNITIES

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ТРАНСФОРМАЦІЙНИЙ ВПЛИВ ШТУЧНОГО ІНТЕЛЕКТУ НА НАВЧАННЯ ІНОЗЕМНИХ МОВ: ВИКЛИКИ ТА МОЖЛИВОСТІ

Objective. *The objective of this article is to investigate the transformative impact of artificial intelligence on foreign language teaching, focusing on its applications, challenges, and opportunities in modern education.*

Methods. *The primary scientific results are achieved through the use of a comprehensive set of general scientific and specialized research methods, including: analysis and synthesis of scientific literature on artificial intelligence and its applications in foreign language teaching; theoretical generalization and specification of AI integration in educational methodologies; comparative analysis of traditional and AI-driven teaching approaches; practical modeling of AI-based learning scenarios; and linguistic research methods such as phonetic analysis, speech recognition assessment, and structural analysis of AI-generated educational content.*

Results. *Artificial intelligence (AI) has significantly influenced the field of foreign language teaching by introducing advanced technological solutions that enhance the efficiency and effectiveness of the educational process. In the course of the study, various applications of AI in language teaching are analyzed, including speech recognition, interactive learning systems, and personalized education platforms.*

AI technologies play a crucial role in automating routine educational tasks such as homework checking, test grading, and attendance recording. These technologies allow teachers to focus on more complex and creative aspects of teaching, such as mentoring and designing individualized learning paths for students.

The study reveals that AI enables a high level of personalization in language learning. Intelligent systems analyze learner data, such as their knowledge level, preferences, and learning pace, to create tailored educational experiences. AI-powered platforms also provide real-time feedback, enabling students to correct mistakes and refine their language skills more effectively.

Speech recognition technology has emerged as a critical tool in improving pronunciation. This technology can identify errors in pronunciation, provide corrective feedback, and guide learners toward more accurate articulation. Furthermore, it fosters confidence and competence in learners by addressing common pronunciation challenges in real-time.

The analysis also demonstrates that AI-powered virtual and robotic teachers are transforming traditional classroom practices. These systems offer interactive and human-centered learning experiences, simulating real-life communication scenarios to help learners practice speaking, listening, and problem-solving skills.

AI has redefined assessment methods, allowing for faster and more accurate evaluation of students' performance. Automated systems are capable of analyzing written, spoken, and interactive language use, providing comprehensive insights into learners' competencies and progress.

Overall, the study confirms that the integration of AI into foreign language teaching not only enriches the teaching process but also enhances student engagement and achievement. However, the findings also highlight the need for ethical considerations, teacher training, and a balanced approach to ensure that AI complements rather than replaces the human elements of education.

Key words: *artificial intelligence, foreign language teaching, personalized learning, virtual teachers, interactive learning, educational innovation, human-machine interaction*

Introduction

In 1956, young American mathematicians John McCarthy, Marvin Minsky and Claude Shannon organised a conference at Dartmouth College in the USA. The conference discussed whether machines could be taught to think like humans. It was then that the concept of ‘artificial intelligence’ was first proposed. The emergence of the concept marked the beginning of research into the new discipline. Professor Winston of the Massachusetts Institute of Technology believes that artificial intelligence can do the intellectual work that only humans could do in the past. [5] The nature of research on the subject is deepening; artificial intelligence is increasingly penetrating the teaching of foreign languages. Under the influence of artificial intelligence, the methods, content, teachers' responsibilities and even the system of teaching foreign languages are changing nowadays. On the one hand, foreign language teachers have to cope with the challenges of the information society. On the other hand, new technologies also force language teachers to rethink their role in the educational process. For example, thanks to image recognition technology, teachers are relieved of the need to check homework and test papers; speech recognition and semantic analysis technology not only helps teachers to conduct oral tests, but also corrects and improves students' pronunciation. As another example, human-machine dialogue technology allows teachers to answer students' questions online. In addition, artificial intelligence technologies such as personalised learning, intelligent learning feedback and robotic distance learning are also rapidly evolving and improving, changing the current structure of the educational process.

The objective of this article is to investigate the transformative impact of artificial intelligence on foreign language teaching, focusing on its applications, challenges, and opportunities in modern education.

Methods

The primary scientific results were achieved through the use of a comprehensive set of general scientific and specialized research methods, including: analysis and synthesis of scientific literature on artificial intelligence and its applications in foreign language teaching; theoretical generalization and specification of AI integration in educational methodologies; comparative analysis of traditional and AI-driven teaching approaches; practical modeling of AI-based learning scenarios; and linguistic research methods such as phonetic analysis, speech recognition assessment, and structural analysis of AI-generated educational content.

Results and Discussions

Professor Lu Bai of Tsinghua University said at the 2017 ‘Artificial Intelligence and the Future of Education Summit’: ‘Anything that reflects repetition and requires the accumulation of large amounts of data can be replaced by artificial intelligence. In education, artificial intelligence is capable of performing the tasks of recording student attendance, checking and correcting homework, correcting test papers, and calculating grades. In addition, foreign language learning software supported by artificial intelligence can check students' foreign language proficiency from many

different aspects; speech recognition technology can help correct pronunciation in real time, and foreign language listening and speaking testing system with intelligent voice technology can conduct automatic oral tests with objective evaluation, etc. Innovative technology will undoubtedly help teachers to free themselves from a number of tasks. At the same time, it will make teachers think about changing their role in the educational process in order to effectively adapt to the educational environment of new times.

In today's society, not only prosperity but also survival is possible only with the help of computer and mobile technology, as well as the Internet. Smartphones are almost ubiquitous; tablet computers are rapidly gaining popularity; and the number of language learning applications is growing. Student language learning is gradually transforming from the traditional classroom format to mobile and blended learning. Such learning is not limited by time or place. An intelligent foreign language learning platform can accurately record and analyse data from the educational process and provide teachers with first-hand information to enable them to understand the progress and competence level of each student. In addition, the artificial intelligence is able to customise the curriculum, design personalised courses according to the level of learners, as well as according to their character, strengths and interests. The system is also able to communicate and interact with learners. Artificial intelligence has completely changed the traditional foreign language teaching model as well as teaching methods. Consequently, foreign language teachers nowadays should respond to the revolution that has taken place in personalised education as soon as possible.

Transition from a traditional educational format to an interactive one the introduction of changes in the teaching of foreign languages in school education and in examinations represents a turning point.

The introduction of changes in the teaching of foreign languages in school teaching and in examinations represents a turning point. Teachers are faced with a choice: to continue using the traditional hands-on learning format or to introduce an interactive mode with the use of artificial intelligence technologies. In the classical teaching format, the lack of an environment for students to use natural language is an objective problem. The use of language requires interaction with people. Not every parent can send his/her child to a foreign language environment for a month; it is also impossible to attach a separate foreign language teacher to each student. Fulfilment of these two conditions is not possible for most foreign language learners. Consequently, it is difficult for teachers to provide interactive language teaching and individualised remedial guidance for each student.

The use of artificial intelligence technologies in the educational process has attracted widespread attention worldwide because it is the only technology that can mimic live teachers in order to provide learners with personalised interactive learning. Modern AI technologies in the educational process are highly interactive and human-centred, taking into account the interests and needs of each learner. The functionalities of the training programs include pronunciation correction; exercises on composing sentences from separate words; practice of dialogue and other situations of practical language use; automatic test aimed at checking the level of listening and speaking. By applying such techniques as pronunciation analysis, speech recognition, image recognition, natural language understanding, human-machine dialogue and other technologies, it is possible to create an artificial teacher who can listen, speak, correct mistakes, assess the level of competence and apply different approaches depending on the learner's needs.

Speech Recognition Technology for Pronunciation Correction for Foreign Language Learners. Whether a child is learning his/her mother tongue or consciously learning a foreign language, listening and speaking are at the heart of the process, and the key to improving these competences is imitation. Consciously, learning a foreign language, listening and speaking are the foundation of the process, and the key to improving these competences is imitation. But after leaving infancy, people's capacity for linguistic imitation is greatly reduced, hence the need for constant reminders and corrections. Herein lies one of the obstacles in the field of foreign language learning. Chinese students learning English can be taken as an example. Unfortunately, very few teachers, parents or classmates have the ability to not only correct their mispronunciation, but also to make

recommendations for improvement. All this leads to students lacking confidence in English, and with incorrect pronunciation at that. The Chinese transcription that conveys the reading of characters – pinyin – uses Latin characters, some of which stand for different sounds than in English. This additionally causes students to face difficulties in listening and speaking, memorising words, etc. In addition to this, they find it difficult to get a feel for the language and their reading speed does not increase fast enough or not at all.

The use of artificial intelligence technology to imitate a live teacher to correct students' pronunciation when teaching reading is an important element of foreign language teaching. This role of modern technology represents a breakthrough in foreign language teaching; such a thing was never possible in the past. Nowadays, artificial intelligence is a listening and speaking coach that patiently guides and helps each learner.

The role of third-generation artificial intelligence technology in solving the problem of assessing learners' pronunciation.

Artificial intelligence pronunciation evaluation does not seem difficult for humans either, but artificial intelligence is still better at it. The essence of traditional speech recognition technology is that no matter how poorly a student speaks otherwise, it is necessary to clearly understand their speech in order to recognise it. The main thing in the educational process is to find problems and errors in students' pronunciation and point them out in a timely manner. This is why high-level speech recognition technologies that can understand the learner's speech and its content no matter how unintelligible he speaks are not suitable for learning a foreign language, because they cannot point out his mistakes and help him correct them.

The learner's mistakes and help them correct them. Much better suited are technologies that are of somewhat lower quality, so they do not always understand the learners' speech. They are more likely to be able to let the language learner understand where they have made inaccuracies in pronunciation.

Traditional speech recognition technology uses big data, technology that is essentially a kind of statistics. The system stores a statistical model of the pronunciation of thousands of students, so it technically cannot answer the question of a perfect score. Meanwhile, the lack of standards in teaching is unacceptable, so traditional intelligent technology is not suitable for foreign language teaching. Thus, a pronunciation correction system with a clear standard for detecting errors and correcting them in a timely manner is a direction that information technology experts have been working on for decades.

Artificial intelligence is creating technologies for various areas of life that can replace humans. In particular, artificial intelligence has given rise to many robot teachers, auxiliary teachers, and virtual teachers and so on; all of them have revolutionised the traditional teaching model, which is based on one teacher addressing many learners at the same time. Today's information technology helps instructors handle a range of functions, including gathering information resources for instruction, transferring knowledge, correcting homework assignments, and even interacting with students. Using big data, virtual teachers are able to gather resources needed in the educational process; students can also search for personalised learning resources recommended by virtual teachers using speech recognition technology. In helping foreign language learners, the robot teacher collects data and patterns of each learner's learning process from its database, analyses the available information and provides recommendations, helps teachers detect problems in the learning process in time, and effectively analyses the language competence level of each learner. J. Maderer believed that in the future artificial intelligence would replace most of the administrative staff and auxiliary teaching staff in higher education institutions [2].

Thanks to Internet and artificial intelligence technologies, a diversified trend of educational development can be observed at present. Online education resources such as MOOCs and others have attracted many students who previously preferred offline education. In this process, there has been an active expansion of the online education market. In 2014, more than 10 billion yuan was invested in

the online education industry, and this amount increased significantly in 2015. This ushered in an era of innovation in online education. [2]

Thanks to artificial intelligence technology, distance education is no longer tied to the original video classroom model and does not even necessarily use the labour of live teachers. Artificial intelligence technology is able to take programmed learning content and use new technologies such as speech recognition, visual analysis, machine learning, data mining, etc. for human-computer interaction in the educational process. Currently, the role of teachers is to help students find ways to learn independently and guide them in the required direction. In doing so, the mechanical part of knowledge transfer can be replaced by artificial intelligence. Even with the continuous development of artificial intelligence and advanced neurobiology technologies, certain thinking actions can also be performed with the help of artificial intelligence. Chinese educator Yu Shengquan once mentioned in an interview with CCTV that in 2016, a professor at the University of Pennsylvania turned artificial intelligence technology into his assistant; he used the technology to answer students' questions: the students' questions were answered by a computer programme in which the necessary information was already recorded. When the robot hears a question, it summarises the information it has received, evaluates it in real time and provides feedback. The robot is so accurate in answering.

Student questions that students do not even notice that the teaching assistant is a robot. The same 'magic mirror' system developed by Tomorrow Advancing Life educational institution based on artificial intelligence technology uses cameras to record the emotional state of students during classes. This technology generates reports that are unique to each student to help teachers better understand their own class [4].

Significant enrichment of teaching resources has been facilitated by the wide use of the Internet and big data. The widespread use of the Internet and big data. Teaching resources and methods are no longer limited to traditional textbooks and electronic materials derived from books. Instead, big data is used in the educational process to collect various learning materials. For example, in China, 60 colleges and universities participate in the 'Student Alliance for Teaching Writing in English', which has collected writing samples from many students. These works have also become teaching materials that teachers can refer to. In addition, teaching resources and technologies have also been enriched through various platforms, software, online learning materials, instructional videos and broadcasts, question and answer sessions with Internet users, automatic grade tracking, and so on.

Non-formal education is becoming a real application of artificial intelligence technology in practice. Artificial intelligence has enriched foreign language teaching methods by adding such educational technologies as human-machine dialogue interaction, classroom interaction between robots and students, and so on. The combination of artificial intelligence and virtual reality technologies helps in the process of introducing situational learning into pedagogical practice. With speech recognition technology, it is possible to first understand students' questions, then analyse their content, search the database for the required answer, and finally express that answer using artificial speech synthesis. Some systems are able to perform instant translation, so that the technology is not limited to a specific language or country. This enables multilingual dialogue with learners from all over the world. This technology is already widely used in foreign language teaching; however, it also has considerable potential for development.

A. Schleicher, an influential researcher in the field of pedagogy, pointed out that educational innovation is not just the introduction of new technologies, but a change in teaching methods. Educational innovations are aimed at enabling learners to acquire competences necessary for success in the global economic competition. [3] Artificial intelligence offers new ideas in the field of foreign language learning. That part of the educational process, which is realistic to mechanise, can be performed with the help of artificial intelligence technologies. For example, it can be such sections of foreign language learning as grammar, memorisation of phrases and sentence patterns, vocabulary acquisition, test performance, formatted writing and so on. This part of the learning process can be fully automated without the need for live teachers. Artificial intelligence can perform targeted

exercises according to the needs of students, as well as analyse the progress of the educational process in a timely manner and make the necessary conclusions. Also, it can clearly understand the dynamics of learning by capturing students' strengths and weaknesses. Advanced virtual reality technologies are transforming traditional classroom learning into situational learning. For example, artificial intelligence and virtual reality can analyse real-life business scenarios and then help learners experience the workplace, office environment, meeting environment, negotiation environment, etc. in context. In this process, they can also interact using automatic speech recognition technology to conduct language practice to simulate real-life situations. This technology is an alternative to traditional educational technology, the disadvantage of which is that it is theoretical and excessive.

The disadvantage of this technology is its theoretical nature and its excessive detachment from the language environment. The use of artificial intelligence and virtual reality technologies can significantly increase the enthusiasm of students as well as the level of interaction in the classroom. All this can have a positive effect on the learning process.

The application of artificial intelligence technology in learning assessment is now highly developed. To get a grade, the learner needs to take a picture of the completed homework and upload it to a special server. After that, the programme will be able to determine to find the existing errors within one second. In 2017, iFLYTEK, a leader in artificial intelligence technology in China, reported on the latest results of its company's application of artificial intelligence in education. Firstly, teachers are getting rid of the need to constantly check homework and tests. Secondly, a system for correcting wrong answers is widely used by English language learners. In addition, easy-to-use speech recognition technology helps correct and improve students' pronunciation. The South China Morning Post reports that in a test involving 120 million participants, in 92 per cent of cases, the artificial intelligence gave a performance grade that a live teacher agreed with. [1]

Conclusions

Artificial Intelligence represents not only a revolutionary change in the field of technology. These technologies have also caused significant social and economic changes as well as changes in education, culture, and people's worldview. In this process, it is necessary to find a new role for live foreign language teachers. To solve this problem, teachers need to keep up with the times, to constantly learn and improve, to strengthen their professional qualities and level of mastery of information technologies, to break the established image of a teacher both in the eyes of other people and in their own minds. Only those teachers who respect learners, observe them and guide them in the right direction will be able to respond promptly to the challenges of tomorrow.

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Метою *цієї статті є дослідження трансформаційного впливу штучного інтелекту на викладання іноземних мов, зосереджуючись на його застосуваннях, викликах і можливостях у сучасній освіті.*

Методи. *Основні наукові результати досягнуті завдяки використанню комплексного комплексу загальнонаукових і спеціалізованих методів дослідження, серед яких: аналіз та узагальнення наукової літератури з питань штучного інтелекту та його застосування у викладанні іноземних мов; теоретичне узагальнення та конкретизація інтеграції ШІ в методики навчання; порівняльний аналіз традиційних підходів до навчання та підходів до навчання на основі ШІ; практичне моделювання сценаріїв навчання на основі ШІ; а також лінгвістичні методи дослідження, такі як фонетичний аналіз, оцінка розпізнавання мовлення та структурний аналіз освітнього контенту, створеного ШІ.*

Результати. *Штучний інтелект (ШІ) значно вплинув на сферу викладання іноземних мов, запровадивши передові технологічні рішення, які підвищують ефективність та результативність навчального процесу. У ході дослідження були проаналізовані різні застосування ШІ у викладанні мови, включаючи розпізнавання мовлення, інтерактивні системи навчання та персоналізовані освітні платформи.*

Технології штучного інтелекту відіграють вирішальну роль в автоматизації звичайних навчальних завдань, таких як перевірка домашнього завдання, оцінювання тестів і облік відвідуваності. Ці технології дозволяють вчителям зосередитися на більш складних і творчих аспектах викладання, таких як наставництво та розробка індивідуальних шляхів навчання для учнів.

Дослідження показало, що ШІ забезпечує високий рівень персоналізації у вивченні мови. Інтелектуальні системи аналізують дані учнів, такі як їхній рівень знань, уподобання та темп навчання, щоб створити індивідуальний навчальний досвід. Платформи на базі

штучного інтелекту також забезпечують зворотній зв'язок у реальному часі, що дозволяє учням виправляти помилки та ефективніше вдосконалювати свої мовні навички.

Технологія розпізнавання мовлення стала критично важливим інструментом для покращення вимови. Ця технологія може виявляти помилки у вимові, надавати корективний зворотний зв'язок і направляти учнів до більш точної артикуляції. Крім того, він розвиває впевненість і компетентність учнів, вирішуючи типові проблеми з вимовою в режимі реального часу.

Аналіз також продемонстрував, що віртуальні та роботизовані вчителі на базі штучного інтелекту змінюють традиційні практики в класі. Ці системи пропонують інтерактивний і орієнтований на людину досвід навчання, імітуючи сценарії спілкування в реальному житті, щоб допомогти учням практикувати навички говоріння, слухання та вирішення проблем.

ШІ переосмислив методи оцінювання, дозволивши швидше й точніше оцінювати успішність учнів. Автоматизовані системи здатні аналізувати використання письмової, усної та інтерактивної мови, забезпечуючи повну інформацію про компетенції та прогрес учнів.

Загалом дослідження підтверджує, що інтеграція штучного інтелекту у викладання іноземних мов не лише збагачує навчальний процес, але й покращує залученість учнів та їх досягнення. Однак результати також підкреслюють необхідність етичних міркувань, підготовки вчителів і збалансованого підходу, щоб гарантувати, що ШІ доповнює, а не замінює людські елементи освіти.

Ключові слова: *штучний інтелект, навчання іноземних мов, персоналізоване навчання, віртуальні вчителі, інтерактивне навчання, освітні інновації, взаємодія людини і машини*