Publication Date: 30 October 2024
Archs Sci. (2024) Volume 74, Issue 6 Pages 1-8, Paper ID 2024601.
https://doi.org/10.62227/as/74601

Globalisation and Digitalisation: The European Approach to Cutting-edge Educational Practices

Alla Martyniuk[1,*], Iryna Zabiiaka[2], Anastasiia Shevchuk[3], Svitlana Lobanova[4], Alla Hubina[5] and Olha Melnychuk[6]
[1]PhD in Pedagogy, Associate Professor, Head at the Department of Foreign and Ukrainian Philology, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[2]Candidate of Pedagogical Sciences, Associate Professor at the Department of Foreign and Ukrainian Philology, Faculty of Digital Education and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[3]PhD in Philology (Germanic Languages), Associate Professor at the Department of Foreign and Ukrainian Philology, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[4]PhD in Pedagogy, Associate Professor at the Department of Foreign and Ukrainian Philology, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[5]PhD in Psychology, Associate Professor at the Department of Foreign and Ukrainian Philology, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.
[6]PhD in Educational and Pedagogical Sciences, Lecturer of the Department of Foreign and Ukrainian Philology, Faculty of Digital Educational and Social Technologies, Lutsk National Technical University, Lutsk, Ukraine.

Corresponding authors: (e-mail: a.martyniuk@lutsk-ntu.com.ua).

Abstract The urgency of optimising the development of Ukraine's education system is driven by the need to preserve intellectual potential and national identity against the backdrop of the priority of integrating into the European system in the context of post-war recovery. The research aims to identify gaps in existing studies on globalisation and digitalisation practices based on successful European experiences and propose a new research direction in immersive technologies. The innovative solutions proposed in the article pertain to immersive technologies integrated into the educational process to enhance material assimilation and create engaging experiences. The advantages of their application are highlighted, including the visualisation of abstract and complex learning concepts, stimulation of active participation in interaction with virtual objects and environments, development of creativity and problem-oriented thinking, and obtaining realistic experience. The study establishes that the implementation of advanced educational practices of the European community and the involvement of long-term international funding in synergy form potential optimal prerequisites for developing the higher education system in the national space through the differentiation of powers between various institutions, autonomy in the organisation of educational process management, and the formation of a competitive environment in the higher education sector.

Index Terms education, learning, digital communications, digitalisation, interactive teaching methods, internationalisation, interpersonal interaction

I. Introduction

The problem of forming a post-war recovery concept is currently considered from the perspective of prioritising sustainable and effective education system development as a foundation for the prospective enhancement of intellectual potential and national identity. Today, there is a need to establish and implement an effective public management system for education based on transparent and open management mechanisms and innovative teaching technologies, approaches, and tools. Numerous studies by contemporary scholars are dedicated to exploring the possibilities of optimising the education system in the national context by implementing successful European practices, integrating the global educational environment, and utilising digital optimisation potential. Some researchers, including Sokolova [1], Tarasenko and Tarasenko [2], emphasise that the effectiveness level of the latter directly determines the speed and quality of the education system's progress.

In a series of contemporary works, including those by Bulvinska [3], Sokolova [4], Hurevych et al. [5] Maksak and Radchenko [6], the structural elements of digital optimisation of the educational environment are highlighted in terms of the application of modern information systems, the specifics of forming digital competence skills during the learning process are studied, and the peculiarities of communicative interaction are researched. At the same time, some scientists have summarised the challenges and problems of digitalising the education system [7], [8].

Despite significant achievements by scholars within the studied problem, the processes of regeneration and transformation of the education system in the context of post-war recovery and development of Ukraine require additional research. In this context, the advanced educational practices of the European integrated space, particularly in the fundamental

concepts of globalisation and digitalisation, for implementation in the national context, hold exceptional value.

The essence of using immersive technologies in an integrated educational environment lies in utilising the potential of virtual reality technologies to model situational variations, which can be successfully implemented into training and educational programmes.

II. Literature Review

Several prominent contemporary scholars' publications and scientific works reflect the most critical aspects of reforming the education system in Ukraine according to generally accepted European standards. The problem has become more urgent against the backdrop of the destructive impact of war on the educational environment. Specifically, as argued by Hladkykh and Sharova [9], focusing on the optimal distribution of powers among different management levels is advisable when selecting effective mechanisms for state management of education development.

This problem is addressed in the scientific research of both theorists and practitioners of educational activities, including Larionov et al. [10], Viunenko et al. [11], Lytvynova [12], Henseruk and Boiko [13]. At the same time, several researchers, including Yordan and Yordan [14] and De Wit and Altbach [15], argue that a proper level of higher education quality, as an influential social institution, serves as the foundation for the optimal societal progress of the country.

Some researchers, including Zhao et al. [16] and Kuhail et al. [17], propose transforming approaches to forming a synergetic model of managing educational and scientific potential, which should be based on creating internal conditions for optimising the system in the necessary direction. The general issues of forming state policy strategies and the practical implementation of specific strategic management paradigm models in the higher education environment based on the European education system are thoroughly investigated in the works of several contemporary scholars, including Gallagher and Savage [18], Lee et al. [19], and Rogoza [20]. Specific issues related to the problems and risks accompanying optimising the education system are reflected in the works of Abidoye & Adeyemi [21] and Mitschek et al. [22].

Gallagher and Savage [18] argue for the feasibility of using the method of immersion in virtual reality as a universal educational tool. The scientists conduct a systematic review of studies on the quantitative learning outcomes and experimental design, asserting the significant prospective potential of the technologies under study. The consequences include a rethinking of management environment tools with self-educational mobile learning, as well as prioritising the tactile-sensory capabilities of virtual reality.

Certain scholars, including Mitschek et al. [22], argue that the effectiveness of the cognitive-affective model of immersive learning is a necessary condition for the successful development of educational programmes. The scientists have explored the associated risks and challenges, analysing fundamental solutions within the context of the researched concept. The authors pay special attention to the problems of uncovering the interconnections between immersive technologies, academic achievements, and scientific motivation, thus providing insights into integrating immersive tools into the existing social progress system.

At the same time, the practical methods of implementing advanced European educational practices in Ukraine's educational realities have not been sufficiently studied and, therefore, require further scientific examination.

This study aims to analyse the prospective vectors of optimisation of the educational sector in Ukraine in terms of globalisation and digitalisation based on the successful European experience.

III. Materials and Methods

The research was carried out based on the principles of comprehensiveness and systematism in scientific studies, which made it possible to analyse the object of study as a holistic system with several interconnections and interdependencies. Several general scientific research methods were used to achieve the objectives, including abstraction, comparison, analysis, synthesis, induction, and deduction.

Analysis and synthesis were employed during the research to identify the main factors in forming the essential functionality of advanced educational practices of the European community within the concept of innovative education development in post-war Ukraine. The unity of analysis and synthesis allowed for an objective and adequate study of educational practices, reflecting the unity of opposites in relation to the connection between the particular and the general. The analytical breakdown of the education system within a global concept into individual components made it possible to identify the structure of the researched object and its specifics, to distinguish the essential from the non-essential, and to implement a classification of priority educational technologies.

In contrast to analysis, synthesis combined the individual components and properties identified through analysis into a unified whole. A meaningful combination occurred in this process, moving from the identical and essential to differentiation and diversity, synergising the general and the particular into a single whole.

The inductive method was applied to form predictive directions for developing the studied process. The deductive method was utilised to identify the priority vectors of the innovative transformation of the education system in national realities. A reliable conclusion was reached through scientific induction, which provides additional substantive justification for the truth of the obtained generalisation, due to the emphasis on necessary regular connections. Deduction ensured the transition in the process of cognition from the general to the particular, deriving the particular from the general by using general scientific principles to investigate contemporary educational technologies. The main conclusions of the research were formed with the help of deduction.

The abstraction method was used to highlight theoretical generalisations, identify critical categories and concepts, and

form conclusions regarding the priority vectors of innovative education development in the digital national post-war space. In this context, the abstraction of potential feasibility was employed as a mental detachment from the standard properties of educational technologies, concepts, and tools, while simultaneously identifying the essential properties being sought.

The comparison was employed to identify specific features of the modern European innovative paradigm in optimising the education system compared to traditional approaches. Through comparison, the qualitative and quantitative characteristics of the studied educational practices, their similarities and differences, were identified. The specificity and essence of innovative educational technologies, which meet the requirements of globalisation and digitalisation, were also compared.

IV. Results

The most significant challenges that require immediate attention during the post-war recovery period are the implementation of the concept of equal access to education for the population and the restoration and intensive development of the intellectual potential of the scientific and educational environment. Noting the European integration course of Ukraine's foreign policy development in the post-war period, ensuring and maintaining the quality of education should consider the risks associated with the partial loss of national self-identity. State policy is called upon to mitigate these, ensuring a stable and prestigious educational environment. Furthermore, the education system requires significant updating of material and technical equipment and implementing modern innovative teaching methods, creating the prerequisites for aligning the national higher education environment with the demands of the dynamic global competition in the field.

Today, education has a specific function in the political sphere. Therefore, to implement the strategy of sustainable recovery in the post-war period, special attention should be given to developing a unified state policy in higher education. The priority is seen in implementing national development programmes that promote sustainable development, international integration, effective regulation of the higher education environment's activities, and efficient control. State policy in education should theoretically encompass an understanding of the target apparatus and practical tools for its implementation. Effective state management in the higher education system will allow for more efficient use of available resource potential, integration of European integrated environment standards, effective utilisation of international funding opportunities, and expansion of its functional boundaries. Modernising existing approaches to state management in the field of higher education involves intensifying national-regional and institutional interaction, as well as implementing general principles of education management, among which the most important are seen as democracy, openness, decentralisation, and regionalisation, while simultaneously maintaining the functionality of the state management level. This approach will allow the implementation of vector trends regarding the mastery of competency-innovative potential management in the education system and the national educational space (Figure 1.)

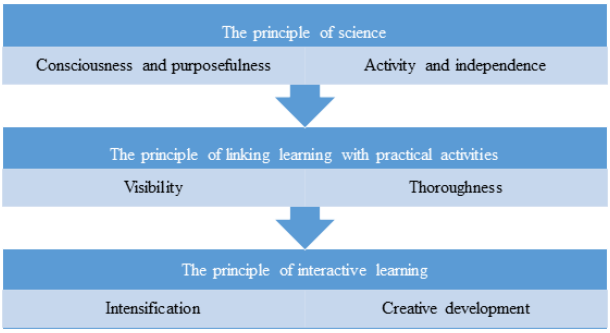

Figure 1: Innovative European Principles of Education Development Source: author's research

Given the need for high-quality preparation of modern students for life in a promising digital society, there is a rapid activation of support for educational projects involving virtual reality technologies in Europe. The effectiveness of implementing any innovative technology in the educational environment is determined by its targeted use in synergy with the traditional educational process requirements and the formation of new educational content. For instance, the use of immersive technologies, which are becoming particularly popular in the European educational environment and involve the active inclusion of virtual training opportunities in the education system, should be based on research results on the impact of these technologies on the quality and effectiveness of the learning process in Ukrainian realities [23], [24].

The features of immersive technologies lie in the presence of a personal presence effect, multisensory capabilities, and variable possibilities for interactive and social interaction, which, in synergy, significantly affect the dynamics of learning outcomes. The digitalisation of the learning process in the context of virtual reality, successfully practised in the European educational environment, allows for a unique experience that synthesises successful learning strategies, particularly with modelling, visualisation, and practical learning. The virtual reality technology educational environment includes a rich multimedia and informational context, creating a system of unique interactivity. At the same time, the context can be successfully adapted to individual learning styles [25].

Virtual and augmented reality technologies optimise learning conditions, ensuring immersion in a multimodal environment enriched with sensory features. Such technologies are seen as effective at various levels of the learning process. According to European experience, the visualisation and cognitive interest formed based on the effect of engagement and attention focusing allow VR technologies to be distinguished as a separate category of tools for improving the educational and management environment, which are closely interconnected. The range of modern immersive technologies can significantly impact the effectiveness of the learning and training processes due to the possibility of modelling various emotional states, engaging attention and interest in the educational material, and

the ability to experience the learning experience personally. The effectiveness of the result of this process is determined by the main requirements that form the basis of educational management content design [26].

Immersive tools are relatively new in education. They cannot completely replace traditional teaching methods but can significantly complement learning by making it practice-oriented, more straightforward, transparent, and attractive [27]. Immersive technologies have significant potential to modernise environmental education by making learning interactive, more interesting, and engaging. Table 1 presents general directions for implementing advanced educational practices and immersive technologies.

The essence of the mechanisms and tools of public administration in higher education represents a hub of political, economic-motivational, and organisational-legal methods of influence. Within the regeneration and renewal of organisational-economic management mechanisms during the post-war recovery period, a development direction for higher education should be ensured that provides a close interconnection between economic progress and social needs. The priority perspective vectors of optimisation reform of the education system in the context of post-war recovery remain the aspects of institutional consolidation of the differentiation of powers between state and local management sectors, considering the national-administrative target apparatus for the effective implementation of national policy, with individualised regional characteristics. Programmes for double degrees, which are joint educational projects between Ukrainian and European universities, have particular potential in this context. Double degree programmes allow Ukrainian students to study through integrated educational programmes simultaneously at two different institutions in different countries, resulting in two diplomas. The goal of implementing double degree programmes, particularly at Taras Shevchenko National University of Kyiv, is to provide students with opportunities to study abroad, expand their professional training potential and enhance their competitiveness as future specialists [28].

Currently, programmes are open and successfully functioning in collaboration with Maria Curie-Skłodowska University (Poland), the University of Warsaw (Poland), Mykolas Romeris University (Lithuania), the University of Nicosia (Cyprus), Paul Valéry University Montpellier III (France), the University of Angers (France), and several others [28].

Each programme has developed an individual learning algorithm and credit transfer according to the European Credit Transfer and Accumulation System (ECTS), allowing students in double degree programmes to benefit from the following opportunities:

- the possibility of acquiring additional knowledge in related fields of science, professional areas, and specialisations;
- attending lectures by leading European professors, participating in joint research and educational programmes;
- gaining experience in practical-oriented learning environments with the use of modern technical equipment in classrooms, laboratories, and research centres, as well as gaining practical work experience in institutions, organisations, offices, and enterprises in a European country;
- enhancing foreign language proficiency;
- obtaining an internationally recognised diploma, which facilitates employment abroad without the need to validate the diploma;
- familiarising themselves with the culture and traditions of other countries and the specifics of conducting business in European Union countries.

The analysis of optimisation vectors in the educational sector in Ukraine, in the aspects of globalisation and digitalisation, based on successful European experience, shows that the destructive changes caused by the war period can be mitigated by developing a unified education management paradigm, implementing national programmes for establishing international cooperation standards and regulating activities in the educational sector. Implementing long-term concessional international financing within the framework of post-war reconstruction in Ukraine will actively stimulate various infrastructure projects, contributing to the rapid revival of the educational environment. The main principle of optimising the management mechanisms of the education system within the framework of state policy should be the support and intensive development of processes to minimise the regulatory influence of state authorities and their powers.

Ensuring the practical implementation of innovative development in educational institutions during the post-war reconstruction period, supported by appropriate state policy, will guarantee proper student preparation and enhance the integration and adaptability of scientific and educational services to modern conditions and the dynamic labour market. Given the current socio-economic conditions, the state governance strategy within state policy implemented by higher educational institutions must consider the innovative potential of each educational institution.

The innovative solutions proposed in the article concern immersive technologies integrated into the educational process to improve material assimilation and create engaging experiences. Their interactivity and ability to create realistic situations allow learners to experience educational material more profoundly and engagingly. The study of the features of immersive technologies identified the advantages of their use, including the visualisation of abstract and complex learning concepts, stimulation of active participation in interaction with virtual objects and environments, development of creativity and problem-oriented thinking, and obtaining realistic experience.

Despite the numerous positive aspects of the consequences of using immersive technologies, their use is accompanied by several risks, disadvantages, and challenges. Among them are the relatively high cost and the complicated accessibility of the necessary technical means. Most virtual reality technologies are expensive, especially under financial constraints and structured budgeting. Additionally, implementing virtual reality technologies in the educational management environment

ARCHIVES DES SCIENCES
A Multidisciplinary Journal

Educational practice	Application
Blended learning	It combines traditional classroom instruction with online modules, increasing the flexibility of learning.
Flipped learning	Students study new material at home, while classroom time is used for practice.
Self-education	Technology provides maximum resources for practical self-study.
Immersive technologies	Use of virtual reality to learn the material in terms of maximum visibility.
Interactive teaching methods	Use of game elements to increase engagement and motivation.
Project-based learning	IT provides tools for planning, developing and presenting projects.
Adaptive learning	Artificial intelligence adapts learning material to the needs of each student.
Distance learning	It allows for learning without being physically present in the classroom.

Table 1: Teaching methods and their application in globalisation and digitalisation context source: author's research

requires specialists to have the necessary skills and proper training to use these technologies in practice.

Another risk is disrupting the connection with reality, as virtual reality technologies can focus on virtual scenarios, distracting from real-life situations. Prolonged use of immersive technologies may cause health deterioration in the form of discomfort, impaired vision, and memory processes. There is also a threat that the active implementation of virtual reality technologies may lead to excessive dependence on digital learning and management tools, negatively affecting the development of other skills and social abilities. Moreover, given the rapid development of immersive technologies, more work is currently required to establish standards and criteria for using these technologies in educational management processes.

VR technologies form a range of effective practical tools that contribute to practical generalisation, study, visualised assimilation, spatial awareness of issues, intensification of cognitive activity, critical thinking, and creativity, forming specific professional skills. The implementation of technology with the addition and visualisation of appropriate content and visual models actively motivates the development of spatial imagination and intensifies the understanding of the essence of the issues, helps to assimilate content through visual representation, creates imaginary spaces for unresolved tasks, and reproduces real-life situations.

V. Discussion

Modern scientists' research results convincingly indicate the relevance of implementing an innovative educational paradigm in crisis and post-crisis recovery and in implementing and developing the principles of globalisation and integration, sustainable development, and digitalisation.

Contemporary scholars Eker and Eker [29], Vyshnyk et al. [30], and Veber et al. [31] are convinced that the traditional managerial paradigm in the field of education in developing countries or those that have experienced crises does not fully allow educational institutions to integrate into the globalised educational environment. According to the scientists, the dynamics of optimisation transformations remain insignificant, and most reforms are eventually assessed as ineffective. At the same time, as stated by Sbruieva [32] and Rogoza [20], socio-political transformations, despite the spectrum of destructive influencing factors, simultaneously act as a driving force for the radical change in the format of relationships between educational institutions in the practice of organising the educational process, as well as in terms of cooperation with other institutions to ensure the sustainable development of the educational environment.

Researchers Zhao et al. [16] and Kuhail et al. [17] consider the issue of activating cooperation between educational institutions and the public as promising for prioritised resolution in the post-crisis period of regeneration. It should be noted that this is a new experience for Ukraine, although it is already standard practice for European countries. According to Gallagher and Savage [18] and Lee et al. [19], the use of interaction and cooperation opportunities by educational institutions with the global community possesses features of mutual benefit aimed at comprehensively resolving management issues in education.

In turn, as scientists Lytvynova [12], Henseruk and Boiko [13] believe, the tasks of this cooperation should include establishing a system of structural and logical connections between theoretical knowledge and its practical application, searching for sources of additional funding and investment, and actively implementing the principles of academic adaptability. According to the scientists, it is necessary to improve educational institutions' management models optimally and further maximise their integration into the global environment.

Researchers Bulvinska [3], Sokolova [4] and Hurevych et al. [5] believe that implementing advanced educational practices in the context of digitalisation allows for the maximum development of the national educational environment's existing potential, promoting the harmonious and active progress of society, the preservation of national identity, and intellectual resources.

Hamilton and colleagues [33] argue for the feasibility of using immersion in virtual reality as a universal analytical tool. The researchers conducted a systematic review of studies on quantitative learning outcomes and experimental design, asserting the significant prospective potential of the technologies under study.

Representatives of the modern scientific community, Kuhail and ElSayary, with co-authors [17], have analysed practical experience in immersive learning. The researchers believe the modern globalised educational system should be based on the synergy of traditional and immersive preventive methods. The authors present the effectiveness of such synergy, highlighting recent achievements from various experimental studies and pilot projects. Continuing this idea, Makransky and Petersen [34] argue that the effectiveness of the cognitive-affective model of immersive learning is a necessary condition for the

successful development of educational programmes.

A representative of the modern scientific community, Chen [35] analysed practical experience in optimising the paradigm of management innovations in the convergence of fundamental traditional principles and new immersive technology tools. Scientists such as Lee et al. [19], studied the concepts of optimising the management process in environmental protection through immersive virtual reality and non-immersive virtual reality in the educational environment. Researchers point out that virtual reality has significant developmental prospects, and its progressive advancement in educational and management spheres will lead to an apparent qualitative increase and effective functioning.

The associated risks and challenges were explored in the works of Liu et al. [36], where scientists analysed fundamental solutions within the context of the researched concept. The authors devote special attention to the problems of uncovering the interconnections between immersive technologies, academic achievements, and scientific motivation, thus providing insights into integrating immersive tools into the existing social progress system.

Research by modern scientists, particularly Aguayo and Eames [37], positions monitoring as an essential element in implementing optimal measures for integrating immersive technologies. The scientists conducted several studies on using immersive learning in mixed reality to improve environmental education.

Scientists Chandler et al. [38], Li et al. [39], Pellas [40], and Han [41] believe that the consequences include rethinking the tools of the management environment with self-educational mobile learning and prioritising the tactile sensory capabilities of virtual reality for the ecological preventive direction of management policy.

Further, scientists Liu et al. [42], Klingenberg et al. [43], Hamada [44], Papanastasiou et al. [45] explore the possibilities of modelling reference conditions of the educational system in virtual reality. Their research aimed to prove that virtual reality can be used to recreate virtual landscapes as an engaging, visceral experience and convey the dynamics of the ecosystem to users effectively and appealingly. Other scientists, Sanabria [46], Perey et al. [47], Tang et al. [48], and Marougkas [49], have demonstrated the significant potential of virtual reality in the outlined problem. However, at the same time, they have identified the need for further research on associated risks and challenges to improve the safe use of this tactic in a safe concept.

VI. Conclusion

In the context of preserving and regenerating the phenomenon of national identity within the educational process, under conditions of effective establishment of international support, the modernisation of the educational system through the implementation of advanced European educational practices creates prerequisites for harmonious continuous development within the concept of sustainability.

The actualisation of the concept of public state policy in the field of education, the implementation of systematic optimisation changes, the introduction of algorithmic mechanisms of public management, and the use of the potential of long-term international funding in the post-war period create potential adequate conditions for the successful development of the educational system in Ukraine. The efficiency of managing the education system should be realised primarily through the differentiation of powers among various institutions, autonomy in organising the management of the educational process, and the formation of a competitive environment in the field of education. The maximum potential for developing the Ukrainian educational sphere is seen in digitalisation, the introduction of innovative practices, including immersive technologies, the individualisation of the learning process, and integration into the global educational environment.

Integrating into the global educational space, post-war Ukraine must consider the successful practical experience of foreign countries regarding state policy in the field of higher education. Some of them can be directly considered as examples to follow, provided the national characteristics of the national education system and its declared priority are considered. The outlined potential of international experience on the issues of implementing modern management systems in educational institutions is capable of ensuring the transition to an adequate state-community level of interaction. The functionality of associations of educational institutions, innovative formations in the studied sphere, public organisations, and regional self-government bodies during the post-war regeneration period will intensify, considering the peculiarities of the strategy for forming a modern national education system aimed at building an effective system of interaction between educational institutions and society.

Immersive learning and training technologies can become an essential functional tool in the globalisation and integration of the educational space. This is not the cheapest learning method, and not everyone can afford it. However, the number of VR and AR products indicates the demand for such a format. These technologies, like others, will become more accessible over time and can evolve as a usual part of the educational process. Virtual reality technologies allow the projection of virtual educational environments, and developing interaction scenarios with visual interactive materials enhances the educational process's effectiveness.

References

[1] Sokolova, E. T. (2022). The public-administrative aspect of the post-war reconstruction and reform of the higher education system of Ukraine. Tavrian Scientific Bulletin. Series: *Public Management and Administration, 4*, 58–65.

[2] Tarasenko, I. O., & Tarasenko, O. S. (2022). Convergence with the European educational system in the context of ensuring the competitiveness of Ukrainian universities in the post-war period. International scientific journal "Internauka". *Series: Economic Sciences, 8*(64), 49–56.

[3] Bulvinska, O. (2020). System of educational sciences: experience of European universities. *Continuing Professional Education: Theory and Practice, 1*, 68–73.

[4] Sokolova, I. (2020). European approaches and practices to ensuring the

quality of higher education. *Continuing Professional Education: Theory and Practice, 2*, 104–113.

[5] Hurevych, R., Kademiia, M., Opushko, N., Ilnitska, T., & Plakhotniuk, H. (2021). The role of digital learning technologies in the era of civilisational change. In *Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology Theory Experience Problems,* pp. 28–38.

[6] Maksak, I., & Radchenko, M. (2023). European grants in the context of non-formal education. *Bulletin of the T. H. Shevchenko National University "Chernihiv Colehium", 177*(21), 21–26.

[7] Hurzhii, A. M., & Lapinskyi, V. V. (2014). Electronic educational resources from theory to practice. *Modern Information Technologies and Innovative Teaching Methods in Training Specialists: Methodology, Theory, Experience, Problems, 38*, 3–11.

[8] Demianchuk, M., & Bodnaruk, I. (2022). Digitalisation of education as a vector for training 21st-century specialists. *Viae Educationis, 4*, 74–81.

[9] Hladkykh, H. V., & Sharova, T. M. (2020). Organisation of independent activity of higher education students using ICT. In *Pedagogy of Forming a Creative Personality in Higher and General Education Schools: A Collection of Scientific Papers, 2*(69), 70–74.

[10] Larionov, V., Homyak, K., Matvieiev, H., Stadnichuk, O., & Kropyvnytska, L. (2021). Multimedia technologies as a means of improving the quality of education. Collection of scientific works of the National Academy of the State Border Guard Service of Ukraine. *Series: Pedagogical Sciences, 26*(3), 82–96.

[11] Viunenko, O., Honzales-Ahadzhanov, K., Ahadzhanova, S., & Rudenko, Yu. (2023). Information and communication technologies of e-learning as a basis for innovation in higher education. Education. Innovatika. *Practice, 11*(4), 13–19.

[12] Lytvynova, S. H. (2020). Conceptual approaches to the use of augmented reality in the educational process. *Modern Information Technologies and Innovative Teaching Methods in Training Specialists: Methodology, Theory, Experience, Problems, 55*, 46–62.

[13] Henseruk, H. R., & Boiko, M. M. (2020). Digital technologies as a means of improving the quality of the educational process of a higher education institution. In Modern information technologies and innovative teaching methods: experience, trends, prospects: materials of the V International Scientific and Practical Internet Conference (Ternopil, 30 April 2020), pp. 110–111. TNPU named after V. Hnatiuk. http://dspace.tnpu.edu.ua/handle/123456789/15380

[14] Yordan, H. M., & Yordan, Kh. V. (2020). Informatisation of education as a basis for the development of the information society. In Modern information technologies and innovative teaching methods: experience, trends, prospects. Materials of the V International scientific and practical. Internet conf. (Ternopil, 30 April, 2020), pp. 115–117. TNPU named after V. Hnatiuk. http://dspace.tnpu.edu.ua/bitstream/123456789/15382/1/39YordanYordan.pdf

[15] de Wit, H., & Altbach, P. G. (2021). Internationalisation in higher education: global trends and recommendations for its future. In *Higher Education in the Next Decade,* pp. 303–325.

[16] Zhao, Y., Llorente, A. M. P., & Gómez, M. C. S. (2021). Digital competence in higher education research: A systematic literature review. *Computers & Education, 168*, 104212.

[17] Kuhail, M. A., ElSayary, A., Farooq, S., & Alghamdi, A. (2022). Exploring immersive learning experiences: A survey. *Informatics, 9*(4).

[18] Gallagher, S. E., & Savage, T. (2023). Challenge-based learning in higher education: an exploratory literature review. *Teaching in Higher Education, 28*(6), 1135–1157.

[19] Lee, V. W., Hodgson, P., Chan, C. S., Fong, A., & Cheung, S. W. (2020). Optimising the learning process with immersive virtual reality and non-immersive virtual reality in an educational environment. *International Journal of Mobile Learning and Organisation, 14*(1), 21–35.

[20] Rogoza, V. (2023). European practice of supporting STEM education ideas. *Science and Technology Today, 13*(27).

[21] Abidoye, F. O., & Adeyemi, A. D. (2024). Analysis of secondary school students' performance in biology and chemistry in Nigeria: influence of ICT. *Journal of Engineering, Management and Information Technology, 2, 1*(06), 43–46.

[22] Mitschek, M. R., & Sanares, R. N., del Rosario, M. G., & Doctor, Jr. J. (2024). Effectiveness and stakeholders' perception of the student information system integration in higher education institution. *Journal of Innovations in Business and Industry, 2*(4), 199–206.

[23] Mialkovska, L., Herasymchuk, H., Sushyk, I., Martyniuk, Y., Haponchuk, O., & Melnychuk, Y. (2023). Management models and methods in modern education: information technologies, sustainability and development. *Cadernos de Educação Tecnologia e Sociedade, 16*, se2, 94–108.

[24] Mialkovska, L., Cherneta, S., Zabiiaka, I., Maiboroda, O., Silvestrova, O., & Voitenko, I. (2024). Effective Communication: Digital, Informational, Sociolinguistic Aspects (European Experience). *International Journal of Religion, 5*(4), 253–260.

[25] Mialkovska, L., Redchuk, R., Sushyk, I., Martyniuk, Y., Maiboroda, O., & Savchuk, N. (2023). Social Management and Digital Communications as Important Components of Modern Higher Education. *Cadernos De Educacao Tecnologia E Sociedade, 16*(1), 143–152.

[26] Mialkovska, L., Cherneta, S., Sushyk, I., Martyniuk, Ya., Maiboroda, O., & Savchuk, N. (2023). Information, Digital, and Socio-Psychological Technologies in the Training of Specialists in the Social Spher. *Studies in Media and Communication, 11*(7), 297–312.

[27] Vassievna, S. R. (2021). Use of Modern Information Technologies in The Educational Process. *The American Journal of Social Science and Educational Innovations, 03*(03), 514–517.

[28] Double degree programmes with foreign higher education institutions for the current academic year. (2024). Department of Academic Mobility of Taras Shevchenko National University of Kyiv. https://mobility.knu.ua/?page_id=73\&lang=uk

[29] Eker, B., & Eker, A. A. (2023). Quality criteria in universities. *Journal of Innovations in Business and Industry, 1*(02), 65–70.

[30] Vyshnyk, O. O., Lavrenko, S. O., Polishchuk, O. A., & Prymyska, S. O. (2023). Innovative educational technologies: European experience, peculiarities of implementation in the training of scientific and pedagogical workers of Ukraine. Academic Visions, 17. https://www.academy-vision.org/index.php/av/article/view/238

[31] Veber, M., Pesek, I., & Aberšek, B. (2022). Implementation of the Modern Immersive Learning Model CPLM. *Applied Sciences (Switzerland), 12*(6).

[32] Sbruieva, A. A. (2021). Comparative pedagogy of higher education: national, European and global contexts. Sumy: Sumy State Pedagogical University named after A. S. Makarenko. 319 p. https://library.megu.edu.ua:9443/jspui/handle/123456789/3898

[33] Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2021). Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. *Journal of Computers in Education, 8*(1), 1–32.

[34] Makransky, G., & Petersen, G. B. (2021). The cognitive-affective model of immersive learning (CAMIL): A theoretical research-based learning model in immersive virtual reality. *Educational Psychology Review, 33*(3), 937–958.

[35] Chen, C. Y. (2022). Immersive virtual reality to train preservice teachers in managing students' challenging behaviours: A pilot study. *British Journal of Educational Technology, 53*(4), 998–1024.

[36] Liu, R., Wang, L., Koszalka, T. A., & Wan, K. (2022). Effects of immersive virtual reality classrooms on students' academic achievement, motivation and cognitive load in science lessons. *Journal of Computer Assisted Learning, 38*(5), 1422–1433.

[37] Aguayo, C., & Eames, C. (2023). Using mixed reality (XR) immersive learning to enhance environmental education. *The Journal of Environmental Education, 54*(1), 58–71.

[38] Chandler, T., Richards, A. E., Jenny, B., Dickson, F., Huang, J., Klippel, A., Neylan, M., Wang, F., & Prober, S. M. (2022). Immersive landscapes: modelling ecosystem reference conditions in virtual reality. *Landscape Ecology, 37*, 1293–1309.

[39] Li, W., Zhu, J., Dang, P., Wu, J., Zhang, J., Fu, L., & Zhu, Q. (2023). Immersive virtual reality as a tool to improve bridge teaching communication. *Expert Systems with Applications, 217*.

[40] Pellas, N., Dengel, A., & Christopoulos, A. (2020). A scoping review of immersive virtual reality in STEM education. *IEEE Transactions on Learning Technologies, 13*(4), 748–761.

[41] Han, I. (2020). Immersive virtual field trips in education: A mixed-methods study on elementary students' presence and perceived learning. *British Journal of Educational Technology, 51*(2), 420–435.

[42] Liu, R., Wang, L., Lei, J., Wang, Q., & Ren, Y. (2020). Effects of an immersive virtual reality-based classroom on students' learning performance in science lessons. *British Journal of Educational Technology, 51*(6), 2034–2049.

[43] Klingenberg, S., Jørgensen, M. L., Dandanell, G., Skriver, K., Mottelson, A., & Makransky, G. (2020). Investigating the effect of teaching as a generative learning strategy when learning through desktop and immersive VR: A media and methods experiment. *British Journal of Educational Technology, 51*(6), 2115–2138.

[44] Hamada, M. (2008). An Example of Virtual Environment and Web-based Application in Learning. *Int. J. Virtual Real, 7,* 1–8.
[45] Papanastasiou, G., Drigas, A., & Skianis, C. (2019). Virtual and augmented reality effects on K-12, higher and tertiary education students' twenty-first-century skills. *Virtual Reality, 23*, 425–436.
[46] Sanabria, J. C. (2017). Enhancing 21st Century Skills with AR: Using the Gradual Immersion Method to Develop Collaborative Creativity. *EURASIA J Math Sci Tech Ed, 13*(2), 487–501.
[47] Perey, C., Engelke, T., & Reed, C. (2011). Current Status of Standards for Augmented Reality. *Recent Trends of Mobile Collaborative Augmented Reality Systems,* pp. 21-38. Springer, New York, NY.
[48] Tang, Y. M., Chau, K. Y., Kwok, A. P. K., Zhu, T., & Ma, X. (2022). A systematic review of immersive technology applications for medical practice and education-trends, application areas, recipients, teaching contents, evaluation methods, and performance. *Educational Research Review, 35*.
[49] Marougkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2024). How personalised and effective is immersive virtual reality in education? A systematic literature review for the last decade. *Multimedia Tools and Application, 83*(6), 18185–18233.