ПЕДАГОГІЧНА АКАДЕМІЯ:
НАУКОВІ ЗАПИСКИ

ТЕОРІЯ І МЕТОДИКА ПРОФЕСІЙНОЇ ОСВІТИ

УДК 378.147:373.2:004(100)

DOI https://doi.org/10.5281/zenodo.20473796

Development of Professional Competencies of Future Preschool Teachers in Preschool Education Institutions through Digital Technologies: Foreign Research and Pedagogical Discourse

Oksana Kobyletska,

PhD student of the Department of Pedagogy and Educational Management named after Bohdan Stuparyk, Vasyl Stefanyk Carpathian National University, Ivano-Frankivsk, Ukraine, https://orcid.org/0009-0005-2337-1407

Accepted: 13.05.2026 | Published: 30.05.2026

Abstract: Objective. *The purpose of the article is a theoretical analysis of foreign scientific and pedagogical discourse on the development of professional competencies of future educators of preschool educational institutions using digital technologies and the identification of modern conceptual approaches and trends in the formation of their digital competence in the international educational space.* ***Methods.*** *The study employs the methods of theoretical analysis, generalization and systematization of foreign scientific sources dedicated to digital transformation in education, professional training of future educators and the development of their digital competence.* ***Results.*** *The analysis demonstrates that foreign scientific and pedagogical discourse treats digital competence as an integrative component of the professional training of a future educator. The study identifies leading approaches to the professional training of future educators of preschool educational institutions. It has been established that digital technologies are considered not only as tools for organizing education, but also as factors that transform the content and methods of professional training. Emphasis is*

placed on developing the ability of future educators to design a safe digital educational environment, effectively adapt digital content to the developmental and age characteristics of preschool children, and ensure methodologically appropriate integration of technological tools into the educational process in accordance with pedagogical goals. The results also show that foreign studies increasingly emphasize the continuous professional development of educators, digital ethics, and the creation of a favorable digital educational environment. ***Conclusions.*** *The study concludes that the development of professional competencies of future preschool educators using digital technologies is a complex and multidimensional process that requires the integration of pedagogical, technological, communicative, and ethical components.*

Keywords: *digital competence, future educators of preschool educational institutions, digital technologies, professional competencies, digital educational environment, professional development.*

Розвиток фахових компетентностей майбутніх вихователів закладів дошкільної освіти засобами цифрових технологій: зарубіжний науково-педагогічний дискурс

Кобилецька Оксана Іванівна,
аспірантка кафедри педагогіки та освітнього менеджменту
імені Богдана Ступарика, Карпатський національний університет
імені Василя Стефаника, м. Івано-Франківськ, Україна
https://orcid.org/0009-0005-2337-1407

Анотація: ***Метою*** *статті є теоретичний аналіз зарубіжного науково-педагогічного дискурсу щодо розвитку професійних компетентностей майбутніх вихователів закладів дошкільної освіти з використанням цифрових*

технологій та визначення сучасних концептуальних підходів і тенденцій формування їх цифрової компетентності в міжнародному освітньому просторі. ***Методи.*** *У дослідженні використано методи теоретичного аналізу, узагальнення та систематизації науково-педагогічних джерел, присвячених цифровій трансформації в освіті, професійній підготовці майбутніх вихователів та їх професійному розвитку, зокрема їх цифрової компетентності.* ***Результати.*** *Здійснений аналіз демонструє, що зарубіжний науково-педагогічний дискурс трактує цифрову компетентність як інтегративний компонент професійної підготовки майбутнього вихователя закладу дошкільної освіти. У дослідженні визначено провідні підходи до професійної підготовки майбутніх вихователів в умовах цифровізації освітнього простору. Встановлено, що цифрові технології розглядаються не лише як інструменти організації освіти, а й як фактори, що трансформують зміст і методи професійної підготовки. Наголошено на необхідності у формуванні здатності майбутніх вихователів проєктувати безпечне цифрове освітнє середовище, ефективно адаптувати цифровий контент відповідно до особливостей розвитку та віку дітей дошкільного віку, а також забезпечувати методологічно доцільну інтеграцію технологічних інструментів в освітній процес відповідно до педагогічних цілей. Результати також показують, що зарубіжні дослідження все більше наголошують на безперервному професійному розвитку вихователів, цифровій етиці та створенні сприятливого цифрового освітнього середовища.* ***Висновки.*** *У дослідженні зроблено висновок, що розвиток професійних компетентностей майбутніх вихователів закладів дошкільної освіти з використанням цифрових технологій є складним та багатовимірним процесом, що вимагає інтеграції педагогічної, технологічної, комунікативної та етичної складових.*

 ISSN: 2786-9458

Ключові слова: *цифрова компетентність, майбутні вихователі закладів дошкільної освіти, цифрові технології, професійні компетентності, цифрове освітнє середовище, професійний розвиток.*

Statement of the problem. The current stage of education development is characterized by profound transformations caused by the rapid introduction of digital technologies into all spheres of social life. The digitalization of education in the 21st century has become one of the determining factors in the renewal of pedagogical systems, changes in the content of professional training of teachers and rethinking of traditional approaches to the organization of the educational process. These processes are especially relevant in the field of preschool education, which is the first link in the formation of a child's personality and basic skills for interacting with the digital environment. In this context, the training of future educators of preschool educational institutions requires a qualitative update aimed at the formation of their professional competencies, taking into account the capabilities of digital technologies. A modern educator must be able not only to use digital tools, but also to integrate them into the pedagogical process in accordance with the age characteristics of children, the principles of game-based learning and the requirements of a safe digital environment.

Foreign scientific and pedagogical discourse pays considerable attention to the problem of developing digital competencies of teachers, considering it as a key factor in improving the quality of education. In the works of international organizations, in particular the European Commission [1], UNESCO [2] and OECD [3], the digital competence of a teacher is interpreted as an integrative formation that includes information literacy, the ability to digital communication, creating educational content, ensuring digital security and solving professional tasks using technology. Framework models, such as DigCompEdu [4] and DigComp 2.2 [5], determine the guidelines for the professional development of teachers in the digital environment and actively influence the reform of teacher education systems in the world. Thus, the relevance of

the study is due to the need to analyze foreign scientific and pedagogical discourse on the development of professional competencies of future teachers of early childhood education using digital technologies, identify modern approaches, concepts and models of their formation, as well as outline the prospects for adapting international experience to the system of training pedagogical personnel in the field of preschool education.

Analysis of recent research and publications. Up-to-date foreign research demonstrates a steady growth of interest in the problem of digital transformation of education and the development of professional competencies of teachers, in particular future educators of early childhood education. Analysis of international publications shows that digital competence in modern scientific discourse is considered not only as a technical skill in using digital tools, but as a complex professional characteristic that encompasses cognitive, methodological, communicative, ethical and reflective components of pedagogical activity.

One of the leading areas of foreign research is the development of conceptual models of digital competence of teachers. Documents of the European Commission [1], OECD [3] and UNESCO [2] have a significant influence on the formation of this area. In particular, the DigCompEdu framework model defines the digital competence of a teacher as an integrated system of professional skills that covers planning and organization of the educational process, creation of digital content, assessment, communication and development of digital literacy of education seekers [4; 5]. International studies emphasize that this model is gradually becoming a basic guideline for the training and assessment of teaching staff, including in the field of preschool education. Researchers note that the implementation of such frameworks contributes to the standardization of approaches to teacher training and provides common criteria for evaluating the effectiveness of digital pedagogical practices in different educational systems. At the same time, foreign scholars underline that the adaptability of the DigCompEdu model allows educational institutions to integrate

digital technologies in accordance with national educational priorities, institutional needs, and the rapidly evolving demands of the digital society.

The findings of G. Falloon [6] demonstrate that the digital competence of a teacher is considered as a combination of operational and technological skills and ethical responsibility. The author emphasizes that a modern teacher must not only own digital tools, but also critically evaluate their pedagogical feasibility, be aware of the consequences of their use and design a safe and developmental digital environment. This approach is especially important for preschool education, where technologies should be maximally adapted to the age characteristics of children.

Research by A. List, W. Brante and L. Klee [7] emphasizes that the digital literacy of a modern teacher includes the ability to critical thinking, digital reading, technological orientation and conscious use of digital resources. In the context of training future educators, this means the need to develop not only technical skills, but also analytical and pedagogical-interpretative abilities regarding the use of digital content in working with preschool children.

An important place in foreign scientific discourse is occupied by the concept of technologically enriched pedagogy of UNESCO, according to which digital technologies should act as a tool for improving the quality and accessibility of education, and not as an end in themselves [2]. Within the framework of this concept, the need to preserve the humanistic nature of pedagogical interaction is emphasized, which is especially relevant for the preschool level of education, where emotional contact between the educator and the child is decisive.

A separate area of research is related to the understanding of digital competence as a dynamic professional practice. E. Bussesund, B. Oliver, O. McGarr and B. Engen [8] state that the digital competences of teachers are constantly changing under the influence of technological development and professional experience. This is especially important for future early childhood educators, as their professional training should be focused on continuous updating of knowledge and skills.

Study by F. Guillén-Gámez, E. Colomo-Magaña, J. Ruiz-Palmero and L. Tomczyk [9] shows that the level of digital competence of teachers depends on the professional context, access to digital resources and opportunities for continuous learning. In the case of early childhood educators, this highlights the importance of creating equal conditions for access to digital technologies in educational institutions. The development of digital competences is influenced by both individual and institutional factors, including the educational environment, level of training and opportunities for professional development. This indicates the need for a systematic approach to the training of future educators resorting to digital technologies.

Also important are the results of research by K. Tzafilkou, M. Perifanou and A. Economides [10], who indicate an insufficient level of readiness of teachers to use digital technologies in the educational process, especially in the area of organizing educational activities and supporting children. In preschool education, this is manifested in the difficulties of integrating digital tools into the child's play and development [11].

A significant contribution to the understanding of digital literacy was made by the International Federation of Library Associations and Institutions [12], which defines it as the ability to find, evaluate, use and create information using digital technologies. This approach emphasizes the information-analytical dimension of professional training for teachers.

Modern research also emphasizes the importance of continuous professional development of teachers in the digital environment. J. Cabero Almenara, R. Romero-Tena and A. Palacios-Rodríguez [13] consider digital competence as a long-term process that requires systematic support from the state, educational institutions and professional communities. They emphasize that the effective integration of digital technologies into education depends not only on technical skills, but also on teachers' ability to critically evaluate digital resources and adapt them to pedagogical goals. Their research also highlights the need for ongoing training programs that foster

innovation, collaboration, and the development of digital pedagogical competence in response to the rapidly changing educational landscape [13].

At the same time, an analysis of foreign literature shows that most research focuses on the digital competence of school and higher education teachers. The problem of developing professional competencies of future preschool teachers exploiting digital technologies remains underdeveloped. This is explained by the specifics of preschool education, where the use of digital technologies should be carried out taking into account the age characteristics of children, the leading role of play and the need to preserve the emotional and communicative nature of pedagogical interaction.

Thus, the analysis of foreign scientific and pedagogical discourse indicates the presence of a number of unresolved issues related to the specifics of the formation of professional competencies of future early childhood educators using digital technologies. This necessitates further scientific research aimed at developing conceptual approaches, models, and methods of their professional training in the context of the digital transformation of education.

Highlighting previously unresolved parts of the overall problem. Despite a significant number of foreign studies devoted to the digital transformation of education and the development of digital competencies of teachers, certain aspects related specifically to the training of future preschool teachers using digital technologies remain underdeveloped in the scientific and pedagogical discourse. After all, in most international studies, digital competence is considered mainly in the context of school or higher education, while the specifics of the preschool level of education remain peripheral. This leads to insufficient consideration of the age, psychological and pedagogical characteristics of preschool children when developing models of digital training for teachers. At the same time, the issue of integrating digital technologies into the process of forming professional competencies of future educators has not been sufficiently explored. Existing studies are mostly focused on the development of

general digital literacy, while the mechanisms of its combination with methodological, game and communicative competencies require further scientific substantiation. The issue of the readiness of future educators to use innovative digital technologies, in particular artificial intelligence, interactive environments and adaptive educational platforms in working with preschool children, also remains insufficiently researched.

Formulation of the article's goals (task statement). The purpose of the article is to theoretically analyze the foreign scientific and pedagogical discourse on the development of professional competencies of future educators of preschool education institutions using digital technologies, as well as to identify modern conceptual approaches and trends in the formation of digital competence of preschool teachers in the international educational space. Objectives of the article are as follows: 1) to analyze modern approaches of foreign researchers to the interpretation of professional and digital competencies of preschool teachers; 2) to consider key international framework models of digital competence of teachers; 3) to identify the features of the formation of digital competencies of future educators of preschool education institutions in the context of foreign scientific research; 4) to summarize the main trends in the development of professional training of preschool teachers using digital technologies in international practice; 5) to identify the problems and challenges that accompany the formation of digital competence of future educators in foreign educational discourse; 6) to outline promising areas for implementing international experience in the system of training educators of preschool educational institutions.

Presentation of the main research material. In foreign scientific and pedagogical discourse, the problem of developing professional competencies of future early childhood educators using digital technologies is based on the provisions of the concepts of the TPACK framework, DigCompEdu, SAMR model, in which digital competence is considered as an integrative component of the professional training of a modern teacher [14; 15; 16]. In particular, The SAMR model is a conceptual framework for integrating digital technologies into education, developed by

R. Puentedura [17]. The name SAMR is an acronym that represents four levels of technology integration into the educational process: Substitution, Augmentation, Modification, and Redefinition. At the substitution level, digital technologies replace traditional tools without significant functional changes, for example, typing a text in Microsoft Word instead of writing it by hand. The augmentation level involves the use of technology with functional improvements, such as spell check, hyperlinks, or multimedia elements in digital documents. At the modification stage, technologies enable significant redesign of learning tasks, including collaborative online editing and interactive communication in real time. The highest level, redefinition, allows teachers and learners to create entirely new forms of educational activity that were previously impossible, such as international multimedia projects, virtual collaboration, and global online interaction [17]. The SAMR model is widely used in educational research and teacher training because it helps assess the extent to which digital technologies not only support but also transform teaching and learning processes in the modern digital educational environment.

Theoretical analysis conducted provides grounds to single out a number of leading approaches to the professional training of future educators using digital technologies, in particular: competency-based, technological-pedagogical, personally oriented, practice-oriented, innovative-research and intercultural-communicative approaches. Their implementation is associated with the formation of digital competence, the development of professional mobility, the ability to pedagogically design a digital educational environment, as well as the readiness of the future educator for professional activity in the conditions of digitalization of education. In the works of foreign scholars, there is a tendency to rethink the role of a preschool teacher as a specialist capable of functioning effectively in a digital educational environment, using innovative technologies in interaction with children, parents, and the professional community, as well as carrying out continuous professional development through digital education.

Analysis of foreign scientific sources shows that digital technologies are considered not only as an auxiliary tool for organizing training, but also as an important factor in transforming the content of professional training of future preschool teachers. In this regard, a competency-based approach is of particular importance, within which digital competence is integrated into the structure of the teacher's professional competence. Foreign researchers emphasize that a modern teacher must possess not only basic digital skills, but also the ability to pedagogically appropriately use digital resources in professional activities. This includes the ability to select and adapt digital content in accordance with the age characteristics of preschool children, organize digital communication with parents, use interactive learning tools and provide a safe digital environment for the child's development.

In foreign discourse, the development of professional competencies of future teachers is closely linked to a technological and pedagogical approach, which involves the integration of pedagogical, methodological and digital knowledge. Scholars emphasize that the effectiveness of digital technologies is determined not by the fact of their use, but by the ability of the future teacher to combine technological tools with educational goals and methods of preschool education. That is why digital platforms, interactive educational environments, multimedia technologies, mobile applications and distance learning tools are becoming increasingly widespread in the professional training of future educators.

Furthermore, researchers emphasize that the digitalization of professional training should not be limited only to the technical mastery of digital resources. It is important to form pedagogical thinking, a critical attitude towards digital content and a willingness to use technology as a means of developing a child’s personality. In foreign scientific discourse, pedagogical thinking is interpreted as the educator’s ability to consciously select, evaluate, and adapt digital technologies in accordance with educational objectives, developmental needs, and the psychological characteristics of preschool children. Researchers emphasize that critical reflection on digital content

 ISSN: 2786-9458

enables future educators to distinguish between pedagogically valuable resources and those that may negatively influence children's cognitive, emotional, or social development [11]. At the same time, digital technologies are increasingly viewed not merely as technical instruments, but as tools for fostering creativity, communication, emotional intelligence, independence, and social interaction, which are essential components of a child's holistic personal development in the contemporary digital environment.

A significant place in foreign studies is occupied by a personality-oriented approach, according to which digital technologies act as a tool for individualizing the professional training of future educators. Scientists note that the digital educational environment creates opportunities for building individual educational trajectories, developing the autonomy of education seekers and forming self-education skills. In this context, online courses, electronic portfolios, digital self-assessment services and adaptive educational platforms are actively used. Such technologies contribute to the development of reflective skills, professional mobility and readiness of future educators for continuous learning in conditions of rapid technological change.

A distinct area of contemporary foreign scientific discourse focuses on a practice-oriented approach to the professional training of future preschool educators. Researchers emphasize that the development of professional competencies becomes effective only under conditions of active student involvement in practical activities within a digital educational environment [18]. Consequently, foreign higher education institutions increasingly implement virtual pedagogical practice, simulation technologies, case-study methods, and project-based learning. Particular attention is paid to the creation of students' own digital educational products, the modeling of professional situations, and the application of digital tools for solving practical pedagogical tasks. Such an approach contributes to the development of professional flexibility, creativity, and the ability to adapt to the dynamic changes of the modern educational space.

Additionally, foreign research increasingly highlights the significance of an innovative and research-oriented approach, within which digital technologies are viewed not only as instructional tools but also as a means of developing the research culture of future educators. Scholars stress that a modern teacher should be capable not merely of using existing digital resources, but also of critically evaluating their effectiveness, participating in the creation of innovative educational products, conducting pedagogical analysis, and implementing digital innovations in professional practice. Participation in international online projects, the use of analytical digital tools, and collaboration within professional digital communities foster the development of research skills, critical thinking, and readiness for continuous professional self-improvement [19].

Another characteristic feature of modern foreign discourse is the growing attention to intercultural and communicative dimensions in the professional training of future preschool educators. Digital technologies create opportunities for professional interaction within the global educational environment, thereby facilitating the development of intercultural communication skills, digital ethics, and media culture. Student participation in international educational platforms, professional online communities, and collaborative digital projects is regarded as an important factor in strengthening professional competence and preparing educators for work in multicultural contexts.

Given the aforementioned, we can argue that the digital competence of preschool educators possesses specific characteristics determined by the developmental and age-related needs of early and preschool-aged children. Teachers must be able to transform abstract educational content into forms accessible and appropriate for children's cognitive development. This requires a profound understanding of developmental psychology, particularly the ideas of Jean Piaget, who emphasized that children at the preoperational stage perceive information primarily through visual representation, play, emotional interaction, and visualization.

 ISSN: 2786-9458

Accordingly, the use of digital technologies in preschool education should correspond to the following psychological characteristics. In this context, modern preschool educators are expected to demonstrate the ability to use interactive whiteboards, apply multimedia technologies, develop digital educational materials, employ digital storytelling tools, organize online communication with parents, and utilize digital platforms for monitoring children's development. Equally important is the teacher's capacity to create a safe digital educational environment. Educators must ensure the protection of children's personal data, adhere to the principles of digital ethics, and cultivate the foundations of safe behavior in digital environments among children. Therefore, the digital competence of a preschool educator can be understood as an integrated combination of knowledge, practical skills, values, attitudes, and professional responsibility that ensures the effective, ethical, and pedagogically appropriate use of digital technologies in preschool education.

Conclusions. Thus, the analysis of foreign scientific and pedagogical discourse gives grounds to assert that the development of professional competencies of future teachers of early childhood education using digital technologies is a complex and multi-level process that combines competency-based, technological and pedagogical, personally oriented, practice-oriented and innovative and research approaches. Foreign experience demonstrates that effective professional training of future teachers in the context of digitalization of education involves not only the formation of technical skills, but also the development of pedagogical thinking, digital culture, professional mobility and readiness for continuous professional development.

Further research in this area can focus on comparative analyses of international experiences in the digital training of preschool educators, the identification of best educational practices, and the adaptation of successful foreign models to the national educational context. In addition, promising areas of research include the study of digital ethics, media literacy, intercultural communication, and the development of teachers' readiness for continuous professional growth in a rapidly changing digital society.

Список використаних джерел

1. European Commission. Digital Education Action Plan 2021–2027. 2020. URL : https://education.ec.europa.eu/focus-topics/digital-education/action-plan (дата звернення: 11.03.2026).

2. UNESCO. Global Education Monitoring Report 2023: Technology in Education: A Tool on Whose Terms? Paris : UNESCO, 2023. URL : https://unesdoc.unesco.org/ark:/48223/pf0000392264.locale=en (дата звернення: 11.03.2026).

3. OECD. Education 2030: The Education 2030 Conceptual Learning Framework as a Tool to Build Common Understanding of Complex Concepts. 2016. URL : https://www.oecd.org/en/about/projects/future-of-education-and-skills-2030.html (дата звернення: 11.03.2026).

4. European Commission. DigCompEdu: The Digital Competence Framework for Educators. Luxembourg : Publications Office of the European Union, 2017. URL : https://joint-research-centre.ec.europa.eu/digcompedu/digcompedu-framework_en (дата звернення: 11.03.2026).

5. European Commission. DigComp 2.2: The Digital Competence Framework for Citizens. Luxembourg : Publications Office of the European Union, 2022. URL : https://publications.jrc.ec.europa.eu/repository/handle/JRC128415 (дата звернення: 11.03.2026).

6. Falloon G. From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development.* 2020. Vol. 68, № 5. P. 2449–2472.

7. List A., Brante W. E., Klee L. H. A framework of pre-service teachers' conceptions about digital literacy: Comparing the United States and Sweden. *Computers & Education*. 2020. Vol. 148. Art. 103788.

8. Bussesund E. S., McGarr O., Engen B. K. Teacher educators' discursive enactment of professional digital competencies. *Journal of Education Policy.* 2025. Vol. 40, № 2. P. 266–287.

9. Guillén-Gámez F., Colomo-Magaña E., Ruiz-Palmero J., Tomczyk Ł. The digital competence of the rural teacher of primary education in the mentoring process: A study by teaching speciality and gender. *Journal of Research in Innovative Teaching & Learning.* 2025. Vol. 18, № 1. P. 3–19.

10. Tzafilkou K., Perifanou M., Economides A. Assessing teachers' digital competence in primary and secondary education: Applying a new instrument to integrate pedagogical and professional elements for digital education. *Education and Information Technologies*. 2023. Vol. 28, № 12. P. 15921–15945.

11. Lucas M., Bem-Haja P., Siddiq F., Moreira A., Redecker C. The relation between in-service teachers' digital competence and personal and contextual factors: What matters most? *Computers & Education*. 2021. Vol. 160. Art. 104052.

12. International Federation of Library Associations and Institutions. IFLA Statement on Digital Literacy. 2017. URL : https://www.ifla.org/wp-content/uploads/2019/05/assets/faife/statements/ifla_digital_literacy_statement.pdf (дата звернення: 11.03.2026).

13. Cabero-Almenara J., Romero-Tena R., Palacios-Rodríguez A. Evaluation of Teacher Digital Competence Frameworks Through Expert Judgement: the Use of the Expert Competence Coefficient. *Journal of New Approaches in Educational Research.* 2020. Vol. 9, № 2. P. 275–293. DOI : https://dx.doi.org/10.7821/naer.2020.7.578

14. Mishra P., Koehler M. J. Technological pedagogical content knowledge: A framework for teacher knowledge.*Teachers College Record.* 2006. Vol. 108, № 6. P. 1017–1054. DOI : https://dx.doi.org/10.1111/j.1467-9620.2006.00684.x

15. Merjovaara O., Eklund K., Nousiainen T., Karjalainen S., Koivula M., Mykkänen A., Hämäläinen R. Early childhood pre-service teachers' attitudes towards

digital technologies and their relation to digital competence. *Education and Information Technologies.* 2024. Vol. 29. P. 14647–14662. DOI : https://dx.doi.org/10.1007/s10639-023-12237-y

16. Redecker C. European framework for the digital competence of educators: DigCompEdu / ed. by Y. Punie. Luxembourg : Publications Office of the European Union, 2017. DOI : https://dx.doi.org/10.2760/159770

17. Merchán Carreño E. J., Mero Suarez K. V., Toala Arias F. J., Toala Zambrano M. M., Álava Cruzatty J. E. SAMR. Aplicación de la tecnología en el aula para un aprendizaje significativo, en la carrera de tecnología de la Información de la UNESUM. RECIMUNDO. 2025. Vol. 9, № 1. P. 882–895. DOI : https://dx.doi.org/10.26820/recimundo/9.(1).enero.2025.882-895.

18. Федоренко С. В., Корнєєва І.О., Дорошенко В. С. Web technologies for developing professional competence of non-linguistic students in English for specific purposes classes. *Електронний науковий журнал «Суспільство та національні інтереси».* 2026. № 3 (23). С. 19–29. DOI :https://doi.org/10.52058/3041-1572-2026-3(23)-19-29

19. Fedorenko S., Kravchenko T. Multimodal Resources and Students' Motivation in English for Specific Purposes. *Arab World English Journal*. 2023. Vol. 14, № 1. P. 59–70. DOI : https://dx.doi.org/10.24093/awej/vol14no1.4