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Peculiarities of training future specialists in higher education institutions using innovative teaching technologies

Abstract. The rapid technological development of the world opens up new opportunities for higher education institutions, but at the same time presents a series of serious challenges in the context of preparing future specialists. The article aimed to analyse trends in education, and the peculiarities of training future specialists in higher education institutions using innovative teaching technologies. Through a thorough analysis of current research and practical developments in this field, the article emphasised the main trends in educational technologies, including the use of information and communication technologies, artificial intelligence, augmented and virtual reality, Big Data, learning analytics, network technologies, television and video technologies, project-based learning, gamification, microlearning, STEAM education, and others. Six key reasons for the necessity of integrating these technologies into the preparation of teachers in higher education institutions were outlined. The main characteristics of these trend teaching technologies were identified as interactivity, deeper learners' engagement and motivation, possibility of personalisation, active collaboration (including global and networking), facilitation of learners' critical thinking and problem-solving, promotion of their interdisciplinary skills and digital competencies, development of readiness for technological challenges and driving innovation in the classroom in future, full or particular automation, efficiency of the educational process, support for learners' lifelong learning, etc. The results of the study can be used by teachers in the process of developing curricula of educational components, textbooks and manuals, methodological materials that ensure the educational process in a pedagogical higher education institution; updating the content of lecture courses and tasks of pedagogical practice, substantiating new teaching methods in higher education and in the system of teacher training

Keywords: technological approach; digital tools; interactive learning environments; pedagogical techniques; educational advancements; teacher competencies; online platforms

INTRODUCTION

Ukraine's integration into the European educational space, coupled with the ongoing informatisation and digitalisation of higher education, calls for adopting modern approaches to organising the educational process in higher education institutions (HEIs). The relevance of this research topic in

contemporary times is undeniable due to the rapid technological advancements transforming the landscape of higher education. Integrating innovative teaching technologies presents a unique opportunity for higher education institutions to adapt to these changes and enhance the

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preparation of future specialists. With the increasing reliance on digital tools, artificial intelligence, virtual reality, and other cutting-edge technologies, educational institutions need to evolve to meet the demands of both students and the workforce. This study highlights the growing need to modernise educational processes, improve teaching methods, and integrate new technologies that foster greater student engagement, motivation, and critical thinking. In light of the digitalisation of education, innovative teaching methods are not only relevant but necessary for developing the professional competencies of future specialists, particularly in fostering digital literacy, problem-solving skills, and interdisciplinary knowledge.

The formalism and inflexibility in approaches to organising educational, scientific-technical, and innovative activities in Ukraine was highlighted in the Strategy for the Development... (2022). These regulations also emphasised the need to enhance education quality through innovation and to support the professional development of academic staff through the integration of innovative technologies. The contemporary labour market demands specialists who not only possess fundamental competencies but are also equipped with digital skills.

According to K. Novruzova (2024), who explored the possibilities of using information and communicative technologies in higher pedagogical education, the key demand of the modern era is to organise the learning process in educational institutions using completely new, more dynamic and innovative methods. A study on the usage of innovative technologies by educators in higher education by researchers V. Prylypko *et al.* (2024) revealed that only two-thirds of higher education instructors effectively and consistently utilise innovative methods (22% of teachers exhibit a low level of engagement with these technologies, 12% show below-average engagement, 28% demonstrate an average level and 38% exhibit above-average engagement). It underscored the need for enhanced innovative practices in higher education institutions and for fostering future specialists' readiness to incorporate modern teaching technologies into their professional activities. S. Vitvytska's (2024) research on the implementation of the competence approach in the pedagogical training of future teachers in higher education emphasised that readiness for innovative pedagogical activity should be as the outcome of the pedagogical training of specialists. S. Vitvytska understood this readiness as a complex, dynamic, multi-component personal education, consisting of three components: target (professional-pedagogical orientation), basic (pedagogical abilities), and operational (competencies).

According to the findings of a survey conducted by H. Kharkevych *et al.* (2024), a significant majority of teachers, 92% of respondents, affirm the necessity of integrating innovative technologies in the teaching English in HEIs. This integration was seen as crucial for effectively preparing students for their professional careers and ensuring their competitiveness in the labour market. Additionally,

75% of respondents emphasised the importance of fostering students' readiness for the use of innovative technologies in teaching English within HEIs. Authors largely concur with the conclusions drawn by H. Kharkevych *et al.* (2024) regarding the most effective innovative technologies for teaching English in HEIs (interactive learning technology, distance learning, multimedia technologies, virtual environment technology, and microlearning technology). However, it is important to note that distance learning is more accurately described as an educational mode or approach to education rather than a distinct technology. T. Hulko & B. Romanenko (2024), studying the question of quality training of future specialists in HEIs, named innovative forms and methods of learning that allow the use of new teaching technologies, namely: contextual, remote, game, problem-based, modular learning, full assimilation of knowledge. Therefore, the question of identifying the status of some innovations as technologies, forms, or methods is open now and important to clarify in educational discourse.

Taking into account the peculiarities of the professional training of future specialists in the conditions of mixed learning in HEIs, V. Pugach (2024) characterised the most promising technologies of distance learning, including: gamification of the process of professional training of future specialists, quest technologies, cloud-based learning technologies, intelligent information systems in education, mobile learning technologies, immersive technologies. But in authors' opinion, the following modern technologies should be added: artificial intelligence and adaptive learning, virtual and augmented reality, blockchain in education, learning analytics, microlearning, and also such tools as online educational resources and platforms, etc.

I. Knysh *et al.* (2023) identified the main innovative technologies leading in education (problem-based learning technology, modular learning technology, business game technology, situational modeling technology, developmental learning technology, interactive learning technologies, case technology, collective and group learning technology, etc.), but authors of this study consider collective and group learning technologies mostly as forms of learning. As A. Tkachenko (2024) stated, exploring new approaches and teaching technologies, that there are enough examples of successful implementation of innovations in higher education both worldwide (Stanford – Stanford Online platform; Harvard – “Digital Learning” project; University of London – “Coursera Partnership” project; Duke University – “Duke Innovation & Entrepreneurship Initiative” programm; MIT Media Lab. – Project “Learning Initiative”) and in Ukraine (Taras Shevchenko National University of Kyiv – project “Virtual University”; National University “Lviv Polytechnic” – innovative laboratories).

The outcomes of the pedagogical experiment, conducted by I. Savytska *et al.* (2024) at the Higher Education Institution “Podolsk State University”, show that using electronic educational resources (Google digital tools, Moodle, and Zoom platforms) is of great importance

and contributes to the improvement of the professional training of future specialists. The authors of this experimental work emphasised that integrating innovative educational technologies helps the applicants of higher education obtain knowledge accessibly and comfortably, improve their self-study skills, maintain constant contact with the course leader, receive consultations, and participate in scientific research work. Despite these researches on implementing innovative educational technologies in training future specialists in HEIs, further investigation is still required. Thus, the objective of the article was to provide a theoretical justification and synthesis of the distinctive peculiarities of preparing future specialists in higher education institutions through the application of innovative teaching technologies.

MATERIALS AND METHODS

This study utilised a combination of research methods to analyse the integration of innovative educational technologies in higher education. A comprehensive review of contemporary literature was conducted to assess current trends and practices in the use of innovative tools and technologies in high school educational process. This review also explored the specifics of various technological platforms and resources in enhancing the educational experience. This review also investigated the specifics of various technological platforms and resources in improving the educational experience. In addition, the authors of the article shared their own practical experience and beliefs about the use of the latest teaching methods in teaching at a higher education institution, namely Hryhorii Skovoroda University in Pereiaslav (HSUP). The collected data and analysis of the experience of using online resources and modern educational technologies allowed us to gain insight into the implementation and role of innovative teaching tools. The analysis of these responses helped to understand the impact of these technologies on student motivation and engagement, improving their learning outcomes, and developing and updating their professional competencies.

Based on the review of modern scientific literature, analysis of the essence and specifics of the functioning of innovative technologies in higher education, and the authors' practical experience, authors of this article have established the role of such innovations in the development of professional competencies of future teachers and systematised the key reasons why integrating these technologies into teacher training in higher education institutions is essential. Synthesis made it possible to summarise the results and formulate a list of peculiarities of training future specialists in higher education institutions using innovative teaching technologies. In addition, comparative analyses were conducted between traditional teaching methods and the use of innovative technologies, which allowed us to identify the advantages and disadvantages of such approaches. The study of the effectiveness of the use of modern tools in teaching revealed a link between the active use of digital resources and an increase in students'

interest in the learning process, their ability to learn independently and think critically. Also, based on the results of the study, the main barriers and difficulties that may arise when introducing innovative technologies into the educational process were identified, and recommendations were formulated to improve the training of future specialists using innovative technologies.

RESULTS AND DISCUSSION

Information and communication technologies (ICT) play a crucial role in training future specialists in higher education institutions within a blended learning environment. In addition to traditional multimedia tools (such as electronic libraries, catalogs, textbooks, manuals, dictionaries, encyclopedias, simulators, testing programmes, and educational resources available on the Internet), modern technologies also include interactive tools like maps, atlases, conferences, competitions, research works and projects, distance courses, and interactive whiteboards, projectors. Other key technologies include modelling tools, virtual reality (VR) or augmented reality (AR), and networking technologies, as well as Google services (e.g. Google+ social platform, Google Apps for educational institutions – Gmail, Google Calendar, Google Talk, Google Docs, Google Sites, Google Video, Google Forms), etc.

The information and communication technologies integration in higher education contributes to the development of students' ability to work with information, and improve communication skills and creative abilities. Additionally, it supports the formation of theoretical, creative, and modular reflective thinking. The use of ICT not only expands the potential of the educational process but also ensures the education effectiveness, prepares younger generations for life in the information space and enables the development of student's creative potential. ICT can produce significant results only when there are generations of teachers who are ready and willing to use modern means in curricular and extra-curricular activities, and when there are methodists who can develop a methodology for using them in the educational process, including the significant number of examples based on which even a peripatetic teacher can use a computer.

In the context of martial law and the introduction of distance and blended learning, the use of electronic educational resources, computer interactive systems, and interfaces in the training of higher education students is relevant. In particular, when teaching pedagogical courses at Hryhorii Skovoroda University in Pereiaslav, the following asynchronous and synchronous interaction tools are used to intensify and enhance learning: Moodle, Google Classroom, Google Meet, Google Forms, electronic textbooks, audio and video materials, mobile technologies (Viber, WhatsApp), cloud technologies (Google Drive), online whiteboards, task design sites, etc. Lectures and practical classes on MS Teams, Zoom, and multimedia Microsoft PowerPoint presentations (with the possibility of organising higher education students into creative

groups to solve educational problems) have proven to be the most effective forms of teaching educational material. For more effective training of students, recommendations for practical and creative tasks could be presented in the form of videos on the YouTube channel (of the HEI or the teacher's one), the website of the HEI (or a department page), social media pages (Telegram, Facebook, Instagram), e-mail, etc. Popular distance learning providers at HSUP and others are the platforms such as Future Learn, Coursera, Prometheus, and EdEra, etc.

The following modern educational technologies are actively used in the educational process of HEIs: network technology (implemented using local and global networks and allows for interactive interaction of all subjects of the educational process), case technology (educational material is selected and compiled by the teacher in advance into a special set and sent to students for self-study), television and satellite technology (implemented using the broadcast of classes on television and/or YouTube), etc.

At HSUP future specialists of the specialty A1 Education Sciences are taught such educational components as "Modern Educational Technologies", "Pedagogical and Management Technologies", "Modern Technologies of Teaching and Education", "Digital Tools in the Educational Activity of a Teacher", the students of the specialty A4 Secondary Education (language and foreign literature (English)) are taught "Information Technologies in Education", "Media Literacy" and "Digital Tools in the Educational Activity of a Teacher". The effective training of higher education students in distance and blended learning at HSUP is facilitated by the quality electronic educational environment of the university, which includes an information portal and institutional repository; free access to Web of Science, Scopus; search engine services and the open scientometric database Google Scholar; universal bibliographic managers Mendeley, EndNote Basic.

The implementation of such and other innovations contributes to the development of a modern educational environment. As the study by A. Kozhevnikova & P. Kozhevnykov (2024) highlighted, that the professional development of future teachers is significantly influenced by the innovative learning environment, which is simultaneously developed due to the innovation activity of students. Yu. Tulashvili (2022) emphasised that future specialists, trained in higher education institutions in fields related to professional functions and activities associated with digitalisation, should acquire essential competencies in various areas. Specifically, this includes methods for analysing and processing large datasets (Big Data) that cannot be handled through traditional methods due to their large volume, in order to obtain new, high-quality knowledge. Furthermore, future specialists should understand the Internet of Things (IoT), which is a modern communication model where objects ("things") use information technologies to interact with each other and their environment. This includes networks of physical devices that provide Internet-based services and mobile apps that use "smart"

machines to exchange information through common management, control, and processing systems.

Other important areas include wearable technologies, which are electronic accessories worn on the human body that exchange data with the global network and other devices, functioning based on the user's movements or environmental changes. Cloud technologies are also essential, enabling distributed digital data processing, where computing resources are provided as online services to internet users. Additionally, cloud computing, which involves applications that operate under an "Infrastructure as a Service" (IaaS) system, is crucial. In this system, users receive basic computing resources (such as processors and storage) and use them to create their operating systems and applications.

Other key areas include sensor technologies, which involve the use of sensors that provide data for applications in industries like manufacturing and medicine, for tasks such as process control, diagnostics, intensive care, monitoring, and security. Future specialists should also be familiar with social networks, which are software services and platforms for interaction among people in groups, enabling users to create and share public or semi-public content and maintain connection lists. Mobile systems and network administration are also important, as they involve managing mobile internet systems with special computer algorithms that create ways to receive and provide information flow through internet communications.

The development of applications (apps) is another critical area, which involves creating native and cross-platform apps. Native applications are developed for specific platforms or devices, while cross-platform apps can run on multiple systems by adapting the source code. Robotics is another important field, which involves technologies for automating complex processes through robotics. Finally, additive manufacturing (3D printing) is an essential area, involving the creation of three-dimensional objects by superimposing successive layers of material based on a digital model. Scientists S. Palamar & L. Nezhyva (2023) emphasised the effectiveness of various digital technologies in training future specialists, particularly for:

- creating mind maps for interactive lessons – Mind Meister;
- presenting educational material – Google Presentation, PowerPoint;
- visualising educational topics, concepts, rules, experiments, story plots, actions of characters, communication situations, etc., in comic book frames – Comic Master, StoryboardThat;
- visualising thematic content using a word cloud – WordArt;
- producing didactic tools for teaching with the help of infographics – Canva;
- organising educational activities and preparing WebQuests using a virtual whiteboard – Padlet;
- preparing interactive tasks – Learningapps;
- online testing – Kahoot!.

It should be added that the use of comics based on electronic resources such as Pixton has also gained popularity in the process of training future specialists in HEIs. In this study, authors of this article emphasised blockchain technology, the distributed digital registry of decentralised network storage, which allows any number of participants to create a secure network where programmes and information are virtually impossible to fake or destroy. In other words, a blockchain is a chain of data blocks (texts, images, videos, software applications) that are linked to each other and stored as identical copies on many different computers. This technology can be used in the educational process in HEIs for final and intermediate assessments, including student knowledge evaluation (such as pass/fail assessments, exams, and qualification works/thesis defences). According to D. Verbyvskiy (2023), blockchain technology is one of the most reliable, proven and secure ways to record, store, and use the results obtained. Moving away from paper documents is quite possible in the digital educational environment.

In the context of this study, attention should also be given to game-based learning technologies, which have become increasingly popular among students. Game technologies are an integral part of modern pedagogical technologies that help enhance the professional training of future specialists in HEIs. Three key functions of game technology were identified: educational (the development of general learning skills), developmental (the enhancement of various mental functions), and formative (the cultivation of personality traits and general culture). Thus, game technology is a system of methods and techniques employed by future specialists, designed to achieve a specific goal and focused on fostering enduring personal qualities in higher education students through active game-based interaction.

It should be noted that the presence of clear stages and sequence of organisation and application of game technologies is one of the main features and a prerequisite for high-quality practical training of future specialists. N. Onyshchenko (2021) stated that a clear structure, understandable for perception, samples of initial instructional documents and experience in the use of game technologies in higher education make it easier for students to independently design and implement these technologies during their pedagogical practice and in their future professional activities.

In the training system for future specialists, it is important to focus on pedagogical games. According to N. Machynska (2013) these games offer several advantages: they stimulate students' curiosity in finding solutions to professional and educational problems within the game environment; they foster greater interest in interpersonal interaction, promote personal development (when used optimally, they can generate long-term interest in self-improvement and the discovery of one's potential); facilitate the introduction of new communicative and behavioral norms; they help students recognise the unique aspects of their own lives, and create a sense of connection to

the world as a whole. The scientist adds that pedagogical games also encourage a better understanding and learning to use the complexity of psychological, social, and organisational communication processes between students; they contribute to the acquisition of experience similar to what students will apply in their professional lives; they motivate game participants to develop specific personal skills necessary for group learning processes; they balance the activity of all students, as even passive group members are engaged in the process (the game providing students the opportunity to solve complex problems rather than remain passive observers); they reduce participants' anxiety (especially at the initial stage of work); they help alleviate certain defensive mechanisms (as instructions and adherence to group norms allow for the modeling of complex behavior patterns during the game); as a result, they can even facilitate changes in the participants' life attitudes (they may become more tolerant of others' opinions and value orientations, and their self-perception may change, among other things). Thus, given the significant advantages of pedagogical games, authors state that their use should be integrated into the practices of higher education.

Game technologies play a crucial role in shaping the educational and professional motivations, interests, and needs of future specialists. They also serve as a powerful tool for influencing students' intellectual and emotional development. These technologies help increase motivation, foster independence and initiative, enhance communication skills, and stimulate the development of practical skills and competencies in higher education students. The specificity of game technologies lies in the fact that they rely on the mechanisms of game activity, the actualisation of emotional content associated with identification with a certain role, active interaction, and achievement of individual and general outcomes. When teaching, it is advisable to use business games (reproduction of the subject and social specifics of a particular activity), role-playing games (acting out certain life roles), Talk Show technologies (structured discussions in which all participants take part), exercise games (consideration of various situations), etc. Business games play a special role in the context of training future professionals, as they improve the quality of their professional competence. Specifically, business games contribute to the growth and enrichment of students' potential, including theoretical knowledge in their field, personality traits, behavioral patterns, and work practices – elements they will apply in their future professional endeavors. Various modifications of business games are often identified: "Business Theater", simulation games, role-playing games, psychodrama and sociogram, exercise games, and "Talk Shows". The modern form of business games is computer games. Thus, certain types of business games facilitate the playing of business roles related to future professional activities. It should also be mentioned that in the study of pedagogical disciplines it is effective to use dramatisations as role-playing games in which students communicate in pairs with each other or in groups. This makes the class

more diverse, allows students to show independence, and realises communication skills and speech skills. They can help each other, and successfully correct the statements of their interlocutors, even if the teacher does not give such a task. Another effective tool is the Talk Show, a structured discussion in which all students participate. Scientist O. Rogulska & O. Tarasova (2019) stated that Talk Shows allow the teacher to control the course of communication, evaluate the participation of each higher education student in order to acquire the skills of public speaking and discussion, expressing and defending their own position, and forming civic and personal activity.

Project-based technologies contribute to the high-quality professional training of future specialists in higher education institutions. These technologies are aimed at solving specific problems by students, which involves, on the one hand, the use of various teaching methods and tools, and on the other hand, the integration of knowledge and skills from different fields of science, technology, and creativity. The results of project work should be substantial: if it is a theoretical problem, a specific solution should be provided; if it is a practical one, a concrete result ready for implementation should be done. Project-based technology involves the use of a range of research, exploratory, and creative methods, techniques, and tools by the instructor. It should be noted that the ability to utilise project-based technology is an indicator of a teacher's high qualifications, innovative thinking, and focus on the personal and professional development of students during the learning process.

Internet projects are popular in the process of training future specialists; their aim is to enhance the speech skills of higher education students and help them learn to acquire significant amounts of information. There are two types of projects, with significantly different planning, execution, and results: www-projects and E-mail projects. The former focuses on developing the ability to find information on the Internet and present the results, while E-mail projects improve written communication skills. Authors completely agree with the research made by The Association for Educational Communications and Technology (Bui, 2024), which had identified the most common current trends in educational technology:

- Video-assisted Learning, which is a type of learning with the accessibility of content through digital displays, and animated videos to improve students' outcomes and reduce teachers' workload;

- Blockchain Technology (Distributed Ledger Technology, DLT), which is a data storage technology used in Massive Open Online Courses (MOOCs) and e-Portfolios to verify skills and knowledge, solve the problems of authentication, scale, and cost of e-learning, and can also help graduate students publish their achievements at the stage of job search;

- Big Data, which is gathering and analysing learner data that meets the needs of students and personalises the educational process by expanding information on, for

example, course topics, student enrollment, student performance (time per course, completion, test results), and student feedback (rating, surveys);

- Artificial Intelligence (AI), that can automate key activities in education (grading, tutoring, providing feedback between teachers and students, tracking students' progress), enhancing in-class teaching and learning, and preventing possible learning problems, etc.;

- Learning Analytics, using data allows teachers to understand and analyse student learning outcomes to optimise learning (for example, to determine what type of information (text, images, infographics, or videos) is popular among students and should be used more, which pieces of educational information need to be repeated and systematised, which students require additional attention due to academic or behavioral problems, etc.), identify challenges, and improve teaching strategies;

- Immersive Learning with Virtual Reality (VR) and Augmented Reality (AR), which help create interactive, experiential learning, and could be particularly useful for explaining complex concepts that cannot be demonstrated to students by simple images or even hands-on experiments in the lab;

- STEAM Education is a trend that applies significant Science, Technology, Engineering, Art, and Maths content to solve real-world problems through hands-on activities and creative design; it enables students to take a greater interest in the world around them, express and implement their ideas, think outside the box, and collaborate better with others;

- Edutainment (the combination of education and entertainment) is an innovative technology that combines entertainment methods (cartoons, gifs, images, audio, special animated training videos, digital educational entertainment platforms, etc.) and active learning to create an effective balance between information and entertainment, encouraging lifelong learning;

- Gamification, which is integrating game elements that allow students to learn and practice in games, and teachers to boost engagement and create a positive learning environment;

- Microlearning, which is the most prevalent trend in educational technology that focuses on short learning units accessible anytime and anywhere, using interactive content to engage students.

Moreover some of these trends may be joined easily and used together effectively, for instance, VR or AR plus gamification; STEAM plus microlearning; microlearning plus VR or AR; gamification plus edutainment, etc.

L. Emerson & Z. Berge (2018) explained that microlearning is much more than just small chunks of just-in-time learning delivered in media-rich formats to a variety of mobile devices. According to O. Fedorova *et al.* (2022) microlearning was stated as a modern educational and methodological approach involving learning management systems and social networks, which provides students with access to tasks, discussion topics and educational content thematically dosed, in specific situations, under control of

the instructor. Authors of this article formulate the concept of microlearning as an educational technology that enables educators to provide learners with educational micro-modules with interactive, structured content and tasks, utilising learning systems and social networks to engage learners.

Emphasising the importance of incorporating the mentioned modern educational technologies, such as such as AI, VR/AR, ICT, Big Data, learning analytics, network technologies, TV/video-based technologies, project-based learning, gamification, microlearning, STEAM-education, blockchain, edutainment, and others, authors state that these trend technologies not only reshape the way teaching is delivered but also offer new opportunities for future educators to enrich their further pedagogical activity. This leads us to the fact that "future teachers should not only acquire theoretical knowledge during training but also be able to apply it in practice creatively and carry out innovative professional activities, effectively using the latest learning technologies", raised by N. Onyshchenko & N. Serdiuk (2023). This perspective motivated us to identify the key reasons why integrating these technologies into teacher training in HEIs is essential:

1. The use of innovative teaching technologies greatly enriches the educational process and motivates learners to study, enabling more interactive, interesting, and personalised lessons, for instance, VR/AR allows for immersive experiences that bring abstract concepts to life; AI, ICT, and network technologies help teachers to tailor the learning experience to suit individual student needs, automate assessments, and incorporate multimedia to boost engagement, etc.

2. They help teachers to adapt future educators to technological change and digital challenges, by equipping them with the necessary knowledge and digital literacy to creatively integrate these tools into their further teaching and foster an innovative classroom environment. For instance, technologies like Learning analytics and Big Data provide valuable insights into student progress, allowing for personalised and adaptive teaching.

3. They promote critical thinking and problem-solving, fostering an environment where students actively engage with the material. For instance, case- and project-based technologies help teachers to create real-world scenarios that challenge students to apply their knowledge and innovate, encouraging deeper understanding and creative solutions.

4. They can foster interdisciplinary skills, helping students understand how different fields intersect and enhancing their ability to think across disciplines. For instance, using VR or AR in STEM subjects provides hands-on learning opportunities, which allow students to experiment with concepts in a tangible, interactive manner.

5. They allow teachers to make the personalisation of learning possible. For instance, the use of AI and Learning analytics can create individualised learning paths that accommodate different learning styles, ensuring each student can learn at their own pace.

6. Integration of these technologies can foster a culture of lifelong learning, equipping students with the skills needed to adapt to new challenges throughout their careers.

Therefore, integrating these cutting-edge educational technologies into training programs in HEIs can not only enhance the quality of education but also ensure that future educators can apply their knowledge creatively and effectively. Scientist A. Tkachenko's (2024) also highlighted the advantages of using those key innovative technologies, including enhances accessibility and flexibility of learning, the facilitation of the integrating theoretical knowledge with practical application, the ability to tailor the educational process to meet the individual needs of students, the increase in student motivation, and the promotion of creativity and critical thinking. In addition to these benefits they also identified several disadvantages and potential risks, such as the high cost of equipment, data security issues, and the necessity of adapting curricula to accommodate new conditions. The authors of the article agree with A. Tkachenko that such strengths collectively enhance student participation, improve learning outcomes through advanced technologies, and provide flexible learning options for students with diverse schedules and commitments. However, it is important to note that A. Tkachenko did not give enough attention to how addressing the weaknesses and maximising the opportunities can play a key role in overcoming current challenges and advancing the potential of innovations in higher education. Comparing authors' research results and outcomes of A. Tkachenko's (2024) research, it is important to underline the point of view towards the strengths of innovations in higher education (increased motivation and student engagement, improved quality of education, and convenience and accessibility of learning), the weaknesses (technical and financial limitations and the training of teachers and students for using advanced technologies), and the opportunities (expanding access to quality education and promoting the development of critical thinking and problem-solving skills through interactive learning methods).

It is also worth adding the laws of Ukraine related to the integration of innovative technologies into the educational process. In particular, the Law of Ukraine No. 1556-VII (2014) regulates the organisation of higher education in Ukraine and defines the legal framework for its development. One of the key provisions of this law is to promote the development of scientific and innovative activities in educational institutions. The Law of Ukraine No. 40-IV (2002) lays down the legal framework for the development of innovation in Ukraine. In the context of education, it plays an important role in promoting the use of new technologies and teaching methods. The Law of Ukraine No. 2807-IX (2022) regulates the process of informatisation in Ukraine and ensures the introduction of information and communication technologies in various fields, including education. Thus, all these legislative acts interact to create a favourable environment for innovative changes in education, in particular for the training of future

specialists using innovative technologies. They contribute to the development of intellectual and digital competences of students, which is essential for training professionals capable of working in a rapidly changing technological and information environment. This integration of innovative technologies into the educational process also helps to increase the competitiveness of graduates in the labour market, providing them with access to modern knowledge and skills that meet the requirements of a globalised economy. Moreover, as L. Slipchyshyn *et al.* (2024) stated, the digitalisation of educational processes opens up new opportunities for improving the quality of education by updating competencies in response to contemporary challenges, which is critically important for Ukraine's post-war reconstruction.

Training future specialists in HEIs through innovative teaching technologies is crucial for preparing educators to meet the demands of a rapidly evolving educational landscape and has several peculiarities, namely: interactivity, deeper learners' engagement and motivation, possibility of personalisation, active collaboration (included globally and networking), facilitation of learners' critical thinking and problem-solving, promotion of their interdisciplinary skills and digital competencies, development of readiness for technological challenges and driving innovation in the classroom in future, full or particular automation, efficiency of the educational process, support for learners' lifelong learning, etc. By integrating innovative teaching technologies in training students in HEIs, future educators can be better prepared to teach in a modern technology-driven world and equipped with the knowledge and competencies to thrive in their careers.

CONCLUSIONS

Therefore, in the context of informatisation and digitalisation of higher education, innovative teaching technologies

are extremely relevant. The use of innovative technologies in the professional training of future specialists in higher education institutions contributes to the formation of their information and technology competence, digital literacy, creative skills, culture, desire and ability to work together, determine their trajectory of self-education and realise their educational needs; and the formation of a harmoniously developed, socially active, and nationally conscious personality of a future specialist, a professionally competent and creative specialist who combines high spirituality, morality, and professional competence. A clear structure, understandable for perception, samples of source instructional documents, and experience in implementing innovative technologies in higher education facilitate students' independent design and implementation of these technologies during their pedagogical practice and in their future professional activities.

In addition to considering the peculiarities of training future specialists in HEIs through innovative teaching technologies, it is important not only to focus on the prospects for their implementation but also to acknowledge the potential challenges and risks associated with their adoption, especially in times of war. Prospects for further research could be the study of forming the readiness to use innovative technologies in the practical activities of future teachers of various specialties in the context of global humanistic trends; and comparative studies of using modern teaching technologies in the educational process of Ukraine and the European Union.

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CONFLICT OF INTEREST

None.

REFERENCES

- [1] Bui, S. (2024). *Top 10 trends in educational technology*. Retrieved from <https://learningstudio.com/latest-educational-technology-trends/>.
- [2] Emerson, L.C., & Berge, Z.L. (2018). [Microlearning: Knowledge management applications and competency-based training in the workplace](#). *Knowledge Management & E-Learning*, 10(2), 125-132.
- [3] Fedorova, O., Shumskiy, O., Golikova, O., Kutsenko, I., Serdiuk, N., & Zahorodna, O. (2022). Microlearning in forming the students' English competencies with VR involvement. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 13(1), 388-402. doi: 10.18662/brain/13.1Sup1/326.
- [4] Hulko, T., & Romanenko, B. (2024). On the question of quality training of future specialists in institutions of higher education. In *VI International scientific and practical conference "Fundamentals of modern scientific research"* (pp. 321-325). Zurich-Vinnitsia: BOLESWA Publishers & UKRLOGOS Group LLC. doi: 10.36074/logos-24.05.2024.071.
- [5] Kharkevych, H., Kruhlij, O., Pechko, N., Sobol, N., & Shyba, A. (2024). Features of using innovative technologies in teaching English language in higher education institutions. *Eduweb*, 18(1), 93-108. doi: 10.46502/issn.1856-7576/2024.18.01.7.
- [6] Knysh, I., Tiahur, L., Ivanova, V., Vasiutynska, Y., & Shovsh, K. (2023). Features of training specialists using innovative approaches. *Amazonia Investiga*, 12(62), 230-239. doi: 10.34069/AI/2023.62.02.23.
- [7] Kozhevnikova, A., & Kozhevnykov, P. (2024). Specifics of innovative educational environment and its influence on the development of future teachers' innovative competence. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 10(2), 72-80. doi: 10.52534/msu-pp2.2024.72.
- [8] Law of Ukraine No. 1556-VII "On Higher Education". (2014, July). Retrieved from <https://zakon.rada.gov.ua/laws/show/en/1556-18?lang=en#Text>.

- [9] Law of Ukraine No. 2807-IX “On the National Informatization Program”. (2022, December). Retrieved from <https://zakon.rada.gov.ua/laws/show/2807-20?lang=en#Text>.
- [10] Law of Ukraine No. 40-IV “On Innovation Activities”. (2002, July). Retrieved from <https://zakon.rada.gov.ua/laws/show/40-15?lang=en#Text>.
- [11] Machynska, N. (2013). *Pedagogical education of Master’s students of higher educational institutions of non-pedagogical profile*. Lviv: LSUUA.
- [12] Novruzova, K. (2024). The possibilities of using ICT in higher pedagogical education. *Bulletin of Postgraduate education: Collection of scientific papers. Educational Sciences Series*, 30(59), 76-92. doi: 10.58442/3041-1831-2024-30(59)-76-92.
- [13] Onyshchenko, N. (2021). Application of game technologies when teaching pedagogical disciples in higher school. *Humanities Science Current Issues*, 4(35), 260-267. doi: 10.24919/2308-4863/35-4-39.
- [14] Onyshchenko, N., & Serdiuk, N. (2023). Practical training of future teachers for innovative activities: International experience. *Scientia et Societis*, 2(2), 73-83. doi: 10.69587/ss/2.2023.73.
- [15] Palamar, S., & Nezhyva, L. (2023). Application of ic technologies (ict) in the context of formation of subject-methodical competence of future primary school teachers. *Pedagogical Education: Theory and Practice. Psychology. Pedagogy*, 39(1), 51-58. doi: 10.28925/2311-2409.2023.398.
- [16] Prylypko, V., Sohan, I., & Matievskiy, V. (2024). Innovative methods in higher education as a response to the challenges of the war in Ukraine. *Academic Visions*, 32. doi: 10.5281/zenodo.12531404.
- [17] Pugach, V. (2024). Use of technologies in the educational process for distance learning. *Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology Theory Experience Problems*, 70, 252-264. doi: 10.31652/2412-1142-2023-70-252-264.
- [18] Rogulska, O., & Tarasova, O. (2019). Technologies of the future foreign language teachers’ training in the conditions of the informational and educational environment of institutions of higher education of Ukraine. *Educational Space of Ukraine*, 15, 111-123. doi: 10.15330/esu.15.111-123.
- [19] Savytska, I., Bulgakov, V., Zbaravska, L., & Rucins, A. (2024). Use of innovative digital education technologies in higher school during distance learning. In *Engineering for rural development: Proceedings of 23rd international scientific conference* (pp. 48-54). Jelgava. doi: 10.22616/ERDev.2024.23.TF011.
- [20] Slipchyshyn, L., Holiiad, I., Yakymovych, T., Dubovyk, O., & Tropina, M. (2024). Post-war modernization of education: the digital learning environment as a key element of the innovative educational cluster. *Psychological and Pedagogical Problems of Modern School*, 2(12), 56-67. doi: 10.31499/2706-6258.2(12).2024.315010.
- [21] Strategy for the Development of Higher Education in Ukraine for 2022-2032 (2022). Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/news/2022/04/15/VO.plan.2022-2032/Stratehiya.rozv.VO-23.02.22.pdf>.
- [22] Tkachenko, A. (2024). Innovations in higher education: New approaches and teaching technologies. *Economical Analysis*, 34(3), 110-121. doi: 10.35774/econa2024.03.110.
- [23] Tulashvili, Yu. (2022). Training of specialists in higher education institutions in the realities of digital transformation. *Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology Theory Experience Problems*, 60, 116-127. doi: 10.31652/2412-1142-2021-60-116-127.
- [24] Verbivskiy, D. (2023). Innovative technologies in higher education institution. *Scientific Bulletin of Uzhhorod University. Series: “Pedagogy. Social Work”*, 2(53), 30-33. doi: 10.24144/2524-0609.2023.53.30-33.
- [25] Vitvytska, S. (2024). Implementation of the competence approach in the pedagogical training of future teachers in institutions of higher and vocational pre-higher education. *Zhytomyr Ivan Franko State University Journal. Pedagogical Sciences*, 118(3), 62-79. doi: 10.35433/pedagogy.3(118).2024.5.

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Особливості підготовки майбутніх фахівців у закладах вищої освіти засобами інноваційних технологій навчання

Анотація. Швидкий технологічний розвиток світу відкриває нові можливості для закладів вищої освіти, але водночас ставить перед ними низку серйозних викликів у контексті підготовки майбутніх фахівців. Метою статті було проаналізувати тенденції в освіті та особливості підготовки майбутніх фахівців у закладах вищої освіти за допомогою інноваційних технологій навчання. Завдяки ретельному аналізу сучасних досліджень і практичних напрацювань у цій сфері, стаття виокремлює основні тренди серед освітніх технологій, зокрема використання інформаційно-комунікаційних технологій, штучного інтелекту, доповненої та віртуальної реальності, Big Data, аналітики навчання, мережевих технологій, телевізійних і відео-технологій, проєктного навчання, гейміфікації, мікронавчання, STEAM-освіти тощо. Виокремлено шість ключових причин, що зумовлюють необхідність інтеграції зазначених технологій у підготовку педагогів у закладах вищої освіти. Виявлено основні особливості трендових технологій навчання, зокрема інтерактивність, глибше залучення та мотивація учнів, можливість персоналізації, активна співпраця (в тому числі глобальна та мережева), сприяння критичному мисленню та вирішенню проблем, розвиток міждисциплінарних навичок і цифрових компетенцій, розвиток готовності до технологічних викликів і застосування інновацій у майбутньому, повна або часткова автоматизація, ефективність навчального процесу, підтримка навчання впродовж усього життя тощо. Результати дослідження можуть бути використані викладачами в процесі розробки робочих навчальних програм освітніх компонентів, підручників і навчальних посібників, методичних матеріалів, що забезпечують освітній процес у педагогічному закладі вищої освіти; оновлення змісту лекційних курсів і завдань педагогічної практики, обґрунтування нових методик викладання у вищій школі й у системі підвищення кваліфікації вчителів

Ключові слова: технологічний підхід; цифрові інструменти; інтерактивні освітні середовища; педагогічні методики; освітні нововведення; компетенції вчителя; онлайн-платформи