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AI-DRIVEN PEDAGOGICAL SHIFTS IN FOREIGN LANGUAGE LEARNING ENVIRONMENTS

This paper explores the transformative role of artificial intelligence (AI) in foreign language education, emphasizing its growing integration through AI-driven interaction technologies and large-scale language models. The rapid advancement of these technologies is reshaping pedagogical practices, redefining the role of educators from traditional instructors to intelligent language facilitators. This shift demands a new skillset where understanding AI functionality, managing digital tools, and promoting ethical, intercultural competence are equally important as linguistic expertise. The study highlights key areas of AI implementation in education, including personalized tutoring systems, immersive learning environments, and the activation of latent knowledge. AI's capabilities (automated content analysis, emotional adaptability, and real-time feedback) facilitate learner-centered instruction and human-machine collaboration, which reconfigures the traditional teacher-student relationship into a more dynamic and balanced partnership.

The future of language education lies in adopting smart pedagogical strategies that integrate AI-supported learning, adaptive assessment, and information literacy development. However, for learners to remain competitive in an AI-enhanced job market, their competencies must go beyond what machines can generate. Higher education institutions, therefore, must embrace anticipatory adaptation, equipping students with both deep specialization and complementary digital, cognitive, and ethical skills. This ensures technological fluency as well as meaningful cultural and professional engagement in the digital age.

Keywords: *information and communication technologies; interaction technologies; artificial intelligence; foreign language education.*

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ЗМІНИ ОСВІТНІХ ПІДХОДІВ ДО НАВЧАННЯ ІНОЗЕМНИХ МОВ ЗАСОБАМИ ШТУЧНОГО ІНТЕЛЕКТУ

У статті розглянуто трансформаційний вплив штучного інтелекту (ШІ) на викладання іноземних мов, зокрема, зосереджуючись на інтеграції ШІ-технологій взаємодії та великих мовних моделей. Зміни вимагають переосмислення ролі викладача – від традиційного інструктора до фасилітатора інтелектуального навчання. Наявність мовної компетентності вже недостатня: необхідно розуміти принципи роботи ШІ, володіти цифровими інструментами та підтримувати міжкультурну й етичну обізнаність.

Автори висвітлюють напрями впровадження ШІ в освіті: персоналізовані тьютори, віртуальне навчання, активація латентних знань. ШІ сприяє переходу до навчання, орієнтованого на здобувача, та трансформує взаємодію викладача й студента в партнерство. Університети мають заздалегідь і цілеспрямовано адаптуватися, поєднуючи глибоку фахову підготовку з розвитком цифрових та когнітивних навичок. Це дозволить забезпечити технологічну обізнаність, а також змістовну культурну та професійну самореалізацію в умовах епохи цифровізації.

Ключові слова: *інформаційно-комунікаційні технології; технології взаємодії; штучний інтелект; викладання іноземних мов.*

Statement of the problem. The advancement of content creation through AI-driven interaction technologies is expected to further accelerate the combination of smart technologies with foreign language instruction on the basis of current large-scale language models. This process will not only re-

shape learning perspectives and strategies but will also enhance applying intelligence in classroom activities and educational environments. As a result, foreign language instruction is shifting from theoretical discussions to practical implementation.

Consequently, educational field must redefine its operational principles and support a shift in educators' roles – from traditional "foreign language instructors" to "intelligent language facilitators". In this modidied view, mastery of linguistic content alone is insufficient. Educators must comprehend how language-related AI operates and develop the skills needed to manage digital tools in support of language learning. At the same time, in our opinion, they should remain committed to fostering ethical values and enhancing students' understanding of cultural and ideological themes.

Artificial intelligence (AI) has been a subject of extensive global research for nearly thirty years. Yet, its educational value, particularly in enhancing learners' professional skill sets, is beginning to be explored. A number of researchers identify three main types of educational programs where AI can be effectively implemented: specialized tutoring systems, intelligent support for implicit knowledge, and interactive virtual intelligence environments.

The current article outlines perspectives of AI-driven foreign language education, emphasizing anticipatory adaptation, transformation of instructional models, enhanced content development, reconfiguration of the learning system, expansion beyond linguistic terms, and growth in digital competence. These approaches seek to revolutionize pedagogical fundementals and classroom practice, offer a systematic view of intelligent language education, and strengthen the integration of AI technology within the educational field.

Analyis of research and publications. Currently, artificial intelligence (AI) has become a central focus of global scientific research. A wide range of scholars are actively contributing to this field, including L. Morska, N. Gabrusiev, I. Zachepa, V. Hrytsyshyn, N. Novokhatska, O. Zagorodnia, D. Crystal, M. Dooly, M. Byram, C. Kirsch, M. Jewell, M. Fleming, M. Wild. Their research reflects the increasing academic interest in both the theoretical and practical aspects of AI application.

A significant portion of AI-related studies addresses ethical considerations such as leadership and governance, transparency, accountability, data security, and confidentiality. These issues are explored in the works of O. Petroe, O. Borodienko, I. Regeilo, I. Drach, O. Bazelyuk, and other researchers, emphasizing the importance of responsible AI implementation.

The capabilities of generative AI, in particular, in the context of interactive and adaptive learning through chatbots, are analyzed by Leticia Owusu Ansah and David Baidoo-Anu [2].

Research conducted by T. Besarab, L. Holubnycha, T. Moroz, and O. Moshynska considers the use of ChatGPT in designing English language curricula, particularly for students specializing in legal studies [7]. Similarly, Hao Yu and Yunyun Guo delve into the educational potential of generative AI in detail. Key areas of AI application in education are emerging in domains such as intelligent learning systems, collaborative instruction, personalized education, and virtual environments [10].

Additional research highlights the use of AI in foreign language education, focusing on adaptive learning techniques aimed at improving student performance. For instance, M. Burlak and Yu. Hrynyova [4] examine the practical use of AI tools in helping university students acquire foreign language skills.

The academic community continues to actively develop the discourse around artificial intelligence, particularly its integration into education. However, despite the wide scope of existing studies, the specific role of AI in foreign language instruction at the university level remains underexplored. Therefore, it emphasizes the necessity of further research dedicated to the professional training of foreign language learners through AI-enhanced methods.

Presentation of the main material. By its essence the primary interaction between educators and learners is the act of teaching. While providing instruction a relational dynamic is formed between both parties. This phenomena represents the most fundamental form of interpersonal interaction in the education process – a distinctive type of relationship within educational environment. Constructing this teacher-learner relationship involves both sides considering modes of interaction, scopes of engagement, as well as emotional aspects in order to establish the most effective and mutually beneficial mode of cooperation that enhances learning outcomes and personal development.

Traditional foreign language learning process interpretes the role of teacher as central authority who plans, coordinates, executes the educational process. Teaching has primarily been based upon the educator's intentions, perspectives, and pedagogical approach. However, we consider the increasing influence of artificial intelligence as significant reshaping factor of these traditional structures. As instructional models evolve, so too does the nature of the teacher-student relationship.

One distinguished feature of education in the age of AI is the development of digital learning environments, where instructions are no longer confined to physical classrooms. Learners now have unrestricted access to educational content across time and space, weakening the traditional dependency between student and teacher.

Technological advancements in AI are actively transforming the ways teachers and students interact. Old education models based on authority and passive compliance are gradually transforming into a new system of interaction that reflects the distinct characte-

ristics of digital era. This technological shift redefines the foundations upon which teacher-student relationships are built.

In the terms of AI-based education, these relationships now emphasize learner-centered instruction and educator-guided collaboration with intelligent systems. There is a strong focus on considering the diverse developmental and psychological needs of students while incorporating innovative artificial intelligence and big data. These elements help develop a more adaptive, responsive, and human-centered teacher-student interaction that supports cognitive, emotional, and ethical growth in a balanced way.

As AI-powered human-machine collaboration becomes increasingly integrated into foreign language education, in our view, it provides an effective mutual learning experience between teachers and students, resulting in greater engagement from learners. Supported by this technology, the relationship has evolved from being solely concerned with the academic purposes to emphasizing emotional engagement as well as from a universal production model to a personalized, creative educational process, and from an instructional model to a partnership in learning. These developments foster a more balanced and meaningful interaction between educators and learners.

AI-powered personalization tools enable students to adjust the pace and approach of their learning in alignment with their emotional states, motivation levels, mental processes, and behavioral tendencies [1]. As modern technologies autonomously track learners' progress and interactions, we believe, individuals are able to refine their learning strategies to better align with their unique objectives across different educational contexts. According to the principles of self-directed learning theory, actions aimed at achieving goals are shaped by a learner's own feelings, thoughts, and conduct.

While individual learner profiles are largely shaped by mental capabilities and cultural perspectives, the roles of cultural sensitivity and cognitive competencies have often been overlooked in the design of AI-driven communication tools aimed at supporting AI technology-learner interaction while foreign language acquisition. As noted by Benfilali, Nadif, Khartite, Benattabou, and Bouih, acquiring a second language inherently involves expressing one's cultural background and life experiences [3]. As students improve their proficiency in another language, they are also exposed to the unique elements of both their own cultural heritage and those of other societies – turning language instruction into a cross-cultural learning experience.

Traditional models of generating knowledge appeared to be inadequate in managing the overwhelming volume of information characteristic of the information era. These older systems often suffer from an abundance of raw data but a lack of effective analytical tools. However, the emergence of advanced AI-driven interactive technologies, especially those built on deep learning architectures, has made it possible to derive meaningful information from extensive data sets [9].

Although the human brain is an exceptionally advanced organ for processing information, it is relatively limited in handling large-scale digital data compared to artificial intelligence. Tasks such as multiplying two double-digit numbers can be challenging for most people, whereas machines can instantly perform highly complex computations. AI overcome these human limitations by automating the processes of data gathering, analysis, and interpretation on a massive scale. Human memory capacity is restricted, and forgetting is a natural trait of the brain. Our cognitive system typically processes fragmented bits of information and lacks the capacity to view complete wide-scope data. In contrast, AI systems operate with high-speed computation, rapid access to information, and the ability to continuously monitor and respond to evolving data patterns in real time.

By enhancing the way humans collect and organize information, AI interaction technologies effectively extend our cognitive abilities. They free up mental resources, allowing us to explore issues from broader and previously overlooked perspectives. As a result, these tools improve our ability to solve problems and accelerate the progress of theoretical understanding.

AI-powered interaction systems also facilitate the fusion of deductive knowledge and experiential learning. Deductive or a priori knowledge stems from rational thinking and assumption without relying on direct observation, while empirical knowledge is grounded in real-life practice and lived experiences. In our opinion, though these forms of knowledge differ in origin, they are interdependent and can mutually reinforce one another. Their integration enables more comprehensive understanding and practical application of information in real-world contexts. This synergy contributes to the ongoing expansion of human knowledge and intelligence making it easier for individuals to absorb and develop new experience-based comprehension.

The current era of digital innovation has introduced numerous challenges to contemporary higher education. Modern technologies, particularly artificial intelligence and big data, are significantly reshaping learning strategies. A number of scholars describe three categories of AI-based programs in education currently available as the potential areas of applying in education: special tutors, intellectual support sleeping knowledge and intellectual virtual reality [11]. The traditional model of merely delivering information is gradually evolving into one where knowledge is transformed into actionable intelligence. As a result, new direction called "smart education" has emerged as a key strategy for advancing digital transformation in education.

This new educational paradigm is built upon modern technologies such as cloud platforms, big data analytics. Its primary objective is to create intelligent learning environments, align the education system with the needs of an AI-driven era, and revise outdated instructional practices. In the context of foreign language instruction, intelligent education involves leveraging AI-based tools to facilitate language acquisition and application. Through contemporary techniques like analysis of numerous texts, learners are able to identify linguistic patterns, synthesize language rules, engage in more effective and autonomous learning.

Smart foreign language education emphasizes learner autonomy, encouraging students to actively seek out knowledge, use diverse digital resources, multimedia platforms, as well as interact with real-world contexts. This approach supports the construction of personalized knowledge framework and stimulates the continuous development and reactivation of learners' second language systems [11].

The focus of smart education is transforming pedagogy through the integration of technology and instructional design, fostering both individual growth and comprehensive development while managing the contradictions between ideal goals and practical realities. When incorporating AI-powered human-machine interaction into foreign language education, as we see, it is essential to identify where these tools best fit within the curriculum, carefully design educational tasks, and present content through multiple perspectives and values.

An urgent challenge faced by contemporary computational linguistics, especially in the development of artificial intelligence, is the design of a natural language processing system. The rise of the information age has intensified the relevance of this problem. At present, no existing system can fully generate a complete lexicon for any given text or deliver thorough morphological analysis for a specific language. Nonetheless, addressing numerous other information-related tasks depends heavily on resolving the issue of morphological recognition [8].

Educators play a crucial role in assisting students on how to effectively engage with these intelligent technologies. Simply acquiring knowledge is not the same as internalizing it, and understanding does not automatically lead to application. Teachers should offer students a balanced and analytical perspective on these tools, introduce them to digital platforms, help them access appropriate resources and learning strategies, and foster analytical thinking skills. This enhances students' ability of applying AI-based technologies efficiently in language learning.

At the same time, in our view, learners should consistently reflect on their individual learning behaviors, recognize areas of growth and weakness, overcome their resistance to technology as well as experiment with new methods of human-machine interaction to enhance their educational outcomes.

It should be noted, artificial intelligence facilitates learning and information retrieval by automating tasks, enhancing content with intelligent features, adapting to various contexts, conducting in-depth analysis, ensuring high precision, and handling vast amounts of data efficiently [12].

In the information era a widely used term "information literacy" refers to an individual's capability to locate, evaluate, utilize, and generate information within a digitally driven society. It has become an essential competency and basic skill that modern university students must possess in order to engage in lifelong learning effectively. Those with strong information literacy skills understand that reliable and comprehensive information fosters sound decision-making. They can identify when information is needed, formulate relevant questions, locate appropriate sources, design effective search strategies, combine new findings with their existing knowledge base, and apply this information in analytical reasoning and problem-solving contexts.

Without a solid basis in information literacy, university students may struggle to keep pace with the demands of the digital age. However, in our opinion, the current approach to developing these skills among students remains inadequate. Introductory computer courses often serve as the initial point of exposure to digital competencies and must therefore assume a critical role in equipping students with the tools they need to navigate the information environment.

It is increasingly important to comprehensively strengthen students' information literacy to achieve multiple goals: build a learning-oriented society, foster national innovation, support educational reforms focused on quality, advance the digital transformation of higher education, enable autonomous learning and data management, and adapt to rapid changes in a world of artificial intelligence.

From a pedagogical standpoint, AI-generated content serves as a supportive mechanism for producing knowledge and enhancing learning. It can assist both educators and learners in executing instructional and scholarly activities more efficiently. Recent advances in the content have shown strong relevance to humanities-based disciplines. To effectively integrate AI-generated content into foreign language learning, students must first achieve a high level of digital competency.

In a professional field increasingly supported by AI-based tools, tasks such as writing texts, producing media scripts, generating code, or translating content are often initially completed by AI-generated content systems at a highly competent level. Human input then focuses on refining and adapting the content, while AI-based technologies can further handle its distribution or publication. This process significantly reduces the

workload of human factor, often allowing one individual to accomplish the tasks requiring several persons before.

Consequently, individuals working in areas such as writing, translation, design, or multimedia must now exceed the performance capabilities of AI-generated content tools. If their creative output merely matches what AI can generate, they may become useless in future job markets. In other words, students in the humanities must cultivate advanced competencies that go beyond what AI-based systems can produce to remain relevant and competitive in the evolving workplace.

As we see, in response to the growing influence of AI-powered interaction technologies on foreign language instruction, higher learning institutions must take an anticipatory and adaptive approach. Rather than reacting passively, foreign language education should embrace change, seek innovation, and focus on developing globally competent, multiskilled professionals – those with a core specialization and complex complementary skills. Educational systems around the world are prioritizing quality and aiming at promoting undergraduate education.

Nowadays, language education must integrate intelligent teaching, adaptive learning, and AI-supported assessment strategies, fully incorporating AI interaction technologies into the broader goals of strengthening higher education. At the core of this transformation is the AI language model–a deep learning-based technology capable of understanding, generating, and engaging in natural language. These models emulate human patterns of thought and communication, producing outputs that resemble human conversation, thus enhancing relatability and usability in everyday social interactions [6].

AI-based linguistic models go beyond the linguistic capabilities of most individuals, combining perception and cognition to create connections between visual information and its understanding. In some cases, they can even detect various surrounding patterns and relationships more effectively than humans. AI language models can adapt responses to individual learners, offering real-time feedback, correcting errors, and supporting individual characteristics [5]. Moreover, they help overcome the lack of engagement in conventional classrooms and reduce the constraints imposed by traditional instructional models, ultimately improving the overall quality and effectiveness of language learning.

Conclusions. The integration of AI-driven interaction technologies into foreign language education marks a paradigm shift – one that transforms traditional pedagogical frameworks and redefines both the content and context of instruction. This transformation is not merely technological but deeply conceptual, affecting the roles of educators, the nature of student engagement, and the very essence of language learning itself. The evolution from teacher-centered authority to collaborative, adaptive, and learner-centered environments reflects a broader trend toward intelligent, personalized, and culturally sensitive instruction.

Artificial intelligence modernizes instructional delivery as well as expands the cognitive, emotional, and ethical dimensions of education. It fosters a more responsive and human-centered learning experience, where data-driven content are used not to replace educators but to empower them. It is essential, this shift demands new competencies from both teachers and learners – digital literacy, critical thinking, cultural awareness, and the ability to navigate complex human-AI interactions.

We believe that transformed education must embrace the task of mastering advanced technologies and preserving the learner-centered values inherent in language learning. By actively reshaping curricula, instructional models, educational institutions have the opportunity to foster multilingual, interculturally competent, and creative individuals. On the other hand, the convergence of AI and foreign language instruction should serve not just to optimize educational processes, but to enrich them, enhancing both the efficiency and the meaning of human communication in a digital environment.

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ФУНДАМЕНТАЛЬНО-ТЕХНІЧНА ПІДГОТОВКА БАКАЛАВРІВ В УМОВАХ ЦИФРОВІЗАЦІЇ ТА ОСВІТНІХ ІННОВАЦІЙ

У статті обґрунтовано теоретичні та практичні засади модернізації фундаментально-технічної підготовки бакалаврів в умовах цифровізації, воєнного стану та освітніх трансформацій. Визначено структуру інтегрованого компетентнісного профілю технічного фахівця, розкрито роль інноваційних освітніх підходів та надано практичні рекомендації щодо оновлення навчальних планів, методів викладання та оцінювання.

Ключові слова: *фундаментально-технічна підготовка; цифровізація освіти; інтегровані компетентності; міждисциплінарність; сталий розвиток; повоєнне відновлення.*

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FUNDAMENTAL-TECHNICAL TRAINING OF BACHELORS IN THE CONTEXT OF DIGITALIZATION AND EDUCATIONAL INNOVATIONS

The article addresses the issue of transforming the fundamental technical training of bachelor's students in the context of digitalization, global challenges, and the post-war reconstruction of Ukraine. The authors emphasize the need to modernize both the content and the organization of the educational process, particularly through the transition to a competence-based model for training a new generation of professionals. The structure of an integrated competence profile is defined, encompassing professional, digital, graphical, transversal, innovation-project, environmental, entrepreneurial, social, civic, and cross-cultural competences, as well as the characteristics of each competence type and their interrelations. The article highlights the growing importance of adaptability, resilience, digital literacy, innovation, social responsibility, civic awareness, and intercultural communication skills in response to contemporary challenges. The impact of warfare, rapid digitalization of education, and the active implementation of educational innovations is examined, which underscores the necessity of rethinking approaches to the training of future technical specialists. This includes project-based and problem-oriented learning, the use of virtual laboratories, digital simulations, e-portfolios, and interdisciplinary modules. Special attention is given to recommendations for integrating these competences into curricula for technical disciplines, modernizing pedagogical practices, and applying up-to-date assessment approaches. The article substantiates the need to implement flexible, adaptive, and inclusive development strategies in technical education capable of responding to both wartime challenges and the demands of the digital economy and sustainable development.

Keywords: *fundamental technical training; digitalization of education; integrated competencies; interdisciplinarity; sustainable development; post-war recovery.*