



УДК 378:004.8:811.111

SYNERGY OF EMI AND AI IN THE MODERN EDUCATIONAL ENVIRONMENT OF HIGHER EDUCATION INSTITUTIONS

СИНЕРГІЯ ЕМІ ТА АІ У СУЧАСНОМУ ОСВІТНЬОМУ СЕРЕДОВИЩІ ЗАКЛАДІВ ВИЩОЇ ОСВІТИ

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Annotation. The article analyzes the innovative possibilities of integrating the EMI (English as a Medium of Instruction) methodology and artificial intelligence (AI) technologies into the process of teaching subjects in English in the conditions of the digital transformation of education. Methodological features of EMI and CLIL (Content and Language Integrated Learning) approaches, their advantages and limitations in implementing the concept of bilingual education are considered. The effective implementation of EMI in Ukrainian higher education institutions is hindered by a number of factors, including insufficient language training of teachers, as well as a lack of adapted educational and methodological resources. It was found that modern tools of artificial intelligence, in particular generative language models, adaptive educational platforms and automated assessment systems, can become a means of supporting EMI strategies, providing personalization of learning, linguistic support and the development of digital competencies. The article describes the Ukrainian experience of using AI in the educational sphere. It is confirmed that the combination of EMI and AI contributes to improving the quality of the educational process, expanding access to English-language academic content, and strengthening Ukraine's integration into the global educational space, and conclusions are presented regarding the prospects for further research on the effectiveness of AI tools in EMI/CLIL environments, taking into account the Ukrainian context and the challenges associated with the war in the country.

Keywords: artificial intelligence, CLIL, EMI, higher education, English language teaching, digital education, personalization of learning, bilingual education.

Introduction One of the key vectors of the development of modern globalized education is the use of English as the language of teaching non-linguistic general education disciplines (English Medium Instruction - EMI). This is necessary for increasing the international competitiveness of educational institutions, activating academic mobility and integration into the world educational space. In non-English-speaking countries, the introduction of EMI in higher education is seen as a strategic tool for modernizing national education and preparing students to function in a multicultural environment. This has become especially relevant in the conditions of martial law, digital transformation and the growing need for remote interdisciplinary communication. But its wide implementation faces a number of significant challenges, both pedagogical, methodical and organizational.



Main text

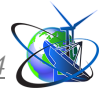
The insufficient level of language training of subject teachers is a very urgent problem for Ukrainian educational institutions. Often, teachers do not have sufficient qualifications or experience in teaching subjects in English. A similar situation is observed among students, especially from regions where access to quality language training is difficult. This makes it impossible to fully master the subject content, causes cognitive overload, and also reduces motivation to study. In addition, in Ukraine, where there is currently a war, which, accordingly, is accompanied by institutional constraints, a violation of the stability of the educational environment and other problems related to the war, the question of the effective implementation of EMI becomes even more complex. In this regard, the search for innovative solutions that could compensate for the shortcomings and ensure the effective functioning of EMI is now particularly relevant. One such solution is the integration of artificial intelligence technologies, in particular generative language models (such as ChatGPT), which demonstrate significant potential in providing adaptive language support, automated feedback, generation of didactic materials, and individualization of the learning process.

One of the priority tasks of modern pedagogical science is the study of the possibilities of using AI in the field of English-language teaching of non-linguistic disciplines, and this, of course, requires theoretical and methodological rethinking and empirical substantiation in the conditions of the Ukrainian educational system.

EMI is actively implemented in the secondary and higher education systems of many countries. It is considered as a tool for the internationalization of education.

According to research by Q. Zheng and T.-H. Choi, already in 2019, 127 universities in China implemented 620 English language teaching programs. This demonstrates the scale of the EMI implementation process in a global context [14].

But, as practice has shown, a number of difficulties were also discovered. According to J. Dearden, the key barriers remain insufficient language training of teachers and the lack of a structured methodological framework [8]. Researchers J. Jon, Y. H. Cho, and K. Byun write that professors at Korean universities often resist EMI



policies, particularly because of language barriers and organizational overload [10]. Students are often unable to understand the material at a sufficient level due to the limitations of their own language competence.

Researcher W. Jia and J. Pun testifies that in the absence of language support, even interactive approaches to teaching lose effectiveness, and teachers and students are in constant cognitive stress [9]. Ukrainian scientists were also engaged in researching the problems of using artificial intelligence in the field of education, especially with regard to the issue of transformation of approaches to teaching non-linguistic subjects in English. In the scientific report of M. P. Shishkina and V. V. Kovalenko, prepared on the basis of the work of the Institute of Digitalization of Education of the National Academy of Sciences of Ukraine, the conceptual principles of the implementation of AI technologies in education are outlined, with an emphasis on the personalization of the educational process and digital support of pedagogical activity [7]. The study of O. O. Harkusha (2025) proved the effectiveness of using ChatGPT as a tool for developing the speaking competence of students of non-philology majors, which creates the prerequisites for the adaptation of similar approaches in the context of EMI in general secondary education institutions [1]. A study by W. Jia and J. Pun suggests that AI can be used as a partner in learning – not only for automation, but also to support teacher professional growth and confidence in working in English [9].

The concept of teaching subjects in English (EMI - English-Medium Instruction) is closely related to the approach of integrated learning of the subject and language (CLIL - Content and Language Integrated Learning). Both approaches involve teaching academic subjects in a foreign language, mainly English, but differ in emphasis and didactic goals.

In particular, EMI focuses primarily on the transfer of the content of the educational subject in English and is often considered as a tool for the internationalization of education, without aiming at the systematic improvement of language competences of students. Instead, CLIL is focused on achieving a double goal: simultaneous acquisition of subject content and development of foreign language



communicative competence. Within CLIL lessons, the teacher consciously integrates language tasks into the teaching of the subject, using appropriate methods, in particular scaffolding (step-by-step complication of educational material with support) and translanguaging (flexible use of the native language alongside the foreign one). In the context of the general education school, the CLIL approach has become widespread in the countries of the European Union and beyond as an effective means of increasing the motivation of students to learn foreign languages and strengthening the applied orientation of the study of non-linguistic subjects. In turn, the EMI approach is more typical of institutions of higher education, in particular master's level programs and professional training, where the use of the English language provides access to current scientific knowledge and international academic discourse. In Ukrainian educational practice, there is also a gradual introduction of programs focused on the EMI approach, both at the level of senior specialized schools (in particular, in classes with in-depth study of the English language and in international educational institutions), and in the university sector [13, p. 429].

However, there are also a number of challenges in implementing both EMI and CLIL. One of the main problems is the insufficient level of English-language training of teachers who teach academic disciplines, as well as the lack of necessary methodological competences for effective learning through a foreign language. Students may also experience cognitive overload associated with the need to simultaneously master new subject material and the language of teaching. If there is no appropriate support (for example, bilingual glossaries, adapted texts, additional classes in academic English), the risk of partial or incomplete understanding of the learning content, as well as difficulties in verbalizing the acquired knowledge, increases. It was in response to these challenges that the CLIL approach was formed, which combines the speech and subject development of students within the framework of a holistic didactic model. Courses built solely on the principles of EMI without appropriate methodological support often start from the assumption of a high language level of students. However, this assumption does not always correspond to the real situation.

In the absence of purposeful efforts on the part of teachers to support the



development of language competences, the results of EMI programs in the field of improving students' language skills often turn out to be lower than expected [12, p. 54].

Therefore, it is important to look for innovative solutions that could compensate for the mentioned shortcomings and increase the effectiveness of the educational process in the conditions of foreign language teaching. One of such solutions in recent years is increasingly considering the use of artificial intelligence (AI) tools, which are gradually being integrated into various fields of human activity, including the field of education. During the last three years, there has been a particularly rapid growth of interest in their use for educational purposes. This is due to the emergence of generative language models, such as GPT-3.5 and GPT-4, developed by OpenAI.

These technologies provide a high level of natural language interaction. They are able to maintain a meaningful dialogue, answer questions, generate structured texts and provide explanations, which positions them as potentially effective tools in the educational process. The use of AI in education is interpreted by researchers as one of the promising areas of digital transformation of the educational environment. According to the data of a systematic literature review conducted by L. Labadze, M. Grigolia and L. Machaidze, which covers 67 empirical studies for the period 2015-2023, the most expressive educational effects of using AI-chatbots are found in three main areas: support during homework and independent work; personalized, adaptive training taking into account the individual needs of students; the development of key educational and digital competencies, in particular the skills of searching for information, asking questions and critical thinking [11, p. 13].

The potential of AI in education is not limited exclusively to chatbots. Other tools are also relevant, among which the leading place is occupied by adaptive educational platforms based on machine learning algorithms that allow dynamically adjusting the complexity of educational content according to the student's level of training. A special role is played by intelligent educational systems (Intelligent Tutoring Systems), which model individual learning trajectories, diagnose gaps in knowledge and offer targeted compensatory measures in the form of additional tasks, explanations or visualizations of educational material.



Speech recognition and natural language processing technologies are a separate direction, i.e. services that automatically create subtitles for audio or video lectures, as well as programs capable of acting as a virtual interlocutor for the formation of conversational skills or evaluating pronunciation based on phonetic standards.

Considering the potential of these digital tools in the field of language training, the situation in Ukraine deserves special attention, where the problem of insufficient level of English language proficiency among pupils and students has deep-rooted historical reasons and has become particularly acute in the context of the strengthening of the European integration vector of state policy. In response to this challenge, the state initiated a number of programs aimed at improving the language competence of the younger generation. In particular, back in 2016, the "Year of the English Language" was declared in Ukraine, which testified to the strategic desire to deepen the language training of citizens. In the context of higher education, the project "English for Universities" (2014-2018) was implemented, which, with the support of the British Council, was aimed at increasing the potential of teaching in English in higher education institutions [4].

The Law of Ukraine "On the Use of the English Language in Ukraine" adopted in June 2024 significantly expanded the regulatory basis for the introduction of the English language in educational and public space. In accordance with Article 8 of this law, the state guarantees the compulsory study of the English language in all institutions of general secondary education, and also stimulates the creation of digital resources for its mastery [5]. Thus, at the regulatory level, a systemic basis has been created for a gradual transition from an exclusively Ukrainian-language educational process to its bilingual or English-language format, which corresponds to both domestic educational priorities and Ukraine's international obligations.

Despite the strategically outlined course for the implementation of English-language teaching within the EMI concept, in practice, the implementation of this approach is accompanied by a number of significant challenges. First of all, we are talking about personnel and methodological limitations. The second challenge concerns ensuring the proper quality of the educational process in the EMI



environment. In the professional environment, there are warnings about the potential formalization of the approach, when teaching English is limited to the use of terms without a deep understanding of the subject content. If both teachers and students have an insufficient level of English language proficiency, there is a risk of a decrease in the quality of learning the material, which contradicts the basic didactic principles. In addition, there is a probable cognitive overload of students who have to master complex subject information and a foreign language component at the same time. In this context, the gradual introduction of the EMI approach on the basis of subject-language integrated learning (CLIL), when language goals are integrated within the scope of studying professional disciplines, and the methodology takes into account the peculiarities of the perception of educational material in a foreign language, becomes particularly relevant in this context [2, p. 45–47]. The third challenge is related to resource provision. Appropriate didactic materials, including modern textbooks, bilingual manuals, multimedia resources created or adapted specifically for pupils and students of Ukrainian educational institutions, are necessary for the full implementation of bilingual education. In real practice, training is often based on translated European publications or materials.

It is also worth considering the challenges caused by the full-scale war in Ukraine. The priority of the Ministry of Education and Science in the current conditions is to ensure the physical safety of participants in the educational process (arranging shelters), providing psychological support, as well as reintegrating children who studied abroad into the domestic education system.

So, innovations such as EMI require reasonableness, flexible implementation mechanisms and adaptability to regional conditions. One of the critical factors for the effective implementation of EMI is the level of digitalization of the educational process. It is digital technologies that can provide access to English-language resources and modern pedagogical practices.

The COVID-19 pandemic has become a catalyst for the accelerated digitization of the educational space and the creation of new online learning tools.

In view of the need for systematic coordination of the digitization of education,



in 2021 the Ministry of Education and Science of Ukraine, together with the Ministry of Digital Transformation, developed the Concept of Digital Transformation of Education and Science of Ukraine - a strategic document designed to ensure the formation of a single digital educational ecosystem [6].

Although the final approval of the concept was postponed due to the outbreak of a full-scale war, in 2025 the Ministry of Education and Science announced its intention to update the document, including certain provisions on the integration of artificial intelligence technologies into the educational process.

In the early 2020s the use of AI was considered an innovation that was only gaining momentum, but in 2023-2024 the use of AI-based tools became an everyday phenomenon in the work of a significant part of teachers and students. Of particular interest is the integration of AI in the context of English language teaching (EMI), where digital technologies can play the role of both a supporting resource and an active didactic tool.

So, at the current stage, AI mainly functions as a tool for "behind the scenes" support of pedagogical activity - primarily at the stages of planning, preparation and evaluation. The most common AI tool in domestic educational practice is the ChatGPT language model developed by the OpenAI company. In the context of English-language teaching, its special value is the ability to generate English-language educational content adapted to the age and level of training of students.

As the researcher O. O. Harkusha notes, it is enough to contact the chatbot with a request about modern digital tools, and it will provide a list of relevant services with a brief description of the functionality. Similarly, ChatGPT can generate a draft version of a literature review, the thesis of a scientific and methodological article, or the structure of a lesson, which significantly saves the teacher's time [1, p. 12]. However, the use of generative AI requires a critical approach. It is important to take into account that the language model sometimes generates inaccurate or fabricated facts, especially in the case of Ukrainian-language content, where the level of linguistic processing is not perfect yet.

Another useful tool is grammar correctors, in particular Grammarly, which allows



you to ensure the linguistic correctness of the created English-language educational materials (tests, presentations, methodological developments). Such tools help overcome the language barrier of a non-native teacher and at the same time preserve the quality of linguistic design. At the level of learners, adaptive digital platforms and mobile applications are becoming increasingly popular, especially in the field of foreign language learning.

Thus, artificial intelligence in combination with a developed digital educational infrastructure opens up new opportunities for the systematic implementation of English-language teaching in Ukrainian educational institutions. In the future, the development of the "EMI + AI" concept requires not only technical and methodical support, but also ethical understanding and responsible integration into educational policy. Having reviewed the presented material, it is possible to single out a number of key advantages of the integration of artificial intelligence (AI) technologies into the educational process based on the EMI (English Medium Instruction) approach. Their implementation contributes both to the reduction of barriers to the introduction of English-language teaching, and to the general improvement of the quality of education in the conditions of digitalization.

Conclusions

So, the concepts of EMI and CLIL, which involve the teaching of subject content in English, have a common functional basis, but differ in methodological priorities. Both approaches demonstrate significant potential for the formation of academic multilingualism and the improvement of the quality of the educational process. At the same time, their effective implementation requires overcoming a number of systemic barriers: insufficient language competence of teachers, lack of specialized methods, difficulties of double cognitive load for students.

Analysis of scientific sources confirms the relevance of the search for innovative means of supporting EMI/CLIL environments, among which artificial intelligence tools, in particular generative language models, occupy a special place. Their rational use contributes to linguistic adaptation of educational content, ensuring individualization of educational interaction and increasing pedagogical self-efficacy.



Further research should be directed to the study of the empirical results of the use of AI in the EMI/CLIL system in various educational contexts, in particular in Ukraine, where English-language teaching acquires strategic importance in the context of integration into the European educational space.

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Анотація. У статті аналізуються інноваційні можливості інтеграції методології ЕМІ (*English as a Medium of Instruction*) та технологій штучного інтелекту (АІ) у процес викладання предметів англійською мовою в умовах цифрової трансформації освіти. Розглянуто методичні особливості підходів ЕМІ та CLIL (*Content and Language Integrated Learning*), їх переваги та обмеження у реалізації концепції білінгвальної освіти. Ефективному впровадженню ЕМІ в українських закладах вищої освіти перешкоджає низка факторів,



зокрема недостатня мовна підготовка викладачів, а також відсутність адаптованих навчально-методичних ресурсів. Виявлено, що сучасні інструменти штучного інтелекту, зокрема генеративні мовні моделі, адаптивні освітні платформи та автоматизовані системи оцінювання, можуть стати засобом підтримки стратегій ЕМІ, забезпечуючи персоналізацію навчання, мовну підтримку та розвиток цифрових компетенцій. У статті описано український досвід використання ШІ в освітній сфері. Підтверджено, що поєднання ЕМІ та AI сприяє підвищенню якості освітнього процесу, розширенню доступу до англomовного академічного контенту та посиленню інтеграції України у світовий освітній простір, а також наведено висновки щодо перспектив подальших досліджень ефективності інструментів AI в середовищах ЕМІ/CLIL з урахуванням українського контексту та викликів, пов'язаних із війною в країні.

Ключові слова: штучний інтелект, CLIL, ЕМІ, вища освіта, навчання англійської мови, цифрова освіта, персоналізація навчання, білінгвальна освіта.