INNOVATION-DRIVEN DEVELOPMENT IN EDUCATION, DIGITAL ECONOMY, AND APPLIED TECHNOLOGIES

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INNOVATION-DRIVEN DEVELOPMENT IN EDUCATION, DIGITAL ECONOMY, AND APPLIED TECHNOLOGIES

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2.7. INNOVATION AND DIGITALIZATION AS FACTORS IN THE TRANSFORMATION OF EXCURSION PRACTICE

The rapid development of digital technologies is radically changing the structure and dynamics of the tourism industry, particularly in the field of excursions, which requires a rethinking of traditional formats of interaction with the audience. Modern tourists are increasingly turning to digital products and services that allow them to obtain information, immerse themselves in the cultural context, and plan their trips in an interactive format. In this context, the digitization of excursions is not just a trend, but a necessity to ensure the competitiveness of tourism businesses, museums, and tour guides.

Despite the growing number of digital solutions on the market, there is still insufficient systematic information on the effectiveness of their implementation, as well as the impact of innovations on the quality of the excursion experience, the degree of tourist engagement, and the formation of sustainable interest in cultural heritage. In addition, there are significant differences in the level of digital readiness of tourism market players, which necessitates the development of universal strategies for the adaptation and implementation of innovative approaches.

Thus, a pressing scientific and practical task is to comprehensively study innovative mechanisms for digitizing excursion activities, taking into account global trends, local characteristics, and the needs of modern tourists. This will not only increase the effectiveness of excursion practices, but also contribute to the formation of an integrated cultural environment accessible to a wide range of tourists (Lysiuk, 2024).

The digitization of excursion activities has become one of the key trends in the transformation of the modern tourism environment. In the context of the development of information and communication technologies, traditional models of excursion practice are being rethought, focusing on interactivity, personalization, and accessibility. This process has both a technological and a sociocultural dimension, as it is not only the tools for presenting information that are changing, but also the very format of interaction between tourists and guides, museums, and cultural locations.

Digitalization encompasses the implementation of digital technologies at all stages of excursion activities: from route planning to post-excursion interaction with tourists. In this context, excursions are transformed from a one-way transfer of information into an interactive experience focused on active participation and audience engagement. In the digital paradigm, the guide is no longer exclusively a source of knowledge, but a coordinator of the research process, and the tourist is no longer a passive listener, but an active participant in a quest, dialogue, simulation, or reconstruction of events (Lysiuk et al., 2022).

The most promising technologies that shape innovative approaches in excursion activities are presented in Fig. 1.

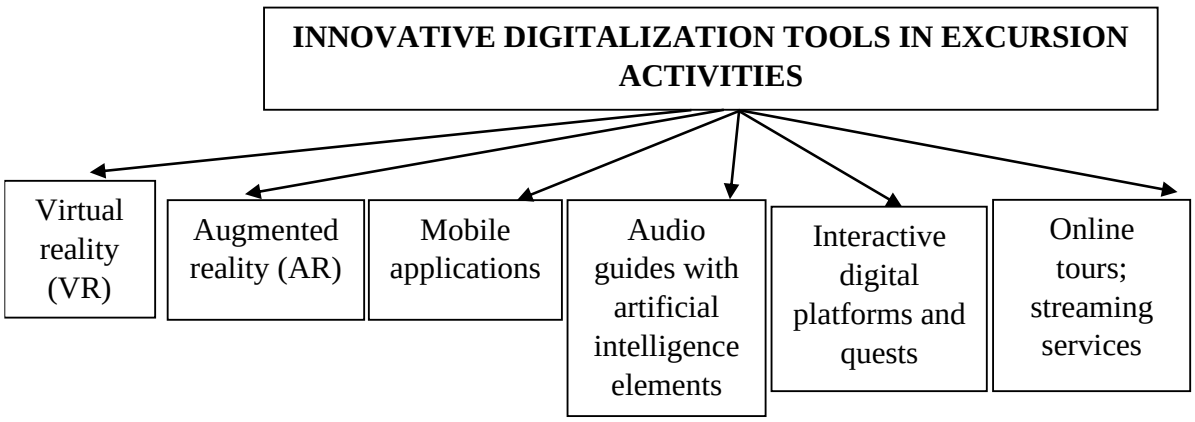

Fig. 1. Innovative digitalization tools in excursion activities
Source: constructed by the authors

Virtual reality (VR): allows the creation of entirely synthetic environments in which users can "visit" historical events, museums, or architectural sites that no longer exist or are physically inaccessible. This is especially relevant during wartime, when access to many cultural sites is limited or completely impossible due to destruction or danger, VR technologies become an important tool for preserving cultural heritage. Virtual tours help maintain an emotional connection to one's native culture and history, even in conditions of forced evacuation or occupation.

Augmented reality (AR): provides the superimposition of virtual content onto real space. For example, using a smartphone or AR glasses, a tourist can see what a building looked like several centuries ago or what a character described by a tour guide looked like.

Mobile applications: function as hybrid platforms for independent tours, combining interactive maps, gamified tasks, multilingual guides, and social features (ratings, comments, reviews).

Audio guides with artificial intelligence elements: capable of adapting to the user's style, offering personalized itineraries and tour content. Such systems are already being implemented in leading museums around the world.

Interactive digital platforms and quests: combine learning, entertainment, and navigation functions. They are often used to engage audiences by integrating gamified mechanics (points, levels, tasks, virtual rewards) (Lysiuk, 2024).

Online tours and streaming services: professional guides conduct tours in real time via Zoom, YouTube, or specialized platforms. Such tours allow you to reach audiences from all over the world and are accessible to people with limited mobility, etc. (Lysiuk et al., 2023).

This approach not only contributes to increasing the tourist appeal of regions, but also creates an inclusive, interactive environment for cultural learning.

To determine and evaluate the perception of digital tools, we analyzed reviews posted by tourists on open platforms such as Google Reviews, Google Maps (the "tours" section), TripAdvisor, Facebook pages of museums, tourist centers, and mobile applications, as well as reviews on Play Market / App Store for applications such as izi. TRAVEL, AR.Lviv, Ukraine 360, etc.

The study examined download rates, ratings, and user activity in popular Ukrainian excursion apps such as Kyshenkova Kraina, LvivAR, ChernivtsiWalk, Castles of Transcarpathia, Kyiv Digital, and other mobile applications that promote the digital popularization of cultural heritage and the development of virtual tourism, as well as video analytics of YouTube tours, which grew rapidly during the period of quarantine restrictions and after the start of full-scale war.

As part of the author's research, in-depth interviews were conducted with managers of tourism companies, developers of AR / VR applications, museum workers, and tour guides. This made it possible to compare the user experience with the realities of the technical and organizational implementation of digital technologies (Bihus et al., 2020).

Analysis of the data obtained made it possible to identify the number of downloads of thematic mobile applications (according to App Store and Google Play data); the dynamics of views of virtual tours on YouTube; and the growth in the number of visitors to websites offering online tours (Fig. 2).

The greatest growth in demand was recorded for audio guides with interactive functions, AR routes in cities, and online tours of memorial sites. Examples of the application of digital innovations in excursion activities in Ukraine are presented in Table 1.

As shown in Table 1, digital tools make it possible to make excursions: flexible (personalized in terms of content and route); accessible (regardless of physical presence or limited abilities); interactive (through gamification and feedback), attractive to young people (through formats close to the digital style).

We are already paying special attention to the application of digital innovations in Ukraine's excursion activities, in particular in the creation of digital copies and virtual reconstructions

of objects that have been destroyed as a result of Russian aggression, such as the cultural heritage of Mariupol and other affected cities (Table 2).

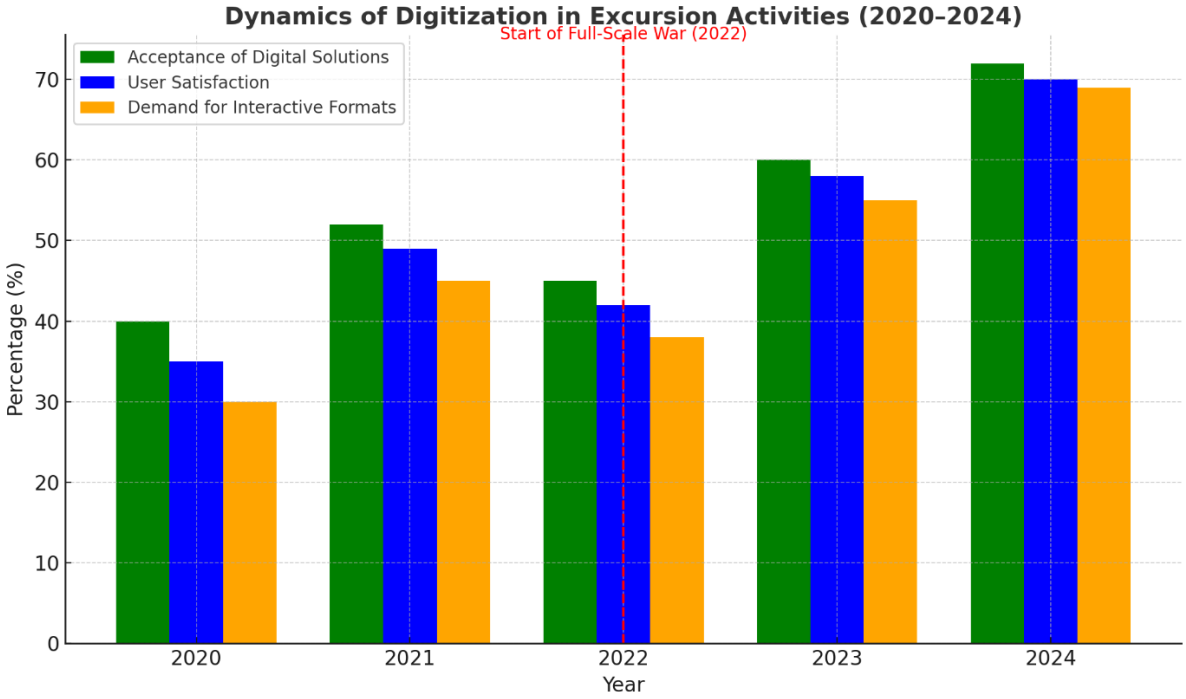

Fig. 2. Dynamics of digitization of excursion activities in Ukraine
Source: compiled by the authors

With the help of digital technologies, we strive not only to preserve the memory of what has been lost, but also to show the world what has been preserved, what is developing and living today, while drawing international attention to the scale of destruction and the importance of restoring Ukrainian cultural identity. In addition, the digitization of excursion activities helps to expand the audience, attracting both domestic and international tourists, and at the same time serves as an important tool for Ukraine's cultural diplomacy on the world stage (Pysareva & Yalovnycha, 2024).

In the post-war period, Ukraine faces an extremely important task – not only to restore material objects of cultural heritage, but also to preserve historical memory and make it accessible to future generations. Digital innovations play a key role in this, allowing the creation of new formats for excursion activities and cultural communication.

One of the most promising areas is virtual reality (VR). It allows for the virtual reconstruction of destroyed monuments, such as the drama theater in Mariupol or the temples in Lysychansk and Izyum. This ensures the preservation of cultural memory, honors losses, and provides remote access for those who are unable to visit these places physically. In addition, VR can be used in military history museums (Kyiv, Dnipro) to recreate key locations of combat operations, turning tours into a powerful educational resource and helping to spread the truth about the war.

Augmented reality (AR) is another important tool. AR technologies make it possible to create interactive memorial routes in hero cities (Chernihiv, Kharkiv, Kherson), where users can see virtual reconstructions of objects in a «before and after the war» format.

This format not only makes tours more exciting, but also helps to gain a deeper understanding of the tragic events and history of the struggle.

Mobile applications and interactive maps have significant potential at the national level. They can become a single digital register of war and heroism monuments, combining regional histories into a nationwide system. This will contribute to both the preservation of memory and the formation of a new generation of tourist routes.

Table 1. Application of digital innovations in excursion activities in Ukraine

Innovative Tool	Location / Object	Form of Implementation	Expected Effect
VR Tours	Saint Sophia Cathedral (Kyiv)	Virtual interior reconstruction	Visualization, accessibility for online audiences
	Kamianets-Podilskyi Fortress	VR fortress assaults	Immersive, engaging tour
	Olesko Castle (Lviv region)	Virtual walks	Accessibility for people with disabilities
AR Technologies	City Center, Lviv	"Lviv AR" project	Gamification of tours, visualization
	Podil, Kyiv	AR app with merchant figures	Lively exploration of city history
	Poltava	AR guide "Battle of Poltava"	Military-historical tourism
Mobile Apps & Maps	Chernivtsi	"ChernivtsiWalk" app with GPS routes	Support for individual tourists
	Uzhhorod	"Castles of Transcarpathia" app	Development of domestic tourism
	Kherson region: Askania-Nova Reserve	Mobile map with excursions	Ecological tourism
	Zaporizhzhia	Industrial tourism app	Digital promotion of the region
Interactive Audio Guides / AI	Kyiv (National Art Museum)	Audio guide with theme selection	Personalization of the route
	Lviv National Art Gallery	Audio guide with facts	Engagement through interaction
Interactive Quests / Gamification	Lutsk	Quest "Legends of Lutsk Castle"	Integration of digital content
	Khmelnytskyi	City quest "Code of the City"	Increased interest in local heritage
	Vinnytsia	Quest "On Pirogov's Paths"	Local branding
Online Tours / Streaming	Kyiv Pechersk Lavra	Zoom tours in English	Dissemination of cultural content
	Ostroh Castle	YouTube live streams	Accessibility anytime

Source: compiled by the authors

Online tours and streaming make it possible to promote areas that are currently unable to receive tourists due to demining or other security restrictions. Video tours involving guides, veterans, or volunteers open up new opportunities for safe cultural communication without physical contact.

Interactive quests and gamification are of particular interest. In some cities, quests called "Paths of Resistance" could be developed to help people emotionally comprehend the events of the war in Ukraine. Gamified tours on the theme of volunteering and helping the army could also be implemented, which would help popularize the heroism of Ukrainians.

Finally, AI-assisted audio guides can be an important tool for memorial parks and mass burial sites. Thanks to the stories of veterans and volunteers, they create a deep personal connection between visitors and history, forming an emotional and spiritual bridge between the past and the present.

Thus, digital innovations in the field of excursion activities are not only technological progress, but also an effective way to preserve national memory, form a new cultural space, and create a safe, accessible, and at the same time modern format for learning about Ukraine's history in the post-war period.

The need for digitization of excursion activities is particularly relevant in connection with the needs of people with disabilities, especially those affected by war, as digital formats (virtual tours, 3D models, audio and video accompaniment) open up new opportunities for them to access cultural heritage, regardless of physical limitations or location.

Table 2. Application of digital innovations in excursion activities in Ukraine (sites that have been destroyed as a result of the Russian-Ukrainian war)

Innovative Tool	Possible Location of Implementation	Form of Application	Goal / Advantages in the Post-War Period
Virtual Reality (VR)	Destroyed or temporarily lost monuments (Mariupol, Izium, Lysychansk)	Virtual reconstructions of monuments (e.g., Mariupol Drama Theater)	Preservation of cultural memory, honoring losses, remote access
	Military history museums (Kyiv, Dnipro)	VR journeys through key battle locations	Educational resource, spreading the truth about the war
Augmented Reality (AR)	Memorial routes of "Hero Cities" (Chernihiv, Kharkiv, Kherson)	AR guide: users see historical sites before / after the war	Interactive comprehension of war history
Mobile Apps & Interactive Maps	Ukraine (national level)	National digital tourist register of war and heroism landmarks	Unification of regional histories into a single digital system
Online Tours / Streaming	Areas not yet open for tourism (e.g., undergoing demining)	Video tours with guides, veterans, volunteers	Safe promotion of territories, supporting tourism without physical presence
Interactive Quests / Gamification	Kyiv, Lviv, Ivano-Frankivsk	Quests "Paths of Resistance" based on war events	Emotional understanding of events
	Khmelnytskyi, Ternopil	Gamified tours on volunteering and army support	Popularization of Ukrainian heroism
Audio Guides / AI Support	Memorial parks, mass burial sites	Audio guides with stories of veterans and volunteers	Creating a deep personal connection with history

Source: compiled by the authors

Such people deserve special respect, honor, and support from society, as well as the full right to be involved in the cultural life of the country (Table 3).

Table 3. Digital solutions for ensuring inclusive tourism in Ukraine

Digital Tool	Form of Implementation / Example	Advantages and Effects
Virtual 3D Tours / VR Excursions	Online tours of historical cities, museums, castles (for people with amputations, limited mobility)	Ability to visit sites without physical movement
AR Navigation with Visual Markers	AR apps with highlighted routes, gesture-based comments, captions (for people with hearing impairments, cognitive difficulties)	Providing clear content for people with perception challenges
Audio Guides with Adapted Text	Audio guides with slow narration, pauses, tactile controls (for people with visual impairments, veterans)	Creating a safe and emotionally stable environment
Online Tours with Subtitles and Sign Language	YouTube tours with Ukrainian Sign Language, subtitles, and infographics (for people with hearing impairments)	Full access to information without perception barriers
Mobile Apps with Personalization	Modes: "light content", "silent support", "high contrast colors" (for all groups)	Inclusivity, reduced sensory overload, independent use
Interactive Routes with Sensory QR Markers	QR codes voiced via smartphone, tactile markers along routes (for people with visual impairments)	Access to content in public spaces (parks, monuments, fortresses)
Gamified Audio Quests with Conversational Interface	Calm, therapeutic routes with stop options and feedback (for people with neurological disorders)	Staying in a safe digital environment, emotional relief
Digital Accessibility Maps (Inclusive Sites)	Map of «inclusive excursion routes» with toilets, ramps, assistance (for people with mobility limitations)	Reduced anxiety before visiting a site, risk-free planning
Audio AR Stories via GPS-Enabled Headphones	Stories triggered near the object (for people with musculoskeletal problems)	Free pace of excursion, independence, minimal effort
Apps with Sign Language Assistant	Animated sign language translator in the app during excursions (for people with hearing impairments)	Barrier-free interaction with content without a live interpreter

Source: compiled by the authors

Therefore, the key objectives of digitizing the above-mentioned tours are to restore tourism without risk (remote or AR / VR tours) and to preserve the memory of the losses and heroism of the people.

Digital tools are becoming an important part of the development of modern excursion activities, as they not only expand the possibilities of tourism, but also make it inclusive, accessible, and more interesting for different categories of people.

Virtual 3D tours and VR excursions open up opportunities for those who, for various reasons, cannot physically visit historic cities, museums, or castles. This is especially important for people with limited mobility or those who are far from the site.

AR navigation with visual markers helps create clear and interactive routes using highlights, gestures, or text comments. This makes content accessible even to people with hearing impairments or cognitive difficulties (Mikhaylyuk, 2022).

Audio guides with adapted text make it easier for people with visual impairments, veterans, or those who need a slower pace of information delivery to understand the material.

Online tours with subtitles and sign language open the door to cultural heritage for people with hearing impairments, giving them full and equal access to information.

Personalized mobile apps allow each user to choose the mode that best suits their needs – from simplified content to contrasting colors or silent accompaniment.

Interactive routes with touch-sensitive QR codes ensure the accessibility of information in public spaces, allowing people with visual impairments to access audio material directly from their smartphones.

Gamified audio quests with a conversational interface combine elements of gaming and therapy, creating a safe digital environment where users can freely interact with history and culture.

Digital accessibility maps help people with limited mobility plan their trips in advance, reducing anxiety and ensuring comfortable conditions for visiting attractions.

Audio AR stories via GPS headphones allow users to experience complete freedom of movement, as information is automatically activated near the desired object, preserving the independence and comfort of the tourist.

Apps with sign language assistant support remove barriers for people with hearing impairments, allowing them to fully enjoy the tour content without the need for an interpreter.

Together, these tools are shaping a new quality of tourism – one that is more inclusive, technological, and focused on the needs of each individual.

The study found that the digitization of excursion activities is not just a technological trend, but a necessary condition for the transformation of the tourism industry in the context of a new sociocultural reality. It encompasses not only the modernization of information delivery formats, but also profound changes in the content, structure, and logic of interaction between tourists and excursion products. Digital technologies open up fundamentally new opportunities for improving accessibility, quality, personalization, and emotional engagement in the learning process.

The innovative digitalization tools systematized in this work, in particular virtual reality (VR) and augmented reality (AR), mobile applications, intelligent audio guides, interactive maps, and gamified quests, have proven their effectiveness both in conditions of peaceful development and in a post-war perspective.

They make it possible to: broaden the target audience through remote formats and linguistic / physical inclusiveness; preserve and promote national cultural heritage, including lost or destroyed sites; support the emotional recovery of society through interactive reflection on history and memory; stimulate domestic tourism and community development, especially in post-conflict recovery situations.

The inclusive potential of digitalization deserves special attention. It has been found that the introduction of adaptive technologies (audio guides with variable speed, AR navigation with sign language, mobile applications with special modes) makes it possible to involve thousands of people with disabilities, including those affected by the war, in excursion activities.

Digital tourism is an effective tool for social integration, cultural rehabilitation, and humanitarian interaction (Lysiuk et al., 2024).

In the Ukrainian context following the Russian-Ukrainian war, digitalization will take on additional significance as a mechanism for preserving national identity, a tool for recording the memory of the losses and heroism of the Ukrainian people, and a safe alternative for the development of tourism in conditions of threats, mine danger, and damaged infrastructure.

Thus, the digitalisation of excursion activities emerges as a strategic direction for the development of the cultural and tourism sector in Ukraine. Its effective implementation requires an interdisciplinary approach, state support, cross-sectoral partnerships (civil society – technology companies – tour operators), and the broad involvement of local initiatives.

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ANNOTATION

Chapter 1. INNOVATIVE TECHNOLOGIES IN EDUCATION AND VOCATIONAL TRAINING

1.1. Vira Andriievska. INTEGRATION OF ELECTRONIC SOCIAL NETWORKS IN THE TRAINING OF FUTURE INFORMATICS TEACHERS

The article explores the problem of integrating electronic social networks into the training of future informatics teachers. The relevance and expediency of conducting educational online marathons in the educational process, which are successfully implemented with the help of the didactic potential of social networks, are substantiated. The specifics of creating an online marathon are shown (taking into account the educational needs and requests of students; logical structuring of the presentation of educational material for each day of the marathon; optimal duration of the marathon; focus on the formation/development of a specific skill; regular real-time monitoring of students' current progress; creation of a community of online marathon participants). An example of the implementation of the educational online marathon "Number Theory" at the Department of Informatics of H. S. Skovoroda Kharkiv National Pedagogical University is given.

1.2. Natalia Bobro. INVESTMENT AND ECONOMIC ASPECTS OF THE DIGITALIZATION OF CLASSICAL UNIVERSITIES IN THE CONTEXT OF DIGITAL TRANSITION

The purpose of the article is to analyze the investment and economic effects of the digital transformation of classical universities in the context of the digital transition, focusing on financial sustainability, resource efficiency, and the formation of new business models in higher education. The study is conceptual and analytical, based on the generalization of modern scientific publications, empirical research, reports of international organizations, and practical cases of university digitalization. The methodological basis combines inductive and comparative analysis, emphasizing the economic feasibility of digital investments. The research demonstrates that university digitalization contributes to increased operational efficiency, cost optimization, revenue diversification, and the creation of digital assets, while proper implementation of digital strategies enhances financial sustainability and opens new opportunities for long-term university development. The study expands the theoretical discourse on digital transformation by integrating the concepts of the knowledge-based economy, investment efficiency, and intellectual resource management and proposes an analytical model explaining the link between digital investments and the university's economic efficiency. This research provides a relevant contribution to understanding the institutional and economic logic of higher education digitalization and offers a holistic approach to assessing its effects at the university system level, combining macroeconomic challenges with micromanagement solutions. The main limitation of the study is the lack of quantitative empirical confirmation of the proposed model, indicating the need for further research on developing KPIs for digital transformation and analyzing the effectiveness of specific business models in various types of universities.

1.3. Vira Chornous, Vasyl Palapa, Valeriy Oksyuta. PROFESSIONAL FOREIGN TRAINING Of FUTURE MEDICAL WORKERS IN THE CONTEXT OF INTERNATIONAL INTERACTION

The article examines the formation of foreign language professional activity of future medical professionals in the context of international interaction. The possibilities of developing students' professional activities during their studies at a medical institution of higher education were identified, which, in turn, is ensured by implementation of acquired knowledge, skills and abilities into practical activities and contributes to their productivity.

The features of the development of foreign language professional education of future medical workers as a process of qualified training of future specialists in the context of international communication and interaction using a foreign language are outlined.

The importance of learning a foreign language and its application in future professional activities is substantiated.

1.4. Pavlo Davydov, Inna Medvid, Inna Tabachnyk. SOFT SKILLS IN THE STRUCTURE OF A HIGHER EDUCATION APPLICANT'S PROFESSIONAL COMPETENCE

The article analyzes the concept and content of soft skills as an integral component of the professional competence of a specialist of the XXI century. Different scientific approaches to their study (behavioral, psychometric, functional, competence-based) are highlighted. Special attention is paid to the «4C» concept (critical thinking, creativity, communication, collaboration), which is recognized as one of the most influential models of key skills of the XXI century. Based on the analysis of domestic and foreign sources, the necessity of a systematic and integrated approach to the formation of soft skills in higher education students is substantiated. This process should include a strategic restructuring of the educational process, in particular: integration of creative tasks into curricula, the use of active teaching methods (project activities, training, debates) and the development of extracurricular activities (volunteering, student self-government, etc.). The article also considers the issue of effective assessment of soft skills and emphasizes their importance in the digital age.

1.5. Nataliia Kucherenko, Serhii Kucherenko. SPECIFICS OF THE INTERRELATIONSHIP BETWEEN VALUE ORIENTATIONS AND PSYCHOLOGICAL WELL-BEING OF PSYCHOLOGY STUDENTS

The article is devoted to the study of the relationship between value orientations and the psychological well-being of psychology students. The value sphere is considered as a system-forming component of personality, which determines life priorities and directions of development. At the theoretical level, the concepts of values by M. Rokeach, S. Schwartz, and modern approaches to understanding psychological well-being (E. Diener, C. Ryff, A. Maslow, C. Rogers, V. Frankl) are analyzed. An empirical study was conducted among master's students of the specialty "Psychology" who combine studies with professional activity. It was found that humanistic values (cognition, creativity, love, family, friendship) positively correlate with self-acceptance, personal growth, and life satisfaction. In contrast, the orientation towards material security and status proved to be a predictor of reduced subjective well-being. The consistency of the value-semantic sphere determines the level of psychological resilience of students and contributes to harmonious professional development. The conclusions emphasize the importance of value regulation of life activity for the preservation of the mental health of young people.

1.6. Oksana Melnychuk, Inesa Khmeliar, Lesia Kushnir. LINGUISTIC SUPPORT AND DIGITAL LITERACY AS INDICATORS OF EDUCATIONAL QUALITY IN THE CONTEXT OF ACCREDITATION: A THEORETICAL PERSPECTIVE

This theoretical paper examines linguistic support and digital literacy as critical indicators of educational quality within the framework of higher education accreditation. Recognizing the increasing demand for transversal competences, the study analyses how these components influence academic program effectiveness across disciplines, particularly in STEM and non-STEM fields. Drawing on interdisciplinary insights, the article discusses the role of language proficiency and digital competence in meeting accreditation standards. The paper advocates for integrating linguistic and digital skills as core educational objectives, emphasizing the need for institutional policies and collaborative approaches to ensure comprehensive quality assurance. This perspective contributes to the ongoing discourse on educational transformation in a digital era, underscoring the pivotal role of language and technology.

1.7. Viktor Nagayev, Sergii Chervonyi, Yevhenii Beznos. FORMATION OF MANAGERIAL COMPETENCE OF SPECIALISTS THROUGH DIGITAL EDUCATIONAL COMMUNICATION

The article examines the essence and specific features of developing managerial competence of modern professionals in the context of digital transformation of education. The role of digital educational communications as a tool for enhancing professional knowledge, skills, and managerial qualities necessary for effective activity in a dynamic environment is revealed. The main approaches to the use of digital platforms, online courses, virtual trainings, and interactive technologies in the process of professional training and advanced development of managers are identified. It is shown that digital educational communications contribute to the integration of academic knowledge with practical skills, the development of critical thinking, and the ability to make managerial decisions. It is concluded that the implementation of digital tools in the system of managerial training increases competitiveness, flexibility, and readiness for innovative changes.

1.8. Svitlana Nykyporets, Maryna Melnyk, Olena Kriutchenko. ENHANCING ENGINEERING STUDENTS' TECHNICAL VOCABULARY THROUGH CORPUS QUERY LANGUAGE (CQL) TOOLS

This article explores the potential of Corpus Query Language (CQL) tools in enhancing the technical vocabulary of engineering students within English for Specific Purposes (ESP) instruction. Based on a study conducted at a Ukrainian technical university, the paper presents a pedagogical model that integrates CQL-based corpus analysis into classroom practice. Real examples demonstrate how learners identified authentic lexical patterns and phraseological structures used in engineering discourse. The results show improved lexical competence, greater learner autonomy, and enhanced metalinguistic awareness. The study highlights the value of corpus-driven instruction for modernising ESP curricula in technical education.

1.9. Iryna Ostopolets, Tetiana Mostova, Yevhen Topalov. PREVENTION OF PROFESSIONAL BURNOUT IN TEACHERS THROUGH COGNITIVE-BEHAVIOURAL THERAPY

The article is dedicated to the problem of teacher burnout, which has become particularly relevant in the context of modern global challenges and military actions in Ukraine. The negative consequences of burnout for mental health and the effectiveness of pedagogical activity are emphasized. The possibilities of prevention based on cognitive-behavioural therapy are considered. A program of training sessions is presented, aimed at developing self-regulation skills, restoring life balance, and building resilience to stress. The integration of the "Healthy Mind Platter" model (D. Siegel, D. Rock) is proposed as a practical tool to support the mental health of teachers.

1.10. Oksana Patlaichuk, Iryna Briukhovetska, Volodymyr Tovstohan. INFORMATION AND COMMUNICATION TECHNOLOGIES IN HIGHER EDUCATION IN UKRAINE: STATUS OF IMPLEMENTATION AND EFFICIENCY

The article examines the state of implementation of information and communication technologies (ICT) in higher education in Ukraine and assesses their effectiveness in the educational process. The main approaches to the classification of information and communication technologies are analyzed, two main groups of ICT are distinguished: general-purpose and professionally oriented. The advantages and challenges associated with the digitalization of education are identified. Based on empirical data, the impact of ICT on the quality of education, interaction between participants in the educational process and innovative development of the university environment are substantiated. The article may be useful for scientists, teachers, administrators of higher education institutions and developers of educational strategies.

1.11. Larysa Poliakova. THE MEANING OF MEDIA LITERACY OF THE UKRAINIAN YOUTH IN THE MODERN HISTORICAL REALITIES

The modern historical realities, in which Ukraine, is staying are marked not only by military challenges, but also by the large-scale informative war. The young people, who are the most active users of digital media, at the same time become the main target of informative attacks. In these conditions, media literacy is one of the key competencies of the 21st century, as it helps to distinguish between true and fake messages, to counter propaganda and to form one's own public position. The meaning of media literacy of the Ukrainian youth people in the conditions of the modern historical challenges, in particular the russian-Ukrainian war and the globalized informative space has been considered in the article. The necessity of the development of the critical thinking, the ability to recognize fakes and to counteract manipulations in media has been emphasized. It is emphasized that the formation of media literacy among the young people is an important factor of strengthening of the national security, the development of the democratic society and the integration of Ukraine into the European space, increasing informative security and the integration of Ukraine into the European educational and cultural space.

Chapter 2. DIGITAL TRANSFORMATION OF THE ECONOMY AND MANAGEMENT

2.1. Iryna Anhelko. THE ROLE OF INFORMATION TECHNOLOGIES IN IMPROVING MARKETING EFFICIENCY IN DIGITALIZATION

The essence and importance of information technologies in improving the efficiency of marketing activity of enterprises in the conditions of digitalization of the economy is revealed. The essence and functional purpose of IT in marketing, the role of modern tools, including CRM systems, Big Data analytics, marketing automation, social networks, cloud platforms and artificial intelligence, which provide new approaches to the management of relationships with clients, optimization of business proceeds and business proceeds, are outlined. It is shown that the use of digital technologies can significantly reduce time and resources, increase the accuracy of forecasting, instantly evaluate the effectiveness of marketing campaigns and form more personalized consumer proposals. It is concluded that information technologies are a key factor in transformation of marketing strategies and determine the success of enterprises in the digital era.

2.2. Oleksandr Bilotserkivskyi. APPLICATION OF INFORMATION TECHNOLOGIES IN ENTREPRENEURSHIP

The purpose of the study is to define the essence of the concept of “information technology” and to analyze their types and functions used in entrepreneurial activity management. An author's definition of information technology is proposed as a set of methods, tools, and processes aimed at the purposeful collection, storage, processing, transmission, and use of data. The main types of information technologies such as operational, analytical, managerial, cloud, mobile, and those used for cybersecurity are considered with their characteristics. The key functions of information technologies including business process automation, resource management optimization, support for managerial decision-making, and improvement of communication efficiency are explored. Their essence and role in enterprise management are revealed.

2.3. Danila Bodashevskyi, Igor Yarmolitsytskyi, Yuliia Bodashevska. PUBLIC-PRIVATE PARTNERSHIP AS A TOOL FOR DEVELOPING GEOINFORMATION SYSTEMS WITHIN THE NATIONAL SECURITY STRUCTURE

The article discusses the role of geographic information systems (GIS) in ensuring national security. It analyzes the theoretical foundations of GIS and geospatial intelligence (GEOINT), their capabilities for collecting, processing, and integrating spatial data in real time. Key areas of application are highlighted separately – from military operations and border control to critical infrastructure protection. The importance of public-private partnerships in the development of GIS is emphasized, and challenges related to standardization, cybersecurity, and privacy protection are discussed. International experience and lessons for Ukraine in creating an effective geoinformation infrastructure are presented. The article emphasizes the need for a comprehensive approach to improve the efficiency, accuracy of analytics, and resilience of national security systems.

2.4. Iryna Farynovych. ASSESSMENT OF LEADERSHIP POTENTIAL AS A TOOL FOR THE STRATEGIC DEVELOPMENT OF TERRITORIAL COMMUNITIES

The article explores the role of civil servants' leadership potential as a key factor in the strategic development of territorial communities. It reveals the essence of leadership in the context of local self-government, outlines its specific features and significance under conditions of decentralization and socio-economic transformations. An improved system for assessing civil servants' leadership competencies is proposed, based on three groups of competencies: organizational management, personnel management, and self-management. The assessment is carried out using an integral indicator, which makes it possible to determine the level of leadership potential and make informed personnel decisions. A correlation has been established between the development of civil servants' leadership potential and the improvement of communities' socio-economic indicators.

2.5. Nataliia Hembarska, Khrystyna Danylkiv, Orysya Voloshyn. KEY ASPECTS OF SMALL BUSINESS FINANCIAL MANAGEMENT IN UKRAINE UNDER CONDITIONS OF WAR

The purpose of this study is to establish theoretical and practical foundations for effective financial management in small businesses in Ukraine under conditions of wartime instability, digital transformation, and the integration of inclusive growth principles. The paper analyzes financial management tools in small businesses, taking into account existing risks and constraints; identifies key challenges and barriers to financial governance in the sector; and proposes directions for improving financial management through the application of digitalization tools, tax planning, and data protection measures. Practical recommendations are developed for small business owners to enhance the efficiency of financial management and ensure resilience amid ongoing instability.

2.6. Lev Kloba, Nazar Dobosh, Oleksandr Starodub. BANK INVESTMENT MANAGEMENT: CATEGORICAL ANALYSIS AND PRACTICAL ASPECTS

The article explores the essence and research tools of bank investment. It presents a range of definitions for the concepts of "investment" and "investing," varying in degree of specificity and methodological approach. The study examines key categories that form the theoretical and methodological foundation of bank investment research, including bank financing, bank investing, bank investment resources, bank investment potential, stocks and flows of bank investments, sources of bank investment resources, and bank investment management.

2.7. Tetiana Lysiuk, Yurii Biletskyi, Larysa Royko. INNOVATION AND DIGITALIZATION AS FACTORS IN THE TRANSFORMATION OF EXCURSION PRACTICE

The article provides a comprehensive analysis of innovative approaches to the digitization of excursion activities, including the use of virtual (VR) and augmented (AR) reality, mobile applications, AI-based audio guides, geolocation services, and interactive multimedia platforms.

The study focuses on the transformation of traditional excursions into digital formats that ensure the accessibility of tourist services regardless of the user's geographical location, promote the personalization of experiences, and expand opportunities for interaction with cultural heritage.

The results presented highlight the role of innovation as a catalyst for competitiveness in tourism and define the vectors for the further development of excursion activities in the context of digital transformation.

2.8. Vitaliy Makohon, Denys Zabolotnyi. FINANCIAL STRATEGY OF AGRICULTURAL BUSINESS: RISK ASSESSMENT THROUGH VAR AND ML APPROACHES

The study proposes a methodology for strategic financial planning of agricultural enterprises that combines forecasting of liquidity gaps with assessment of left-tail interest rate risk based on VaR. The approach is based on an ensemble of volatility models (GJR-GARCH), machine learning (XGBoost), and historical estimates optimized by the coverage error metric. The model accounts for seasonality, cyclicality of financial needs, and regional specificity, ensuring adaptability to external shocks. Scenario analysis of rate increases and yield reductions enabled the assessment of the sector's marginal resilience. A potential reduction in liquidity risk by 12-15%, improvement in VaR accuracy by 20-25%, and decrease in debt burden by 10-12% was established.

2.9. Oleksiy Poburko, Oleg Brykar. RESEARCH ON THE POSSIBILITIES OF BUSINESS SCALING IN UKRAINE THROUGH THE DEVELOPMENT OF INDIVIDUAL INVESTMENT

Regardless of the economic situation, entrepreneurs have two options: develop their business or remain at the same level, because without moving forward, the risk of falling behind will only increase. Entrepreneurs can choose growth or scaling, which will most likely require additional capital to strengthen the team and improve operational activities. Among the sources of capital, funds from individual investors are of great importance, which, when combined into joint investment funds, are a significant resource for development.

2.10. Olha Synihovets. INTEGRATION OF NANOTECHNOLOGIES INTO INTERNATIONAL BUSINESS PROCESSES AND THEIR MANAGEMENT

The development of nanotechnology is marked by rapid growth in the capitalization of the nanotechnology segment of the global market, with an increase in the scale of nanotechnology involvement in the global economy at various levels and in line with modern technological developments. Integration is a key element of process improvement, enabling

companies to reduce costs, improve quality, and increase efficiency. The introduction of nanotechnology into international business processes ensures innovation, increased efficiency, and competitiveness of enterprises in the global market. By strategically integrating nanotechnology, international businesses gain opportunities for growth and long-term development. Integration is occurring in various key areas, including product development, supply chain management, and data analytics.

2.11. Nataliya Synyutka, Oksana Kurylo, Andriana Mazur. E-VAT AS A TAX COLLECTION STRATEGY FOR AGRICULTURAL PRODUCERS IN UKRAINE

The aim of this paper is to study an electronic tax collection strategy for the agricultural sector in Ukraine in the context of budget revenues. We analyse and estimate the tax burden on the agricultural sector before and after Ukraine's fiscal reform between 2010 and 2023. The growth of VAT revenues in relation to GDP after the reform remains unstable. Using agriculture as an example, this article confirms that electronic VAT has had no positive impact on domestic tax collection.

2.12. Tetiana Tkachenko, Oleksandr Hladkyi, Sergii Khlopiak. INFORMATION AND INNOVATION FRAMES IN ECONOMICS AND MANAGEMENT OF METROPOLITAN CITIES AND AGGLOMERATIONS

The economics and management frames of metropolitan cities and agglomeration’s development (inner and outer aspects, functional-component and functional-territorial properties as well as specific signs) are explored. Unique features of representativeness, progressiveness, dynamism and international relations additionally characterize metropolitan agglomeration. The redistribution of economic activities between central core (basic activities) and peripheral zones (attendant activities) are clearly revealed in functional-component structure of metropolitan agglomerations. The market-based mechanisms of economic activities’ optimal relocation in the agglomerated territories that include economic incentives, materials and information encouragement, creation of favorable conditions as well as economic sanctions are investigated.

Chapter 3. APPLIED AND SPECIALIZED TECHNOLOGY SOLUTIONS

3.1. Yelyzaveta Chukurna. STRATEGIES DERECTIONS FOR RENOVATIONG THE ARCHITECTUAL HERITAGE OF THE SOVIET PAST IN THE URBAN ENVIRONMENT

The article presents the results of a comparative analysis of the use of architectural heritage of the Soviet period using the example of two cities: Odesa (Ukraine) and Tbilisi (Georgia). The directions for implementing the renovation strategy are identified using the example of positive features of preserving the architecture of Tbilisi and the aspects of implementing the renovation strategy for the city of Odesa are formed. A SWOT-analysis is conducted, based on which a matrix of renovation strategies for architectural heritage is developed and proposed. Attention is focused on the preservation of historical and cultural heritage, considering European practices in achieving sustainable development goals.

3.2. Rostyslav Dydiak. ANALYSIS OF ACOUSTIC SIGNATURES OF HEAVY TRACKED VEHICLES USING MACHINE LEARNING METHODS

This paper presents an analysis of the revealing acoustic signals of heavy tracked vehicles, focusing on their identification and classification using modern signal processing and machine learning methods. Acoustic data were collected under controlled outdoor conditions at various distances and operational modes, including engine work, movement, and impulsive sound events. Preprocessing included noise filtering, normalization, and spectral analysis. Harmonic and MFCC-based feature extraction enabled detailed characterization of vehicle-specific sounds. Statistical analysis confirmed the stability of low-frequency engine components and highlighted attenuation of high-frequency harmonics with distance. Machine learning models, including StandardScaler and Logistic Regression, were applied to classify sounds, showing promising results. The study demonstrates the potential of acoustic signatures for automated recognition of large-scale mechanical equipment. Findings indicate that spectral patterns and harmonic interactions form unique sound portraits. These results provide a foundation for further research with deep learning methods to enhance accuracy in real-world complex environments.

3.3. Andrii Lagun, Nataliia Kukharska. DESIGN FEATURES OF GEOGRAPHIC INFORMATION SYSTEMS FOR ADDRESSING ENVIRONMENTAL SECURITY ISSUES AND BIODIVERSITY MONITORING

The paper presents the results of research focused on addressing environmental security issues in various sectors of the national economy through the use of Geographic Information Systems built with modern information technologies. The authors analyze different types of human impact on the environmental situation across various regions of the planet. The study establishes the influence of anthropogenic factors on biodiversity, highlighting that deforestation, landscape transformation, and the expansion of agricultural land significantly affect the environment and alter the living conditions of flora and fauna. The development of agriculture alters the structure of surface water systems, making the design of environmental monitoring information systems for surface water quality an essential step in ecological research. The authors also highlight the impact of agricultural enterprises and waste treatment facilities on the environmental situation. Finally, the paper describes the main information technologies used in the design of Geographic Information Systems, with particular emphasis on the integration of interactive maps for visualizing research results.

The importance of learning a foreign language and its application in future professional activities is substantiated.

3.4. Andrii Orhiian, Hanna Balaniuk, Alexandr Orgiyan. EXPERIMENTAL STUDY OF THE INFLUENCE OF TECHNOLOGICAL FACTORS ON VIBRATIONS AND MACHINING ACCURACY ON WIDE UNIVERSAL TOOL MILLING MACHINES

This work is devoted to the experimental study of the influence of various factors on vibrations and machining accuracy on wide-range universal tool milling machines. In the course of the research, experiments were carried out on climb milling with horizontal and vertical spindles, as well as boring with a vertical spindle, using SCh5-32 cast iron as samples. Special attention was paid to the influence of the arrangement of machine components and the condition of movable joints on vibrations during machining, as well as the conditions for clamping the samples, their orientation in the table plane, and the sequence of machining. Strain gauging was used to assess the relative vibrations of the milling cutter and the workpiece, and machining accuracy was evaluated by surface roughness, deviations from flatness and parallelism, as well as ovality and conicity during boring. The influence of these factors on the non-parallelism of the base and machined surfaces and roughness is also analyzed.

3.5. Oleksandr Ovcharov. INTEGRATION OF DIAGNOSTIC DATA INTO THE TURBOGENERATOR TECHNICAL CONDITION MANAGEMENT SYSTEM

The article presents a model of an integrated system for managing the technical condition of a turbogenerator, combining the functions of monitoring, diagnostics, forecasting and strategic management of the operation of power equipment at a nuclear power plant. Particular attention is paid to integration with maintenance and repair systems, which allows a transition from a scheduled approach to the concept of condition-based maintenance. The proposed model provides automated transfer of collected data to forecasting and management modules, taking into account data from other systems and existing reserves (stocks), and creates a unified information space that includes repair history, data from spare parts catalogues and maintenance schedules.

3.6. Yevhen Prokofiev. MODERN INFORMATION TECHNOLOGIES IN THE VOCATIONAL TRAINING SYSTEM: AN INNOVATIVE APPROACH TO THE ORGANIZATION OF THE EDUCATIONAL PROCESS

The article examines the features of the introduction of modern information technologies into the system of professional training of specialists, focusing on their role as a key factor in the innovative transformation of the educational process. The importance of information and communication technologies for the formation of digital and professional competencies of students, the development of their independence, critical thinking and the ability to continuous learning is emphasized. The need to design an integrated educational environment that combines traditional pedagogical methods with modern digital tools to ensure adaptability and flexibility of professional training in the digital economy is substantiated.

3.7. Iryna Stepanova, Svitlana Nykyporets, Halyna Kukharchuk. INTEGRATING ARTIFICIAL INTELLIGENCE TOOLS INTO PROJECT-BASED ENGLISH LANGUAGE INSTRUCTION FOR TECHNICAL STUDENTS: A FRAMEWORK FOR FOSTERING CRITICAL AND CREATIVE THINKING

This article presents a pedagogical framework for integrating artificial intelligence (AI) tools into project-based English language instruction for technical students in Ukraine. Against the backdrop of war-related disruptions, the study explores how platforms such as ChatGPT and Grammarly can support the development of critical and creative thinking within English for Specific Purposes (ESP) courses. Using a mixed-methods approach, the research demonstrates that AI-enhanced project-based learning significantly improves higher-order cognitive skills, increases student motivation, and fosters ethical awareness. The proposed framework responds to both academic and psychological needs of learners during wartime, offering flexible, real-world language tasks that promote autonomy and engagement. The study concludes with practical recommendations for educators and curriculum designers seeking to modernize ESP instruction in technical disciplines while preparing students for professional challenges in uncertain times.

3.8. Yaroslava Vasylkevych, Mykola Ryk, Oksana Kikinezhdi. DEVELOPMENT OF MOTIVATION FOR CREATIVE ACTIVITY OF STUDENTS AS AN INNOVATIVE TECHNOLOGY IN PROFESSIONAL TRAINING

The article provides theoretical justification and empirical research into the features of students' motivation for creative activity. The obtained results reflect the motivational profile and structure of the leading motives of creativity. In the hierarchy of motives for creative activity among students, intrinsic motivation prevails over extrinsic motivation. The most significant factors encouraging creative activity are the desire for self-affirmation and the cognitive need. The leading motivation for creativity is personal independent motivation (developmental motivation). Less significant for effective creative activity turned out to be externally oriented instrumental

motivation, which supports the satisfaction of such needs as fame, success, and material rewards, enabling creative self-expression and obtaining recognition from others, impressing others, and self-presentation. The article considers opportunities for supporting the motivation for creative activity within professional education.

3.9. Tetiana Yarkho, Tatyana Emelyanova, Ievgen Medvediev. THE MODERN CONCEPT OF CLASSICAL AND APPLIED FUNDAMENTAL MATHEMATICAL PREPARATION OF STUDENTS OF EUROPEAN TECHNICAL UNIVERSITY

The paper is devoted to the implementation of the concept of classical and applied mathematical preparation of students in the educational process of technical universities of Ukraine, taking into account the integration into the European educational space. In the current conditions of industrial and transport reconstruction of the state, national technical universities should provide preparation of specialists capable of meeting the rapidly changing challenges of time. The important factor in the reliability and quality of professional preparation of technical university students is the professional and applied orientation of general mathematics education. The paper presents the subject and main tasks of elective mathematical disciplines of technical and transport orientation and samples of relevant professional content.

3.10. Valentyna Yuskovych-Zhukovska, Oleg Bogut. THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE EFFICIENCY OF IT PROJECT MANAGEMENT

The rapid advancement of Artificial Intelligence (AI) is transforming the practice of IT project management by enhancing decision-making, optimizing planning and resource allocation, improving risk assessment, and automating routine processes. This study investigates the level of AI adoption among IT project management professionals in Ukraine, identifies key areas of application, and examines the relationship between AI usage and project performance. The results provide actionable insights for developing an AI adoption roadmap in project management environments and underscore the strategic role of AI in shaping the future of IT project management.

3.11. Inna Zhukovych. THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE STUDY OF THE ENGLISH LANGUAGE BY CADETS OF HIGHER MILITARY EDUCATIONAL INSTITUTIONS

The article explores the essence of the concept of artificial intelligence (AI) and showcases various online AI platforms and chatbots designed for independent English language learning. It highlights the advantages of utilizing these tools in the process of foreign language acquisition. The research findings indicate that cadets of higher military education institutions can leverage AI tools for more comprehensive assistance or consultation, followed by practical application in mastering a foreign language. The study emphasizes the critical role of foreign language proficiency in the career of a modern officer. It also draws attention to the career advancement opportunities enabled by English proficiency, particularly in the context of international cooperation and Ukraine’s aspirations to become a NATO member, where officers have a wide range of development opportunities.

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