

Sumy State Pedagogical University named after A. S. Makarenko Публікації 2025 року

Dubynska, O., Mondich, O., Krasilova, Y., Udovenko, J., Holotenko, A. Ukrainian University Teachers in Wartime: Intersectional Stress and its Impacts on Teaching and Student Engagement (2025). *Research in Post-Compulsory Education*, DOI 10.1080/13596748.2025.2598951

This article examines student academic performance through the lens of stress-related intersectionality among university lecturers in Ukraine during wartime. It presents empirical research on how professional stress, exacerbated by the military context, affects the pedagogical effectiveness of higher education lecturers and, as a result, student academic performance. The main stress factors identified include work overload, emotional burnout, administrative pressure, lack of institutional support, and war-related challenges such as danger, displacement, and the constant threat of attack. The study, conducted in three Ukrainian higher education institutions located in regions with different security and social conditions, included surveys, interviews, focus groups, and diary keeping with both teachers and students. The results confirm that stress during war significantly undermines the quality of teaching, student motivation and academic performance. The article proposes a set of stress management strategies, including organisational changes, psychological support systems in universities, the development of self-regulation skills, and professional mentoring. The implementation of these measures will strengthen the mental health of Ukrainian teachers and contribute to improving student academic performance in conditions of martial law.

Otriazhyi, P., Obada, T., **Kovalchuk, O.**, Vasilyan D., Gol'din, P. A new seal from the Late Miocene of the Eastern Paratethys highlights the past regional diversity of true seals (Phocidae) (2025). *Swiss Journal of Palaeontology*, 144 (1), art. no. 28. DOI: 10.1186/s13358-025-00372-7

True seals rapidly evolved in many forms in the epicontinental basin of Paratethys during the Miocene. However, most of their nominal taxa so far were proposed based on isolated limb bones, and their taxonomy has long been under discussion. Here we describe a new articulated skeleton MCFFM V-150 of a medium-sized seal with pachyosteosclerotic postcranial bones from the Late Miocene of the present-day Moldova and propose a new genus and species for it-Paratethyphoca libera. It is distinguished in the presence of a supraorbital process of the frontal bone in its posterior portion, a long snout, a proportionally long humerus (88% of the skull length), a short deltoid crest of the humerus, and a low supraspinatus fossa of the scapula. We also suggest this taxonomic identification for other Paratethyan seals. Phylogenetic analysis placed Paratethyphoca libera among other stem Phocinae described so far from the Paratethys; however, its close relationship to a living hooded seal Cystophora cristata cannot be ruled out. Additionally, MCFFM V-150 showed tooth wear interpreted as a sign of suction prey capture strategy, shared by another Paratethyan seal Monachopsis pontica and the living bearded seal Erignathus barbatus.

Davydenko, S., **Kovalchuk, O.**, Otriazhyi, P., Gol'din, P. A high-resolution 3D reconstructed skeleton of the extinct dwarf whale Cetotherium riabinini from Ukraine (2025). *Scientific Data*, 12 (1), art. no. 1798. DOI 10.1038/s41597-025-06086-2

Cetotheres (family Cetotheriidae) were small-sized extinct baleen whales, likely the smallest among toothless baleen whales. Cetotherium riabinini Hofstein, 1948 is known as a single specimen, the holotype. It is represented by a well-preserved 3 meter long skeleton including an almost complete skull and most of the postcranial bones. This specimen is held in the National Museum of Natural History in Kyiv, and

therefore it is the part of fragile Ukrainian heritage at risk. Thus, creating high resolution digital twins of the specimens serves not only for research purposes but also contributes to a partial preservation of heritage. Here we present a full-size 3D surface scan of the mounted skeleton of Cetotherium riabinini, a detailed scan of its right forelimb, and scans of its separately stored bones from the museum collection. Additionally, we provide a complete digital restoration of the C. riabinini skeleton, combining all available bones, reconstructing damaged elements, and modelling missing bones based on those in related baleen whale species both extinct and recent.

Prokopenko, O., Trypolska, G., Bashynska, I., Telizhenko, O., Strelcow, W., Kovalenko, Y., Lytvynenko, S., Wozna, A. Financial Mechanisms and Risk-Based Modeling of Energy Efficiency and Renewable Energy Adoption in Households (2025). *Energies*, 18 (21), art. no. 5799. DOI: 10.3390/en18215799

The research aims to evaluate financial instruments on household uptake of energy efficiency and renewable energy towards different risk scenarios. The study addresses the problem of behavioral response to financial incentives when technological, financial, or institutional risks are perceived as continuous. Two sophisticated models were used for the analysis to quantify the effect of subsidies, green loans, personal income, energy costs, and governmental support for energy efficiency and renewable energy uptake. The research data came from the UK, Estonia, Germany, Poland, and Ukraine between 2022 and 2024. The results suggest that countries experiencing drops in risk indices with strong institutional support, such as Germany and the UK, had maximum improvement in energy efficiency (as high as 598.72 kWh saved a year) and renewable energy implementation rates (above 30%). Countries posing high risk, like Ukraine, require more potent and custom-made strategies to achieve comparable advances compared to a less-risky environment. The evidence indicates that even financial mechanisms are most fruitful if they are complemented by risk management tactics. With these results, policymakers can proceed with useful information in formulating economically appropriate strategies that rely on realistic assumptions of behavior.

Ponomarenko, L., Kompaniets, L., Luchentsova, I., Smyrnova, T., Piatnytska, D. Curatorship in Higher Education: The Influence of Student Personality on Training (2025). *Revista Conrado*. 21 (107), art. no. e4964

This article explores the hypothesis that the development of students' socio-cultural potential within higher education can be maximized through the strategic integration of university leisure activities, guided by a well-designed structural and functional model and supported by specific pedagogical conditions. Drawing on a comprehensive review of contemporary pedagogical literature, the study identifies and clarifies the key components and dimensions of students' socio-cultural potential, emphasizing how personality traits influence engagement, motivation, and overall educational outcomes. Leisure activities are positioned not merely as recreational opportunities but as powerful educational tools that can enhance communication, teamwork, creativity, and social responsibility among students. The article proposes a structural-functional model that articulates the stages, processes, and mechanisms through which socio-cultural potential can be developed effectively. Pedagogical conditions for implementing this model, including mentorship, personalized guidance, and collaborative learning strategies, are discussed and tested in practical university settings. The findings demonstrate that aligning leisure-based educational interventions with students' personality profiles significantly improves their socio-cultural development, strengthens their academic performance, and fosters a more holistic educational experience. By integrating personality-aware curatorship practices into higher education, institutions can cultivate graduates who are not only academically competent but also socially aware, culturally sensitive, and equipped to navigate complex professional and social environments. This research contributes to the theory and practice of curatorship, offering a replicable methodology for educators, administrators, and policymakers aiming to enhance student development in modern universities.

Borrani, A., Mackiewicz, P., **Kovalchuk, O.**, Barkaszi, Z., Capalbo, C., Dubikovska, A., Ratajczak-Skrzatek, U., Sinita, M., Stefaniak, K., Mazza, Paul P. A. The evolutionary history of Rhinocerotidae: phylogenetic insights, climate influences and conservation implications (2025). *Cladistics*, DOI 10.1111/cla.70015

Family Rhinocerotidae exhibits a complex and debated phylogeny, with fossil records spanning over 50 million years. This study presents a comprehensive phylogenetic total-evidence analysis of Rhinocerotidae to date, integrating morphological, molecular, fossil and paleoclimatic data within maximum parsimony, maximum likelihood, Bayesian and time-calibrated frameworks. A matrix of 106 taxa and 534 morphological characters, including 11 newly defined ones, was assembled through systematic revision of previously ambiguous characters. In contrast to earlier studies, a fossil-based outgroup was selected in place of extant Tapirus to improve character polarity and reduce topological artefacts associated with distant outgroup choice. The resulting cladograms resolve longstanding conflicts in rhinocerotid systematics and identify many supported clades. Analyses of the studied clades revealed an association between lineage diversification and climatic thresholds, which appear to have mediated ecological turnover and the differential persistence of traits. The application of an integrative total-evidence approach illustrates the role of climatic and ecological filters in shaping the evolutionary trajectories of megafaunal lineages and contributes to broader methodological discussions in phylogenetics. The analytical framework developed provides a comparative model applicable to both extinct and extant taxa, reaffirming the value of rigorous cladistic methods in paleobiology and systematics.

Dubikovska, A., Górka, M., **Kovalchuk, O.**, Bienkowska-Wasiluk, M., Swidnicka, E., Barkaszi, Z. Middle Miocene (Badenian) fishes from the north west of the Fore-Carpathian Basin (2025). *Swiss Journal Of Palaeontology*, 144 (1), art. no. 65. DOI: 10.1186/s13358-025-00408-y

Diverse assemblages of cartilaginous and actinopterygian fish fossils were recovered from Middle Miocene deposits of southern Poland (north-western part of the former Fore-Carpathian Basin). Here we describe and analyse the taxonomic composition of fish assemblages from 13 Badenian localities based on materials collected in the early 1960s. A total of 423 specimens were studied, most of which belong to ray-finned fishes and sharks. The latter is the most diverse group (13 families of 5 orders), in which sand tiger sharks (Carchariidae) and requiem sharks (Carcharhinidae) predominate. Regarding actinopterygians, 92% of the specimens belong to seabreams (Sparidae). Pristiophorus sp., Araloselachus vorax, and Raja gentili have been first recorded for the Fore-Carpathian Basin, whereas Trigonodon jugleri and Diplodus sitifensis have been first documented in the north-western part of the region. The studied fossils come from localities confined to marginal marine subtidal to shallow and deeper sublittoral zones of the basin. The majority of the revealed taxa are thermophilic and occupy pelagic, benthopelagic, and benthic habitats, although species that can also be found in deeper and cooler environments are represented in the studied sample as well. This implies a complex marine ecosystem with diverse ecological niches in the north-western part of the Fore-Carpathian Basin. Taxonomically similar fish assemblages have been reported from the Burdigalian, Langhian, and Serravallian of Europe, indicating continuity and integrity in the evolution of fish faunas in different basins of the Paratethys during the Miocene.

Berezovsky, A., Gasparic, R., **Kovalchuk, O.** New data on Early Oligocene invertebrates from the Nikopol manganese-ore Basin in Ukraine (2025). *Neues Jahrbuch Fur Geologie Und Palaontologie-Abhandlungen*, 316 (1), P. 23–39. DOI: 10.1127/njgpa/1281

The present study offers new data on Early Oligocene bivalve molluscs and decapod crustaceans from manganese-ore beds of the Nikopol Basin in southern Ukraine. Both molluscs, primarily of the genus

Crassatella, and crabs, particularly of the genus *Coeloma*, provide significant novel insights into the faunal assemblages of the Eastern Paratethys during the Early Oligocene. Three bivalve species, *Crassatella* (*Bathytormus*) *originalis*, *Thracia* (*Thracia*) *acris* and *Pholadomya* (*Pholadomya*) *arguta*, are described as new. Our findings highlight the ecological conditions of the Nikopol Basin, characterised by a setting with fluctuating salinity levels and redox conditions, which had an impact on the preservation and diversity of invertebrate taxa within the Nikopol Basin.

Yepishin, V., Khalaim, Y., Demyanenko, S., **Govorun, O.**, Novytskyi, S., Tsykal, S. New Records of Little Known Pyraloid Moths (Lepidoptera: Pyraloidea) from Different Regions of Ukraine (2025). *Zootaxa*, 5696 (1), P. 1–27. DOI: 10.11646/zootaxa.5696.1.1

This paper presents new reports of 42 Pyraloidea species from Ukraine, comprising both regional and country-level novelties. Two species are recorded in Ukraine for the first time: Apomyelois cognata (Staudinger, 1871) (Phycitinae) from Luhansk region and Herpetogramma licarsisalis (Walker, 1859) (Spilomelinae) from Odesa region. Another three species are found for the first time in mainland Ukraine: Tsaraphycis mimeticella (Staudinger, 1879) (Phycitinae) from Luhansk region, Nyctegretis ruminella De la Harpe, 1860 (Phycitinae) from Zaporizhzhia region, and Hydriris ornatalis (Duponchel, [1832]) (Spilomelinae) from Odesa region. All of these were previously known only from Crimea. Additionally, 35 other species are recorded from different regions of Ukraine for the first time. Adults and genitalia of several rare or interesting species are illustrated. Some inaccuracies regarding misidentification and misprint made in previous publications are corrected here.

Volynskyi, T., Desse-Berset, N., Zivaljevic, I., Gorobets, L., **Kovalchuk, O.** Atlas for the Identification of Sturgeon Species of Europe by Skeletal Elements and Implications for its Use in Archaeozoology (2025). *International Journal of Osteoarchaeology*, 35 (5), P. 413–420. DOI: 10.1002/oa.70035

This paper presents a comprehensive photographic atlas for the identification of sturgeon species in Europe based on skeletal elements. The atlas aims to facilitate accurate species identification of sturgeons from archaeological sites across Europe by providing photographs of key skeletal elements and main body measurements. These data were collected from examinations of 42 specimens representing eight sturgeon species and two intergeneric hybrids. The atlas covers 22 skeletal elements, focusing on those most commonly preserved in the context of archaeological sites and useful for species-level identification. This resource is intended to support archaeozoologists in their efforts to reconstruct past human activities, trade networks, and environmental conditions. It can also contribute to current conservation efforts by documenting the diversity and distribution of individual species-level taxa of sturgeons in the historical past of Europe.

Boiarynova, I., **Mironets, L.**, Zhyhaylo, O., Bilychenko, O., Karhut, V., Kurchatova, A. Professional Mobility of a Teacher in the Conditions of Digitalization of Society (2025). *Revista Conrado*, 21 (106), art. no. e4480.

The article proves the importance, content, and directions of the formation of professional mobility of a teacher in the conditions of digitalization of society. Digital mobility is considered a key element of professional mobility. The qualities and components that are fundamental for the formation of development and identification of professional mobility of a teacher in the conditions of digitalization of society are highlighted. The results of the ascertaining stage of the experiment showed an insufficient level of formation of professional mobility of a teacher in the conditions of digitalization of society. At the formative stage of the experiment, pedagogical conditions for the formation of professional mobility of a teacher in the conditions of digitalization of society were introduced in the experimental groups. At the control stage, the effectiveness of the implementation of pedagogical conditions, and the role of training and seminars for the

formation of professional mobility of a teacher in the conditions of digitalization of society were checked. The effectiveness of the implementation of pedagogical conditions and the role of training and seminars for the formation of professional mobility of a teacher in the conditions of digitalization of society is evidenced by the dynamics of the levels of professional mobility of teachers in the experimental groups. As a result of the study, scientific and methodological recommendations were developed for students and teachers regarding the formation of professional mobility of teachers in the context of the digitalization of society.

Trypolska, G., Kubatko, O., **Prokopenko, O.** Establishing Solar Energy Cooperatives in Ukraine: Regional Considerations and a Practical Guide (2025). *Energies*, 18 (14), art. no. 3623. DOI: 10.3390/en18143623

The energy system of Ukraine needs to be decentralized, which aligns entirely with its intention to join the EU. The study focuses on regional peculiarities in establishing solar energy cooperatives and provides practical guidance on developing an energy cooperative in Ukraine. The article studies the different elements of electricity tariff composition for households, compares the existing support schemes (feed-in tariff and net metering), and defines which regions are the most suitable for establishing energy cooperatives (using solar installation). The primary methods employed are descriptive analysis, net present value analysis, and the integral assessment method, which collectively provide a comprehensive framework for evaluating both the economic viability and regional suitability of solar energy cooperatives. The findings indicate that the most suitable regions for solar energy cooperatives in Ukraine are located in the northeast and southwest of the country. The study highlights the importance of tailoring regional programs for energy cooperatives to enhance energy security and support the country's low-carbon energy transition. The findings may be of interest and applicable in Ukraine and beyond.

Pukhno, S., Nepomniashcha, H., Mykolaiko, V., Krasnenko, O., Medvedieva, A. Implementation of E-Learning in the Context of Digital Education (2025). *Revista Conrado*, 21 (105), art. no. 3623.

The article defines the essence, structure and content of e-learning and reveals the possibility of its implementation in modern conditions. The theoretical justification of e-learning as a pedagogical system is given and it is filled with specific content. An ideal theoretical model of the pedagogical concept of e-learning in a university is developed and on its basis a pedagogical logical-semantic model, an algorithm for its formalization and implementation by means of computer technology are developed. The procedure of pedagogical examination as a system of forecasting and correction of the educational process in "E-learning" is scientifically substantiated and diagnostic tools for its implementation are developed. It has been proven that the global educational space and the educational space of the university, as a set of all possible educational situations displayed on uniform measurement scales, is a metric space on which the operations of fuzzy equality and fuzzy inclusion are performed. For the first time, the possibility of using the language of predicate logic to create a formalized pedagogical model of training, capable of displaying in real time the current and prospective levels of achievement of the set educational goal by the student using the semantic constructions of natural language.

Komarovska, O., Kolubayev, O., Ivaniukha, T., Antonyuk, I., **Yeromenko, A.** Innovative Processes in 20th-Century Music: From the Avant-Garde to the Digitization of Music (2025). *Studia Universitatis Babeș-Bolyai Musica*, 70 (Special Issue), P. 27–42. DOI: 10.24193/subbmusica.2025.spiss1.02

The musical art of the twentieth century is characterized by the rapid evolution of styles, genres, and expressive means, inspired by the development of technology, including in the field of sound recording and electronic musical instruments. The purpose of this paper is to provide a generalized overview of the

innovations that appeared in music during the twentieth century and determined its stylistic diversity. The research methodology is based on an empirical approach that includes the analysis of musicological literature and the analysis of scores by composers from different countries who worked in different musical genres and made the greatest contribution to the introduction of the latest compositional techniques. It has been found that innovations in the music of the twentieth century affect the timbral palette and peculiarities of the pitch organization of the musical fabric. The renewal of timbral diversity is primarily associated with the development of electronic sound synthesis, which opens up opportunities for generating sounds inaccessible to acoustic musical instruments. By the end of the twentieth century, special synthetic sounds became the basis of electronic dance music, such as techno and house. Innovative methods of pitch organization refer to composers' searches aimed at expanding or introducing alternatives to the classical tonal system. Such alternatives include modality, serial technique, and microintervals. These updates concern not only the author's material, but also the methods of composer's work with folk music-the combination of folk melodies with innovative harmonic and timbral solutions became the basis of neo-folklorism.

Leleka, V., Vasilevskiy, V., **Kravchenko, I.**, Davydova, N., Redko Digital Technologies in the Professional Training of Future Specialists in Physical Culture and Sports for Health Activities (2025). *Eduweb-Revista de Tecnologia de Informacion y Comunicacion en Educacion*, 19 (3), P. 359–376. DOI: 10.46502/issn.1856-7576/2025.19.03.23

The article emphasizes the importance of health work in the field of physical culture and sports, highlighting ways to enhance key training areas in higher education through digital technologies. These methods aim to improve the quality of physical culture professionals and promote a healthy environment during society's modern development. The role of educational, training, methodological, and practical classes in establishing a healthy environment is clarified. The components of physical culture and health preservation are described to support the application of digital technologies, along with measures and tools related to the health function of physical culture-specifically, physical culture and health technologies-as well as the tasks and rules of modern health work. An experiment testing the effectiveness of the developed system for training future physical culture and sports specialists indicated that the control group's results remained largely unchanged. In contrast, the experimental group showed significant qualitative improvements after implementing the system and conducting the author's special course. These changes are reflected in the overall readiness structure and in various factors, marked by shifts in the significance of individual components of readiness.

Vdovina, O., Mykolaiko, V., **Kharchenko, I.**, **Krasilov, A.**, Yeromenko, A. Development of a Pedagogical Model of Combined Management of the Quality of Educatio-Nal Activities of Higher Education Students (2025). *Revista Universidad y Sociedad*, 17 (4), art. no. e5344.

In the article, based on the analysis of modern approaches to quality management of students' educational activities at the university, specific features of the concept of adaptive quality management of educational activities are identified. The functions and features of the pedagogical model of adaptive quality management of students' educational activities at the university are developed and substantiated. The features of the interdisciplinary project as a technology of adaptive quality management of students' educational activities at the university are revealed. The adaptive potential of various types of quality control of educational activities is revealed. An experimental test of the developed system of adaptive quality management of students' educational activities at the university is conducted. The information presented in the article allows us to conclude that targeted work on the implementation of the pedagogical model of adaptive quality management of educational activities of university students increases the motivation for educational activities, has a positive effect on the development of students' research

competence, and contributes to the successful development of levels of training, students' experience in goal setting, goal implementation, and reflection of activity results. It is also important to note the positive impact of the adaptive quality management system of educational activities on the development of students' critical thinking.

Topolnyk, Y., Gurevych, R., Debenko, I., Klochok, O., **Cherniakova, Z.**, Yarova, A., Maksymchuk, B. The Impact of Digital Technologies and AI on Adult Learning: From Digital Literacy to Neuroplasticity (2025). *Brain-Broad Research in Artificial Intelligence and Neuroscience*, 16 (2), P. 148–155. DOI: 10.70594/brain/16.2/11

This article explores the urgent issue of developing digital skills and stimulating neuroplasticity in adults during rapid digital transformation. It examines how information and communication technologies (ICT) and artificial intelligence (AI) contribute to effective adult education. The article analyses the theoretical foundations of digital literacy and neuroplasticity. It also discusses practical strategies for enhancing these areas through ICT and AI. To support this analysis, the study applies several research methods. These include a theoretical review of scientific literature, comparative analysis, and case study approaches. The methods are used to investigate real-life examples of adult learning with tools such as online courses, AI-powered tutors, and neurofeedback systems. The findings show that ICT and AI significantly expand access to education and support personalised learning. Besides, they help improve cognitive functioning, increase learning motivation, and promote neuroplasticity in adult learners. The article presents some examples of digital tools that personalise learning and support cognitive development. These include AI tutors, online learning platforms, and neurofeedback technologies. In addition, the article discusses the challenges and future ways of integrating ICT and AI into adult education. It highlights key issues such as ethics and accessibility. Finally, the article emphasises that digital literacy and neuroplasticity are essential for successful ageing and lifelong learning. It concludes by underlining the critical role of ICT and AI in creating inclusive, engaging, and effective learning environments for adults.

Prokopenko, O., Jarvis, M., Prause, G., **Omelyanenko, V.**, Kara, I. Optimizing Suburban Public Transport Through Smart City Logistics: A Study on Information Flow and Passenger Management (2025). *Acta Logistica*, 12 (2), P. 291–299. DOI: 10.22306/al.v12i2.621

The study explores how Smart City technologies influence logistics operations in suburban public transportation systems. By enhancing passenger and vehicle movement, the study assesses the role of sensor data, real-time information, and data analysis in improving the flow of materials, personnel, and information in suburban transit. Findings demonstrate that Smart City initiatives lead to shorter wait times, improved route optimization, and greater reliability, thereby boosting overall transport logistics. Through real-time dataprocessing, suburban systems can manage flow dynamically, offering valuable insights for scalable implementations in both urban and suburban logistics.

Hrinchenko, H., **Prokopenko, O.**, Karbekova, A., Antonenko, N., Kovshun, N., Kubakh, T., Poliushkin, S. Sustainable Lifespan Re-Extension Management of Energy Facilities: Economic Assessment and Decision-Making Model for Phased Decommissioning (2025). *Sustainability*, 17 (10), art. no. 4610. DOI: 10.3390/su17104610

This study proposes a decision-making model based on the economic assessment of phased decommissioning of energy facilities, specifically focusing on a nuclear power plant (NPP). The objective of the research is to develop and validate an economic assessment methodology for comparing immediate and deferred dismantling strategies for a 1000 MW NPP unit. For economic justification, a comparison of

the economic expenses is proposed based on the accumulation of radioactive waste, safety activities, and labour costs for the two options. The methods employed include a multifactorial analysis based on expert assessments, considering economic expenses related to radioactive waste accumulation, safety activities, and labour costs. Criteria with differences exceeding 10% for quantitative indicators and fundamental differences for qualitative indicators were deemed significant; each criterion's acceptability was weighted accordingly. The key results show that deferred dismantling is economically preferable; the total score for deferred dismantling exceeds that of immediate dismantling by approximately 10% (14.16 points vs. 15.86 points). A comparison of block schedules for decommissioning, dynamics of labour costs, and annual volumes of reprocessed radioactive waste for the baseline and optimised deferred dismantling options shows that both options meet the continuity condition of the 'active' stages. At the same time, the optimised option demonstrates significant advantages in the uniformity of labour costs and workload of radioactive waste treatment plants during dismantling. The activities at the stage of power unit decommissioning are proposed to be carried out within the licence framework for its operation by the organisational and technical solutions to ensure safety during operation. The deterministic consequences and risks will align with the safety assessment, which will be determined based on the latest analysis results, taking into account sustainable operation.

Gorobets, L., Stupak, A., **Kovalchuk, O.**, Volynskyi, T., Vietrov, V. The Use of Animals by Inhabitants of the Medzhybizh Castle (Ukraine) in the 12th-19th Centuries CE (2025). *Journal of Archaeological Science-Reports*, 65, art. no. 105187. DOI: 10.1016/j.jasrep.2025.105187

During excavations in the Medzhybizh Castle (western Ukraine), a large number of animal bones were found, mainly in kitchen remains dated to the 12th-13th and 18th-19th centuries and, to a lesser extent, in the 17th century layer. A thorough analysis of the sample allows establishing the role of fish, birds, and mammals in the everyday diet of the inhabitants of the castle during the Medieval Warm Period and at the end of the Little Ice Age. In general, the sources of meat were quite similar during different historical periods: domestic ungulates and birds predominated, while the role of hunting was less significant. The large number of remains of wild birds and mammals is likely because the castle was inhabited by the nobility and the military guard, for whom hunting was part of everyday life. Fish were an additional source of protein for the inhabitants of the Medzhybizh Castle. Seven fish species were identified in the sample, of which the northern pike, zander, and common carp are represented by the largest number of remains. Cultural changes are manifested in the emergence of new methods of cooking and the disappearance of falconry. Domestic animals and birds in the 18th-19th centuries were slightly larger than those in the 12th-13th centuries. Despite the general similarity in the diversity of wild species, certain changes have been identified, probably due to the impact of local climate changes. Based on the habitat preferences of particular species, it is possible to assume the appearance of open landscapes and the decrease in forest cover and thickets of riparian vegetation during the Little Ice Age.

Kyrylenko, N., Havrylo, O., Romanyshyn, R., **Mykhalchenko, N.**, Koperlos, R. The Impact of Pedagogical Innovations on the Development of the Educational Environment in the Context of Modern Challenges (2025). *Revista Conrado*, 21 (104), art. no. e4489.

The article theoretically substantiates the cluster approach in education as a methodological basis for the development of the education system. The content of the concept of "educational cluster" is revealed depending on the level of clustering. Pedagogical innovations are substantiated as an essential characteristic of educational clusters; the existing classifications are supplemented by the author's typology of pedagogical innovations based on the cluster approach in education. The concept of "logistics of pedagogical innovations" is defined as a mechanism for managing an educational holding, as well as an area of theoretical research and practical activities aimed at creating conditions sufficient for the

production, testing, implementation of pedagogical innovations and promotion of the results obtained in the educational environment. Based on the cluster approach in education, the concept of logistics of pedagogical innovations has been developed in a set of system-forming ideas, categorical and conceptual apparatus, features and principles of its implementation in an educational holding. A conceptual model of logistics of pedagogical innovations has been formed, including its methodological foundations, types and stages of logistics activities, the content of the main logistics strategies, in accordance with which to develop criteria for assessing the effectiveness of logistics. The problems of implementation, ideology and main directions of development of logistics of pedagogical innovations in the educational holding are revealed.

Rakhimov, T., **Prokopenko, O.**, Kichuk, N., Nych, T., Bushman, I. Emergency Period as a Catalyst for the Development of Inclusive Distan-Ce Learning: Analysis of Experience (2025). *Revista Conrado*, 21 (104), art. no. e4559.

The impact of the emergency period on global education systems has led to a rapid transition to distance learning and has revealed challenges in integrating students with special educational needs. The main goal of this research is to study the part of inclusive distance learning during the pandemic, research distance learning technologies, pedagogical challenges to working with distance learning, and social challenges of the educational system and measures against these hurdles. The study analyzes the key factors leading to the development of an inclusive learning environment using secondary data analysis, which includes adaptive technologies along with teacher training and government policy interventions. The research shows the necessity of investing in inclusive practices and digital tools and helps teachers to develop in order to allow more equal access to education for all students. It ends with practical recommendations for educational institutions, teachers, and policymakers and sets the agenda for further research to examine the long-term impact of the pandemic on inclusive education.

Rakhimov, T., **Prokopenko, O.**, Kichuk, N., Nych, T., Bushman, I. The Development of Inclusive Distance Learning: Analysis of Experiences in Isolationel (2025). *Revista Conrado*, 21 (104), art. no. e4580.

The impact of the COVID-19 pandemic on global education systems led to a quick transition to distance learning and brought to the fore the problems of inclusiveness of students with special educational needs. The main goal of this research is to study the part of inclusive distance learning during the pandemic, research distance learning technologies, pedagogical challenges to working with distance learning, and social challenges of the educational system and measures against these hurdles. The study analyzes the key factors leading to the development of an inclusive learning environment using secondary data analysis, which includes adaptive technologies along with teacher training and government policy interventions. The research shows the necessity of investing in inclusive practices and digital tools and helps teachers to develop in order to allow more equal access to education for all students. It ends with practical recommendations for educational institutions, teachers, and policymakers and sets the agenda for further research to examine the long-term impact of the pandemic on inclusive education.

Barkaszi, Z., **Kovalchuk, O.** Diversity of Late Cenozoic Actinopterygian Assemblages of the South of Eastern Europe (2025). *Diversity-Basel*, 17 (4), art. no. 259. DOI: 10.3390/d17040259

In the late Cenozoic, the south-west of Eastern Europe was a region affected by extensive hydrological transformations that resulted in the retreat of the Eastern Paratethys and the emergence and further evolution of freshwater communities. In recent decades, a relatively rich fossil actinopterygian fauna has been described from this area. The present study was based on previous systematic studies and aimed to assess and trace the temporal dynamics of the diversity of fish assemblages that existed in the area from the Late Miocene until the end of the Pleistocene. Species diversity, taxonomic diversity, taxonomic

complexity, and functional diversity were analysed. It was found that the diversity of the fish assemblages notably decreased during the Late Miocene, when representatives of the families Clariidae, Moronidae, Sciaenidae, and Gobiidae disappeared, and remained relatively low during the Pliocene. During the Pleistocene, however, functional diversity gradually increased, despite fluctuating species and taxonomic diversity and taxonomic richness and complexity, which suggests an increasing stability of the coenotic structure within the fish communities. The revealed temporal trends reflect the impact of the palaeoenvironmental and palaeoecological processes that characterised the region during the late Cenozoic, particularly orogenic and climatic changes, and the evolution of a typical limnophilous, lacustrine-riverine fish fauna.

Sokyrka, V., Yakovenko, K. Ukrainian Scientific Intelligentsia in the Context of Implementing Social Policy of the Soviet Power in the 1920s (2025). *Eminak*, 2, P. 252–265. DOI: 10.33782/eminak2025.2(50).798

The purpose of the research paper is to analyze the implementation of the Soviet power's social policy regarding the scientific intelligentsia, including through the prism of the activities of the All-Ukrainian Committee for the Assistance to Scientists (VUKSV) in the 1920s as an institution supporting the Ukrainian scientific community in the context of political and social and economic crisis. The scientific novelty is in the characterization of the Soviet state's social policy regarding scientific intelligentsia and using the VUKSV to organize financial and food assistance for it. Conclusions. The Ukrainian scientific intelligentsia belonged to those strata of society in the 1920s that were particularly acutely affected by social, political, and economic changes that led to a deterioration in their quality of life. Inflation, the closure of a number of higher educational institutions and scientific institutions, the lack of a stable income, and the famine of 1921-1923 put the scientific intelligentsia in conditions of struggle for physical survival. Research into the activities of the VUKSV has become important for understanding the mechanisms of survival and adaptation of the Ukrainian scientific community during the period of radical social changes. Soviet state bodies sought ways to subordinate the scientific intelligentsia. For this purpose, institutions of control over it were established. However, the activities of the All-Ukrainian Committee for the Assistance to Scientists in the conditions of the 1920s became one of the most important stages in preserving the Ukrainian scientific tradition during the period of social and economic crisis. During the times of famine, political repressions, and economic collapse, it was through the VUKSV that it became possible to provide support to many outstanding Ukrainian scientists, allowing them to preserve their scientific potential and continue to make a significant contribution to the development of national science. Preserving scientific personnel potential and the conditions for scientific activity in the 1920s became extremely important for shaping the future scientific environment in Ukraine.

Kostolovych, M., Yaroslavtseva, M., Pyekharyeva, S., **Bykova, M.**, Radchenko, L. Development of Creative Competence in University Students Through Information Technologies: An Experimental Study (2025). *Eduweb-Revista de Tecnologia de Informacion y Comunicacion en Educacion*, 19 (2), P. 122–142. DOI: 10.46502/issn.1856-7576/2025.19.02.9

The article reveals the content of the concept and the main indicators of creative competence. The article aims to verify the developed and research-based pedagogical conditions for training specialists for the formation of creative competence in professional activity using information technologies. Regarding the research methodology, we used quantitative methods of data analysis. This group of empirical research methods includes obtaining information about the object under study that allows us to identify its quantitative characteristics. When determining the sample of subjects, the general specificity of the research subject was considered. The total sample size was 120 subjects. When forming the sample, the criteria of content, representativeness, and equivalence were taken into account. As a result of the experimental work, according to all the specified criteria and indicators, a positive dynamic of creative

competence was formed due to the use of modern information technologies among EG students, which confirms the significant influence of the specified pedagogical conditions on the preparation of students for the manifestation of creative competence in professional activities.

Lutsenko, I., Leshchenko, H., Prots, T., **Gvozdetska, S.**, Omok, H. Classification of Innovations and Challenges in Teaching Physical Education in the Digital Age (2025). *Eduweb-Revista de Tecnologia de Informacion y Comunicacion en Educacion*, 19 (2), P. 266–279. DOI: 10.46502/issn.1856-7576/2025.19.02.18

Introduction: Digitalization in the field of physical education requires additional assessment. The purpose of the article is to conduct a systematic analysis of new innovative solutions and key problems of their implementation in the process of teaching physical education in the era of digital technologies. Methods: The PRISMA scientific approach was used, which made it possible to identify the most relevant scientific sources (n=40). Time range: 2017-2025. The content analysis method was used to process the materials. Results: The following types of digital innovations were identified: mobile applications and platforms, gamification, artificial intelligence, intelligent educational ecosystems, wearable technologies, inclusive digital tools, flipped learning, and virtual and augmented reality technologies. There are serious challenges to their application: insufficiently developed digital infrastructure in educational institutions, low level of digital literacy of physical education teachers, pedagogical inconsistency, technological challenges, and psychophysiological limitations. For the further use of digital technologies, a classification of innovative solutions is proposed. It is proposed to distinguish such solutions by functional direction, degree of interactivity, format of use, and general purpose. Conclusions: The conclusions emphasize the importance of continuing research, since digitalization in the educational dimension is constantly developing.

Khodun, E. Religious Freedom in the Ussr After the Russian Orthodox Church Restoration in September 1943: Us Viewpoint (2025). *Occasional Papers on Religion in Eastern Europe*, 45 (4).

This article deals with the reaction of American society to changes in the religious policy of the Soviet Union during World War II. After the reestablishment of the Patriarchate of the Russian Orthodox Church in September 1943, American assessments of the state of religious freedom in the USSR ranged from optimistic, which considered this event as a relaxation of restrictions or even the beginning of a new type of relationship between the regime and religious communities, to deep skepticism, which was based on an awareness of the true motives and goals of the Soviet leadership. The Kremlin's decision was seen as a compromise aimed at improving relations with the United States. Although the level of religious freedom in the USSR did increase compared to the pre-war period, it remained significantly lower than in the USA. In general, the restoration of the Russian Orthodox Church was a significant diplomatic victory for the Roosevelt administration and an important stage in obtaining the cooperation of the allies.

Oleshko, A., Gruenbaum, B. F., Zvenigorodsky, V., Shelef, I., Negev, S., **Merzlikin, I.**, Melamed, I., Zlotnik, A., Frenkel, A., Boyko, M. The Role of Isolated Diffuse Axonal Brain Injury on Post-Traumatic Depressive- and Anxiety-Like Behavior in Rats (2025). *Translational Psychiatry*, 15 (1), art. no. 113. DOI: 10.1038/s41398-025-03333-3

Traumatic brain injury (TBI) is a significant global health concern and is associated with short-term and long-term comorbidities such as mood disorders and reduced quality of life. Diffuse axonal brain injury (DABI) is a common but severe type of TBI. The role of DABI in the development of psychiatric sequelae after TBI is not well understood due to the challenge of isolating DABI from general TBI in the human population. Here we investigate the role of DABI in the occurrence of post-TBI depressive- and anxiety-like behaviors in a rat model. Forty rats were randomly assigned to two groups, with 20 receiving DABI

and 20 receiving sham treatment. We used a magnetic resonance imaging (MRI) protocol developed for DABI using a 3-T clinical scanner to confirm DABI. We then compared neuroimaging, neurological and behavioral assessments across experimental groups. There was a significant difference between DABI and sham groups on sucrose preference, a measurement of depressive-like behavior ($p < 0.012$), and time spent on open arms on a plus maze test, a measurement of anxiety-like behavior ($p < 0.032$). For MRI-detected injury, there was a difference in diffusion-weighted imaging with relative anisotropy ($p < 0.001$) and fractional anisotropy ($p < 0.001$) mapping. We found that isolated DABI in our model led to post-traumatic depressive-like behavior in 30% of cases and anxiety-like behavior in 35%. Additionally, we established diagnostic cut-offs for depressive-like and anxiety-like behaviors in injured rats. We also documented comorbidity between the development of depression and anxiety in DABI-exposed rats. We anticipate that this study will greatly enhance the understanding of the relationship between DABI, TBI, and mood disorders like depression and anxiety, and aid in developing treatment options for these interconnected conditions.

Popova, L., **Kovalchuk, O.**, Barkaszi, Z., Rekovets, L. New Fossils from the Area of the Dnipro Ice Lobe and the Chibanian-Late Pleistocene Boundary: A Reply to Mroczek et al. (2025). *Journal of Quaternary Science*, 40 (3), P. 558–562. DOI: 10.1002/jqs.3702

The stratigraphic and palaeogeographic interpretations in our article (Popova et al., 2025) received criticism from Mroczek et al. (2025), who argued that our results contradict regional and global stratigraphic models and that we propose a revision of the Ukrainian regional stratigraphic scheme without sufficient data background. We want to clarify that the main focus of our study was to shed light on climatically induced biotic transformations in the Middle Dnipro area during deglaciation and postglacial stages. We did not revise the stratigraphic framework but only provided support for an already established correlation model, according to which the Dnipro stage is associated with MIS 6, the Kaidaky with MIS 5e and the Tiasmyn with MIS 5d. This stratigraphic scheme is opposed by Mroczek et al. (2025), who questioned the reliability of our results. Here, we address their comments and discuss an approach to deal with competing stratigraphic models and methods of biostratigraphic, palaeogeographical and palaeoecological interpretation.

Tkachuk, S., **Hromova, N.**, Korostylov, H., Rogulska, O., Bilozorov, O. Innovative Approaches to the Creation and Implementation of a System of Remote Network Support for the Pedagogical Practice of Students of Higher Education (2025). *Revista Conrado*, 21 (103). art. no. e4336

The article substantiates the necessity and possibility developing and using network distance support for dents' pedagogical practice. The concept of "network distance support for students' pedagogical practice" defined. A model of network distance support for students' pedagogical practice based on an Internet resource is developed and the criteria for the effectiveness this model are determined. The experimental inclusion of the developed network distance support for students' pedagogical practice in the educational process of university is analyzed. The conditions for the effectiveness of network distance support for students' pedagogical practice are identified. The problems and difficulties of organizing and conducting pedagogical practice students of pedagogical universities, associated with information and communication disunity of the subjects of practice during its implementation, are systematized. The positive impact of the use of Internet technologies the content and organization of the educational process in the practice of teacher training is analyzed; the impact of the Internet technologies used on the content, of activity of subjects of the educational process, role and functions.

Vasile, S., **Kovalchuk, O.**, Venczel, M., Ratoi, B.-G., Haiduc, B.-S. Fishes and Squamate Reptiles from the Pliocene Sites of Beres, Ti and Malus,Teni (Eastern

Romania) – A Reassessment of Old But Poorly Known Material (2025). *Geobios*, 88/89, P. 265–274. DOI: 10.1016/j.geobios.2024.02.007

This paper performs a revision of teleost fish and squamate reptile material from the Early Pliocene sites of Beres,ti and Malus,teni (eastern Romania), found in old collections, but never described in detail. The fish assemblage includes a few cyprinid species (Rutilus robustus, Rutilus cf. R. frisii, Scardinius ponticus, Barbus sp., Tinca sp.), Silurus cf. S. soldatovi, pikes (Esox moldavicus and Esox sp.), as well as indeterminate remains of salmonid, percid and sparid fishes. Squamate reptiles are represented by isolated vertebral and cranial material assigned to the anguid lizard Pseudopus pannonicus, as well as by isolated snake vertebrae belonging to the viperid Macrovipera sp. This is the most taxonomically diverse Pliocene ectothermic vertebrate assemblage described so far from the Romanian Carpathian Foreland. The obtained results contribute to a better understanding of continental vertebrate fauna evolution in the eastern part of central Europe. (c) 2024 Elsevier Masson SAS. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

Kovalchuk, O., Tuzyak, Y., Gorobets, L., Yanenko, V., Swidnicka, E., Dubikovska, A., Stefaniak, K., Barkaszi, Z. A New Sarmatian (Late Middle Miocene) Vertebrate Assemblage from the Periphery of the Forecarpathian Basin (2026). *Historical Biology*, 38 (1), P. 279–291. DOI: 10.1080/08912963.2025.2461156

A new Early Sarmatian s.l. (Volhynian, late Middle Miocene) vertebrate assemblage is described from the outskirts of the Forecarpathian Basin, which at that time was an integral part of the Eastern Paratethys. The studied fossils come from greenish-grey and black silts and clays of the Kharalug locality (Rivne Oblast, Ukraine), which palaeogeographically is situated nearby to the north-eastern coast of the basin. The studied sample comprises 115 specimens, mainly of fish bones, whereas reptiles (turtles) and birds (ducks) are represented by a single bone each. The fish remains have been assigned to five genera and three families (Cyprinidae, Siluridae, and Percidae), of which percids are the most abundant being represented by pikeperches (Leobergia, Sander) and perches (Perca). The studied Kharalug assemblage is likely mixed, its taxonomic composition is relatively poor, and, although less diverse, demonstrates some similarity to assemblages of the subsequent (Bessarabian) stage of the Eastern Paratethys. The ecological features of the revealed taxa along with the geological and palaeogeographical contexts suggest a shoreside freshened palaeoenvironment for the Kharalug locality, possibly a lagoon or a lake at some distance from the coastline. The obtained results may contribute to the reconstruction of local Miocene palaeoenvironments within the Paratethyan realm.

Dubikovska, A., Górka, M., Skyrpan, M., Bienkowska-Wasiluk, M., Barkaszi, Z., **Kovalchuk, O.** New Data on the Early Badenian (Middle Miocene) Bony Fishes of the Forecarpathian Basin (2025). *Journal of Vertebrate Paleontology*, 45 (1). DOI: 10.1080/02724634.2025.2516023

During the Middle Miocene, the shallow marine environment of the Forecarpathian Basin, which was part of the Central Paratethys, harbored a rich and diverse fish fauna. Here we describe a series of fish fossils represented by 531 specimens of dental elements recovered from the lower Badenian deposits of the Mykolaiv Beds in western Ukraine. Sixteen taxa have been identified that belong to the families Sphyaenidae, Trichiuridae, Labridae, Acanthuridae, Sparidae, Tetraodontidae, and Diodontidae. Due to the quality of the material, only six taxa have been identified to species: Labrodon pavimentatum, Trigonodon jugleri, Acanthurus haueri, Diplodus jomnitanus, Diplodus sitifensis, and Sparus umbonatus. Most of the recovered taxa were common representatives of the Middle Miocene fish fauna of the Central Paratethys. Acanthurus haueri as well as Oligodiodon sp., Diodontidae gen. et sp. indet., Tetraodontiformes family indet. and the orders they represent (Acanthuriformes and Tetraodontiformes) are recorded for the first time in the Forecarpathian Basin. Most of the identified specimens belong to sea

breams (83.6%), followed by porcupinefishes (8.7%), barracudas (4.2%), and wrasses (2.3%), which are all predatory fishes occupying different trophic niches within the marine environment.

Kovalchuk, O., Bienkowska-Wasiluk, M., Dubikovska, A., Swidnicka, E., Stefaniak, K., Khekalov, O., Barkaszi, Z. Oligocene flatfishes (Teleostei, Pleuronectiformes) of the Outer Carpathian Basin (2025). *Journal of Vertebrate Paleontology*, 45 (1), DOI: 10.1080/02724634.2025.2520490

*The Oligocene fossil record of the diverse group of demersal flatfishes in Europe is rather poor, as only three monospecific genera have been reported from the territory of the Czech Republic, Germany, and Romania. In this work, we analyze 35 flatfish specimens represented by imprints of articulated skeletons and recovered from Oligocene localities in Poland and Ukraine. As a result, representatives of four families have been revealed (Scophthalmidae, Pleuronectidae, Bothidae, and Soleidae) and four species were recognized, including two newly described species. The first, *Oligobothus polonicus* sp. nov., is placed in the family Bothidae, and the second, *Oligosolea carpathica* gen. et sp. nov., belongs to the family Soleidae. Remains of the first species are more numerous and come from the localities Kr & eogon;pak, Przysietnica, and Wojtkowa (late Rupelian, c. 29.7-27.8 Ma), whereas *Oligosolea carpathica* gen. et sp. nov. is represented by a single imprint from Obarzym (late Rupelian, c. 32-31 Ma). All identified taxa, along with a relatively large number of Pleuronectiformes indet. specimens from various localities, indicate that flatfishes were a spatiotemporally widespread group of teleosts during the Oligocene (both the Rupelian and Chattian stages) within the Outer Carpathian Basin.*

Shyshenko, I., Kovtun, O., Aleksakhina, T. Employers' Perceptions of the Role of English-Language Competence of Economists in the Development of Innovative Activity of Enterprises (2025). *Baltic Journal of Economic Studies*, 11 (5), P. 414–424. DOI: 10.30525/2256-0742/2025-11-5-414-424

Economic transformation and intensified international competition increase the demand for specialists capable of operating across linguistic and cultural borders. This study examines how employers in Ukraine assess economists' English language competence and how they relate it to enterprise innovation. The aim is to explore employers' evaluations of economists' English skills and their perceived contribution to innovation-related activities and overall company performance. The analysis is based on a quantitative survey of 50 employers from the IT, financial, service, and production sectors who evaluated selected economist employees using five-point Likert scales. The questionnaire captures three groups of indicators: perceived level and use of English at work, perceived impact of English on individual performance, and perceived impact of English on enterprise development. Descriptive statistics show that employers rate initial English proficiency at 3.6 points on average, frequency of use at 3.9, and quality of English-mediated task performance at 3.7, which indicates regular use with considerable room for improvement. Employers also give high scores to the impact of English on communication with partners and clients (4.6) and on overall work effectiveness (4.4), while they rate its contribution to participation in new or international projects at 4.1. At the enterprise level they rate the contribution of English to partnership expansion at 4.0 and to entry into new markets at 3.8. In result, employers treat English not as a marginal asset but as an integral element of professional competence that supports innovation-related communication, project work and external relations. The findings offer practical guidance for revising economics curricula and aligning language training with workplace expectations, while also indicating the need for deeper, multi-source studies of the link between language competence and innovation capacity.

Kornus, A., Kornus, O., Liannoi, Y., Danylchenko, O., Lutsenko, S. Oncologic Burden in Ukraine: Regional Inequalities and Environmental Risk Factors (2025). *Geospatial Health*, 20 (2), art. no. 1418. DOI: 10.4081/gh.2025.1418

This study investigated regional inequalities in cancer incidence in Ukraine and their potential links to environmental pollution. Using data from 26 Ukrainian administrative regions, we analyzed 50 cancer indicators - covering incidence, prevalence and mortality across population subgroups - and 25 environmental variables reflecting air, water and soil contamination, including emissions of methane, sulphur dioxide, ammonia, suspended particulate matter and radioactive waste. A total of 1,250 pair-wise Pearson correlations were computed, revealing 69 moderate-to strong positive associations ($r \geq 0.3$), of which 23 were statistically significant at the 95% confidence level ($p < 0.05$). The most consistent associations were observed for methane emissions, which showed significant correlations with six cancers, including breast, uterine, skin and non-Hodgkin lymphomas. Sulphur dioxide, suspended particulates and non-methane volatile organic compounds also demonstrated significant associations, particularly with hormonally mediated cancers and urban cancer prevalence. Geographic disparities were further shaped by demographic structure, healthcare access and underreporting in conflict-affected regions. Spatial visualizations and heatmaps supported the identification of recurrent pollutant-cancer associations, suggesting systemic environmental contributions to cancer burden. These findings underscore the multi-factorial nature of cancer risk in Ukraine and highlight the need for integrated environmental monitoring, strengthened diagnostic infrastructure, and regionally tailored public health strategies to reduce environmentally mediated cancer incidence.

Varenia, N., Rozvadovskyi, O., Khodanovych, V., **Davydova, T.**, Draliuk, I. Ensuring National Security Through Effective Critical Data Management (2025). *European Journal of Sustainable Development*, 14 (3), P. 703–714. DOI: 10.14207/ejsd.2025.v14n3p703

Emphasising the importance of protecting the information space, the article highlights the essence and challenges of the state's information sovereignty and its significance for national security. It also defines the main specific terms describing information security, such as: "information warfare", "destructive propaganda", "information confrontation", and others. In the context of irreversible information attacks, the state policy in the field of national security requires a targeted and reliable state decision. Considering the documents of alienated countries and methods of optimising counter-propaganda activities of different states, the specifics of state activity are the basis for preserving information resources necessary for national security. The secrecy of information and manipulative information technologies are the basis for a rationalistic system of diverse use. Studies of state administrations and newly created information structures abroad open up new but critical communication approaches in combating the threats of unpredictable actions. The analysis of private and public organisations in Ukraine was carried out in the following areas: operational activities, counterintelligence, intelligence, technical operations, protection of personal data of military and civilian personnel, anti-terrorist operations, international activities, internal reporting, finance, civil defence, territorial defence, housing and communal services. The article highlights that there is no unified approach to the classification of restricted information in these areas, which further complicates the information protection system in this area.

Drushlyak, M., Semenikhina, O. Educational Potential of Chatgpt from Students' Perspective: The Ukrainian Dimension of Generative Artificial Intelligence Use (2025). *Information Technologies and Learning Tools*, 109 (5), P. 186–201. DOI: 10.33407/itlt.v109i5.6289

The rapid development of generative artificial intelligence (AI), particularly ChatGPT, highlights the need to consider both its educational potential and its risks. University educators and students today act simultaneously as active users and as critics of AI. This dual role generates public and academic debates about their usefulness, reliability, and ethical constraints. The purpose of this paper is to examine the perceptions of Ukrainian higher education students regarding ChatGPT and their practices of using it as an educational tool. The empirical basis comprises responses from 379 participants representing diverse

educational levels and fields of study. The data were collected as part of an international survey. The analysis applied descriptive statistics, clustering, t-tests, analysis of variance, and correlation analysis. The originality of this research lies in being the first empirical attempt, in the Ukrainian context, to identify three types of ChatGPT users through cluster analysis: highly active, moderately active, and low-active (skeptical). This typology demonstrates the diversity of students' digital autonomy and their readiness to integrate AI into learning. An important scientific finding is the absence of statistically significant differences in attitudes toward ChatGPT by gender or educational level. This indicates the universality of its perception among Ukrainian students. At the same time, positive correlations were found between frequency and experience of use and the overall evaluation of ChatGPT's functionality. The results show that students mostly use ChatGPT for educational purposes. However, their use is irregular and accompanied by only moderate levels of trust. The highest ratings were given to cognitively oriented functions such as simplifying complex information, summarizing large volumes of data, and presenting material effectively. By contrast, trust remains low regarding ChatGPT's ability to ensure the accuracy of results. The paper provides recommendations for the differentiated implementation of ChatGPT in the educational process, considering students' varying levels of digital maturity. It also emphasizes the need to develop AI literacy to support academic integrity and to foster key competencies for the 21st century.

Lukashova, T., Drushlyak, M. Generalized Norms of Groups: Retrospective Review and Current Status (2025). *Algebra and Discrete Mathematics*, 40 (1), P. 109. DOI: 10.12958/adm2433

In this survey paper the authors specify all the known findings related to the norms of a~group and their generalizations (since 2016 in more details). Special attention is paid to the analysis of their own study of different generalized norms, particularly the norm of non-cyclic subgroups, the norm of Abelian non-cyclic subgroups, the norm of decomposable subgroups and relations between them.

Kondratska, H., Stoika, O., Gudmanian, A., Shapovalova, O., Vaidych, T. Using Information and Communication Learning Tools to Develop Professional Skills in Higher Education Students (With a Special Focus on Linguistic and Pedagogical Subjects) (2025). *Revista on Line de Politica e Gestao Educacional*, 29 (Special Issue), art. no. e025037. DOI: 10.22633/rpge.v29iespl.20472

In the context of globalisation, digitalisation and modernisation of education, the use of information and communication technologies (ICT) in the educational process is becoming a critical factor in developing the professional competences of higher education students. This article investigates the effectiveness of information and communication tools in developing professional competences for future teachers and philologists. The methods of the study were a survey of higher education students, teachers and heads of structural units, and an experimental study based on the comparison of indicators of the levels of use of information and communication teaching aids. The study results demonstrate that the systematic use of ICTs ensures the adaptation of students to the modern challenges of professional activity.

Hryntsiv, M., Zamishchak, M., Bondarenko, Y., Suprun, H., Dushka, A. Approaches to Speech Therapy for Children with Autism Spectrum Disorders (ASD) (2025). *International Journal of Child Health and Nutrition*, 14 (1), P. 32–45.

Background: The article analyzes methods of correcting speech disorders in children with autism spectrum disorders (ASD). It is based on a literature review and practical cases on this issue. Methods: The study used observation methods of behavior, speech, and communication of children with ASD, questionnaires from parents, educators, and correctional teachers, and experimental research based on the information obtained. The main methods of correction of speech disorders in children with ASD are highlighted, which

include speech therapy, alternative and augmentative communication (AAC), therapy using games and imitation techniques, the use of behavioral techniques, and multisensory approaches. Traditional and innovative means for implementing the outlined methods of correction of speech disorders in children with autism spectrum disorders are outlined. A methodology for determining the effectiveness of the use of methods for the correction of speech disorders in children with autism spectrum disorders is proposed. Results: Criteria and indicators for evaluating the outlined methods of correcting speech disorders have been developed. The main criteria include speech development, development of communication and social skills, reduction of stereotypical and repetitive forms of speech, emotional and behavioral regulation, use of alternative means of communication, and individual progress. Based on the developed criteria, a survey was conducted among parents, educators, and therapy specialists on the effectiveness of using the outlined methods of correcting speech disorders. The effectiveness of the use of traditional and innovative means of correction of speech disorders in the context of the implementation of the outlined methods of speech correction in children with ASD was experimentally tested. The effectiveness of the above methods was tested for different groups of children with ASD, including preschool, school, and adolescent age. In the course of the test, the control group used traditional means, and the experimental group used a combination of traditional and innovative means of correcting speech disorders in children with autism spectrum disorders (ASD). Conclusion: The positive influence of the combination of traditional and innovative means of correction of speech disorders in children with autism spectrum disorders (ASD) on the development of language skills is noted.

Zakharchenko, E., Klymenko, O., Trotsenko, V., Kravchenko, N., Kliuchevych, M., Mozharivska, I., Kyrylchuk, K., Datsko, O., **Toryanik, V.**, Hnitetskyi, M., Stavtyskyi, A., Kotiuk, R. Monitoring and Restoration of Soils (Agrocenoses) in the Border Regions of the North-Eastern Forest-Steppe of Ukraine: Challenges and Prospects (2025). *Modern Phytomorphology*, 19, P. 310–315. DOI: 10.5281/zenodo.17349579

This study investigates the impact of war on soil degradation in the Sumy region and across Ukraine, highlighting risks to sustainable agriculture and evaluating strategies for restoration that align with environmental and climate resilience goals. A key challenge is the physical deterioration of soils caused by mining activities, explosions, heavy machinery movement, and chemical contamination from heavy metals and explosive residues. These war-related impacts are compounded by climate hazards such as increased drought frequency, higher erosion risks, and reduced crop quality. The findings demonstrate viable pathways for the reconstruction and recovery of the agricultural sector in the Sumy region. Proposed measures include bioremediation technologies, the use of green manures, agroforestry, land-use zoning, and the development of precision farming. Furthermore, certain crop varieties and hybrids—including cereals (wheat, barley, corn), oilseeds (sunflower, rapeseed), and legumes (soybeans) were identified as having the ability to either minimally accumulate pollutants in edible grains or concentrate them in non-edible parts, ensuring both safe consumption and compliance with export standards to the EU. The article describes in detail the problems of the impact of war on the environment and the implications for a sustainable transition, drawing on data from primary literary sources and reports.

Burov, O., Lavrova, E., Lytvynova, S., Pinchuk, O., Proskura, S., Tkachenko, O., **Kovalenko, N.**, Chybiriak, Y., Dolgikh, Y. Cognitive and Perceptual Reliable Performance: Comparison of Psychophysiological Limitations (2025). *27th International Conference on Human-Computer Interaction*, 2523, P. 3–13. DOI 10.1007/978-3-031-94153-5_1

Changing the task presentation time can significantly affect the time of problem solving. Research shows that when the task presentation rate increases, the time to complete it can decrease due to increased

concentration and mobilization of cognitive resources. However, excessive acceleration can lead to errors and poorer performance due to stress and overload. The aim of this study was to identify quantitative criteria for assessing the ultimate possibility of reliably solving the cognitive and perceptual problems based on a comparison of the time needed to solve problems and the response of the cardiovascular system. The survey included test task performance (logical-combinatorial and perceptual tasks) and heart rate. Time for every task performance was fixed during the test session and limited (5 intervals in both tests of 10 min each with modeling different "time pressure"). We have revealed in our study that the ratio of the time of the test performance for 10 min and the tension of cardiac regulation by interbit intervals can be a quantitative measure of the limits of human capabilities for processing a stream of perceptual tasks. A significant criterion can be the measurement of the time of tasks' solution in the perceptual test reduced to 0.62 of the average time it takes to solve such problems by this person without time limits.

Kornus, O., Lyannoy, Y., Kornus, A., Venherska, N., Omelyanenko, V. Sociological Studies on the Social Infrastructure of Communities in the Sumy Region: A Geographical Perspective on Problems and Prospects for Sustainable Development in Wartime (2025). *Journal of Geology Geography and Geoecology*, 34 (2), P. 292–303. DOI: 10.15421/112525

Social infrastructure plays a key role in building sustainable and cohesive communities. A sociological survey of the local population is an effective tool for obtaining relevant information to make informed decisions on developing social infrastructure. The article aims to analyse the state of social infrastructure in Sumy region based on a sociological survey of residents and identify key problems of social infrastructure functioning and ways to solve them. The target audience was residents of Sumy region aged 18 and over. The survey is being conducted from 31 July to 31 August 2024 as part of the international research and education project 'Territory of Innovations: Best Practices for Sustainable Development at the Local Level' and the research project 'Organisational and Economic Support for post-war Sustainable Development of territories based on the infrastructure and service methodology for the development of innovative communities. The survey was conducted digitally using the Google Form tool. The questionnaire covered a wide range of issues related to key aspects of social infrastructure, such as healthcare, educational services, cultural institutions, communications and household services, trade services, and tourist services. The survey involved 109 residents from 22 communities representing all administrative districts of Sumy region, although most respondents were from Sumy district and Sumy city. The results of the sociological survey indicate significant problems in the development of the social sphere in Sumy region, which the hostilities have exacerbated. 67% of respondents consider the social infrastructure in their communities to be underdeveloped. The article discusses ways to improve the social infrastructure of Sumy region, including the modernisation of educational and medical institutions, effective management of housing and communal services, development of regional programmes with a focus on the needs of rural areas, and support for cultural and tourism initiatives. Based on the survey results, a roadmap for developing social infrastructure has been developed in line with the sustainable development goals. The survey highlights the needs of the population, inequality in access to services and development priorities, taking into account the specifics of the territories. The survey results can be used to formulate effective local policies to support social cohesion and strengthen communities.

Olitskyi, V. The Orthodox Episcopate of Ukraine in the Conditions of Khrushchev's Anti-Religious Campaign (2025). *Scientific Papers of Vinnytsia Mykhailo Kotsyiubynskyi State Pedagogical University Series History*, 52, P. 87–93. DOI: 10.31652/2411-2143-2025-52-87-93

The purpose of the research is to clarify the features of the functioning and reaction of the Orthodox episcopate of the Ukrainian Exarchate to the challenges of Khrushchev's anti-religious campaign, to analyse its strategies of adaptation, resistance or cooperation with the Soviet authorities, as well as to

determine the impact of these processes on the position of the Church. The research methodology is based on the principles of historicism, objectivity, systematicity and an interdisciplinary approach. The author adheres to the concept of microhistory and personalised history, focusing on the specific actions and reactions of representatives of the episcopate in the conditions of Soviet anti-religious policy. The main methods of the study were historical and comparative, chronological, biographical, and source analysis. The scientific novelty lies in the fact that the Orthodox episcopate of the Ukrainian Exarchate during Khrushchev's anti-religious campaign became the object of a separate scientific study for the first time. Conclusions. The Orthodox episcopate of Ukraine during the Khrushchev anti-religious campaign was in an extremely difficult position, balancing between official loyalty to the regime and attempts to preserve church life, spiritual tradition and internal unity of the Church. Although state policy radically influenced its activities, the bishops continued to fulfil their pastoral duties, trying to adapt to new conditions. The episcopate was heterogeneous in its actions and approaches to confrontation or cooperation with the authorities. Changes in church administration introduced in 1961 formally weakened the canonical authority of bishops over parishes. However, spiritual guidance, pastoral missions, and the informal support of parishes remained the sphere of active service for Ukrainian bishops. A significant role in the position of the bishops of the Ukrainian Exarchate was played by the active intervention of the KGB in the personnel policy of the Russian Orthodox Church. However, not all secret service agents behaved as executors of external will—some sought to use their position to protect the Church and develop a spiritual life.

Kosenko, Y., Korol, O., Boriak, O., Chobanian, A. Wordwall as a Tool of Historical Concept Formation for Schoolchildren with Intellectual Disabilities in Distance Learning (2025). *Information Technologies and Learning Tools*, 106 (2), P. 1–34. DOI: 10.33407/itlt.v106i2.6023

The article substantiates the relevance of historical concepts formation for schoolchildren with intellectual disabilities, analyzes scientific sources regarding the use of information and computer technologies in special education, and highlights significant challenges in distance learning for children with intellectual developmental disorders. The difficulty of mastering digital technology algorithms by such children is emphasized, as well as the necessity of providing support to their parents and caregivers during online learning using internet technologies. The article also underscores the need for professional development of special education teachers and additional consultations for parents, caregivers, and students with intellectual disabilities. The capabilities of the interactive educational application Wordwall in designing educational games and tasks for students with intellectual disabilities are discussed. The functions of this resource, which allow teachers to quickly adapt exercises, modify them (simplify or complicate), depending on the cognitive abilities of children in this category, and adjust tasks developed by colleagues based on the topic, educational objectives, and lesson content or teaching style, are described. The toolkit of the Wordwall application, which enables the customization of tasks through changes in graphics, fonts, sounds, and more, is detailed. Examples of accessible task templates are provided, such as Matching Pairs, Quiz, Anagram, Flashcards, Complete the Sentence, Find the Match, Grouping and Random Wheel. The article underscores the role of Wordwall in enhancing cognitive and language skills, improving memory and attention, boosting motivation to study Ukrainian history, and enriching students' active vocabulary. History teachers in special education schools positively evaluate the application as an effective tool for working with students with intellectual disabilities.

Korost, I. The Set of Sites of the Territory and Vicinity of the Bilsk Hillfort: Main Results of the Initial Stage of Research (2025). *Arheologia*, 2, P. 111–146. DOI: 10.15407/arheologia2025.02.111

The article deals with the problems of studying the archaeological monuments of the Bilsk microregion in the period from the 18th to the first half of the 20th centuries. The first cartographic materials and

descriptions of the Bilsk hillfort and sites of its districts are analysed. It is determined that the systematic scientific study of the microregion begins in the second half of the 19th century. The results of the first archaeological research in the microregion in 1906 by V. O. Gorodtsov are described in detail. Information about the discovered sites (a settlement, a burial, a fortification) of this period is presented, and the plans for some of them are highlighted. Some issues of studying the defensive structures of the Bilsk hillfort are analysed. The locations of cuts and profiling in the fortification areas are identified and marked on maps. A generalised list of discovered/described archaeological sites of the Bilsk complex as of the middle of the 20th century is prepared. The vision of a wide range of researchers regarding the constituent monuments of the Bilsk hillfort is analysed. In the article, the development of the idea of considering the settlement and its surroundings as a single large-scale archaeological complex is traced. The author's views on the possibility of modern localisation of some of the studied objects at the beginning of the last century are presented. In 2024, the ash hills of the Western fortification of the Bilsk hillfort, which were excavated by V. O. Gorodtsov in 1906, were identified. The main results of the Bilsk microregion research in the selected period are determined. The first publications of materials (in particular, by V. M. Shcherbakivskiy) on the possibility of identifying the Bilsk hillfort with the ancient city of Gelonus, which Herodotus wrote about, are highlighted and analysed.

Cherniakova, Z., Barbashova, I., Kosenko, R., Koreneva, I., Kuzmenko, H. Sustainable Development Principles Integration into Educational Curricula: Implications and Prospects (2025). *Nativa*, 13 (2), P. 330–339. DOI: 10.31413/nat.v13i2.19448

Education has a critical role in shaping a society capable of sustainable development. The Sustainable Development Goals (Global Goals), adopted by the UN in 2015, provide for the implementation of an ambitious plan to overcome key problems of humanity by 2030. Achieving the Goals requires balancing economic, social, and environmental components. Therefore, the implementation of the basic principles of sustainable development (SD) in education for the effective development of humanity is an urgent problem, both theoretically and practically. After all, it is thanks to education that a person's personality, social ties, understanding of himself and his place in society are formed, and personal and professional realization takes place. The article aims to highlight theoretical scientific developments related to the issues of SD and its specifics in the educational sphere, as well as practical steps related to the implementation of the goals and principles of SD by integrating them into the educational process and educational programs. The object of the study was scientific works related to sustainable development, documents that contain a description and interpretation of the SD concept, its necessity and ways of implementation. Attention is focused on practical cases, in particular on the example of Great Britain and Germany. The choice of countries is due, firstly, to their long-standing educational traditions, secondly, to the implementation of SD at the state level, covering all spheres of society, which is what SD requires, and thirdly, to the importance of these countries for Ukraine in the course of the Russian-Ukrainian war. The methodological basis of research consists of the methods of literature analysis, the method of analysis and synthesis, the structural-functional method, and case studies. In many countries of the world, starting in 2015, a global transformation process has begun in educational institutions at all levels of education in accordance with the Sustainable Development Goals and taking into account local traditions, human resources, technical and technological capabilities and national policies. Examples of successful implementation of SD principles in the educational sphere, in particular, by integrating the SD goals and objectives into educational programs and their practical implementation, combining theoretical knowledge and practical cases, are Great Britain and Germany. An important condition for achieving the goals of SD is state policy. In particular, in Great Britain and Germany, relevant strategies and platforms have been developed; active international cooperation is underway; innovative methods of learning and teaching are being introduced; state, business structures, civil society organizations, etc., are being involved.

Among the general challenges, one can single out: systematicity in the transformation of education, its understanding not as a form of passive transfer and acquisition of knowledge, but its construction and

creative use to solve problems; integration of education into all spheres of society; interaction between the educational environment, authorities, civil society, at the individual level; development of critical thinking skills, environmental awareness, social responsibility; availability of a sufficient number of teachers who would themselves be bright carriers of sustainable development values and its relays for education seekers; support from relevant authorities and material, technical, technological and financial support; a systematic approach to planning, implementing and monitoring all forms of education; motivation of education seekers to an active life position, the desire to live in a democratic society and an environmentally safe world; interdisciplinary approaches in combining academic disciplines. Given the situation in geopolitics, it can be stated that it is evidently difficult to achieve the Sustainable Development Goals by 2030, as originally planned. However, humanity currently has no alternative; therefore, the transition to SD philosophy in accordance with its goals and principles in the field of education remains one of the conditions for the survival of humanity at this stage of development.

Dubiaha, S., **Pushkar, L.**, Illyash, S., Shvydun, L., Hlushko, T. Harnessing Gamification for Educational Leadership and Its Impact on Primary and Secondary School Students' Motivation to Learn (2025). *International Journal Of Organizational Leadership*, 14 (Special Issue), P. 582–599. DOI: 10.33844/ijol.2025.60502

The intensive spread of information and communication technologies in modern society and the growing integration of digital tools into everyday life are radically transforming traditional models of learning and teaching. Representatives of the modern generation, who grew up in the digital age, demonstrate unique cognitive characteristics, diverse learning styles, and specific expectations of the educational environment. In the context of dynamic changes in the educational environment, introducing innovative didactic methods and technologies based on ICTs contributes to both the activation of cognitive activity and the emergence of new pedagogical paradigms. The study aims to determine the effectiveness of gamification on the motivation of primary and secondary school students to learn, in particular, by surveying to assess its ability to change the level of learning activity, increase interest in the learning process and stimulate positive motivational behaviour of students in the context of integrating gamification elements into the educational process. Research methods: comparative analysis, systematisation, generalisation, and survey. Results. The survey found that platforms such as Kahoot and Minecraft: Education Edition have shown high efficiency in increasing motivation and developing key competences. At the same time, less popular tools need further optimisation. The high correlation coefficient (.99) between the popularity of platforms and their ability to motivate students indicates a strong positive relationship between these characteristics, which confirms the effectiveness of using gamification platforms to increase motivation. The study found that using gamification in the educational process significantly improves students' motivation and performance, particularly by increasing the high level of development of key parameters such as motivation to learn, creative thinking and the ability to work independently. Gamification has been shown to impact the learning process positively: 63 per cent of students reported improved attention, 58 per cent reported increased interest in learning, and 70 per cent reported easier memorisation. The study found that 65 per cent of students felt more emotionally satisfied, and 70 per cent became more actively involved in learning. It was determined that gamification is most often implemented in the Ukrainian language and mathematics (35.7% and 31.3%, respectively). It was found that the main methods of gamification used by teachers include virtual awards (85%), interactive games (80%) and mobile applications.

Ivanytska, S. "Write Back More Often, Even With Short Letters": Epistolary of Borys And Maria Hrinchenkos to Serhii Yefremov, 1907–1910 (2025). *Rukopysna ta knyzhkova spadshchyna Ukrainy-Manuscript and Book Heritage of Ukraine*, 36, P. 38–61. DOI: 10.15407/rksu.36.038

The purpose of the article is to analyze the correspondence of Borys and Maria Hrinchenko to Serhii Yefremov from 1907 to 1910, which is stored in the fonds of the Department of Manuscripts and Textual Studies of the Taras Shevchenko Institute of Literature. The objectives are to assess the source potential of this epistolary, to identify new information that these 61 letters provide for understanding of the relationship between Hrinchenkos and Yefremov, little-known facts and main directions of their activities, and the system of interaction among the leaders and activists of the Ukrainian movement during this period. Methodology. The main research methods were the method of archival heuristics, historical and critical methods of studying historical sources, and historico-biographical method. Scientific novelty. The correspondence of Borys and Maria Hrinchenkos to Serhii Yefremov during a critical period for the Ukrainian movement was introduced and commented on. The state of epistolary studies in the field of Hrinchenko studies is analyzed. The main issues discussed in Borys Hrinchenko's letters and the style of his correspondence are highlighted. Conclusions. According to the analysis of sources and literature, in recent years there has been an increase in the interest of researchers in the archaeographic study and scientific understanding of Borys Hrinchenko's epistolary. The presented texts of letters from the Hrinchenko couple to Serhii Yefremov reveal new biographical facts, inform about creative intentions and achievements, provide some details of publishing projects and various aspects of the correspondents' public activities, contain information about Hrinchenko's family life and health, reproduce the uniqueness of the writer's epistolary style, and allow comparing it with Maria Hrinchenko's style. For Yefremov himself, Hrinchenko was not just a "man of duty" but one of the "significant Others" whose memory he kept in his academic life.

Lomachinska, I., Ishchuk, M., Chornomordenko, I., Taran, G., Turchyn, M., Martsinko, N., **Pasko, K.**, Lobanchuk, O. Hybrid Warfare and Customs Security: Strengthening Resilience for Sustainable Development (2025). *European Journal of Sustainable Development*, 14 (1), P. 643–660.

This article examines the threats facing Ukraine's customs system in the context of hybrid warfare waged by the Russian Federation in the digital era. It explores key scientific approaches to defining the concept of "hybrid warfare", which is characterized as a complex, multidimensional phenomenon that integrates military, informational, cyber, economic, and political instruments of influence. This form of aggression complicates the identification, counteraction, and neutralization processes, while simultaneously posing a threat to critical components of national resilience. The article emphasizes that hybrid warfare targets the disruption of essential infrastructure, including law enforcement agencies, healthcare systems, food security, transportation networks, the economy, and other sectors vital to the functioning of the state. Particular attention is given to the indirect influence tools employed by the aggressor state, such as support for separatist and terrorist groups, which may involve financing, arming, and carrying out acts of state terrorism. The article also highlights the impact of informational and psychological campaigns designed to transform public opinion destructively in the targeted countries. In the case of Ukraine's customs service, it outlines the diverse methods of hybrid influence, including economic pressure through customs mechanisms, the creation of artificial trade barriers, the spread of contraband, cyberattacks on customs infrastructure, campaigns to discredit customs authorities, the use of corruption schemes, and political-legal manipulations aimed at delaying reforms and influencing foreign economic agreements. The article concludes that customs security has become a priority not only for national security but also as an essential element in achieving the United Nations' Sustainable Development Goals related to peace, justice, institutional resilience, and economic stability. The article underscores the need for the digital transformation of Ukraine's customs system as a strategic response to modern challenges. Such transformation will help strengthen institutional resilience, enhance public trust, ensure procedural transparency, and improve Ukraine's position in the global information space.

Butenko, Y., Rudska, N., Kovalenko, N., Hotvianska, A., Horshchar, V., Tkachenko, R., Turchina, S., Dashutina, L., Mikulina, M., **Toryanik, V.** The Impact

of Environmentally Balanced Agricultural Systems on Changes in the Agrophysical State of Typical Chernozem Soil and the Energy Management of Sunflower cultivation (2025). *Journal of Ecological Engineering*, 26 (7), P. 428–437. DOI: 10.12911/22998993/203917

The relevance of the studies lies in developing methods for primary tillage of soil under sunflower that significantly affect agrophysical indicators. This task acquires special importance under conditions of unstable and insufficient moisture. It is expected to improve the agrophysical properties that would impact the soil's moisture balance and control of crop weeds, which would subsequently allow obtaining high yields. Therefore, the need to develop such methods of primary tillage under row crops, primarily under sunflower, becomes urgent. The study took place in the left-bank forest-steppe zone of Ukraine (Sumy region), utilizing typical low-humus chernozem soil throughout the years 2023-2024. It was found that the largest reserves of productive moisture in the arable horizon at the time of sunflower sowing with plowing at 20-22 cm were 16.9 mm, and the smallest at no-till disc cultivation were 16.4 mm. At the time of harvest, the moisture reserves significantly reduced to a critical level, namely to 0.6-1.0 mm in the arable horizon and to 24.0-25.8 mm in the meter horizon. During the sunflower's germination period, the density of the arable layer soil remained within the optimal range across all soil treatment methods, with values for plowing ranging from 1.14 to 1.24 g/cm³, deep loosening-1.17-1.26 g/cm³, no-till treatment with a heavy cultivator at 12-14 cm-1.22-1.28 g/cm³, and disc cultivation at the same depth-1.20-1.27 g/cm³. The density of the arable horizon under sunflower increased more significantly at plowing than at no-till treatments from plant emergence to harvest. The yield of sunflower seeds in the variant with plowing was the highest-3.28 t<middle dot>ha⁻¹. Soil treatments without turning the soil, both deep at 35-40 cm and shallow at 12-14 cm, led to a significant decrease in sunflower seed yield by 0.40-0.71 t<middle dot>ha⁻¹ at LSD05-0.04 t<middle dot>ha⁻¹. The coefficient of energy efficiency was lowest at plowing under sunflower-2.6. As the energy intensity of the sunflower yield decreased at no-till soil treatments without turning the soil, it increased to 3.0-3.3.

Kyselov, V., Sakhnenko, A., Vorona, V., Skrypka, I., Yeremenko, L. Comprehensive training for young football players: Technical, physical, and psychological readiness for global competitions (2025). *Sport TK-Revista Euroamericana De Ciencias Del Deporte*, 14 (45), art. no. 45.

This study aimed to identify the main factors influencing the effectiveness of training football players in adolescence to achieve high results at the international level. The study used methods of analysing scientific literature, observing training processes and competitions, and experimental approaches to assessing athletes' physical and psychological fitness. It included 136 football players: men (n = 92; 67.65%) and women (n = 44; 32.35%). The age range was 14-22 years old and the average age 19.6. The results showed that adapting training programmes to the individual needs of athletes and considering the sociocultural context plays a key role in ensuring their competitiveness in international competitions. The analysis of technical and tactical indicators of young football players before and after the implementation of practical recommendations showed significant improvements: an increase in the number of short and medium passes forward (from 74 +/- 23 to 105 +/- 24, p<0.05) and backward (from 62 +/- 19 to 84 +/- 25, p<0.05), which indicates better ball control and pace of the game. The decrease in technical errors confirms the improvement in technical stability, while the number of long passes remained unchanged (p>0.05), probably due to their selective use. The study's results may be helpful for coaches, sports psychologists, and sports institution managers in developing training programmes for young athletes.

Degtyarev, S., Osadchij, E., Korotia, O. Archaeological Complex of Romny Culture Near the Kamin Village on the Seim (2025). *Eminak*, 1, P. 175–196. DOI: 10.33782/eminak2025.1(49).775

The purpose of the research paper is to analyze the results of the research on the archaeological complex of the Romny culture near the Kamin village in the middle reaches of the Seim. The scientific novelty. The materials of archaeological explorations of the complex of sites of the Romny culture near the Kamin village are introduced into scientific circulation. According to the research outcomes, at the site, a general map of the location of the components of the archaeological complex is compiled, artifacts originating from the settlement territory are analyzed, and a variant of the reconstruction of the resource managing zone of the Siverians separate community is proposed. Research methodology. A range of methods, inherent in both the humanities and the exact sciences, are employed in the study. Cartographic modeling facilitated the remodeling of the layout system of the archaeological complex and is an effective tool in reconstructing the resource zone of the settlement. The analytical method allows for the identification of cultural and chronological correspondences to the artifacts found among the finds of the Romny archaeological culture and cultural communities synchronous with it. Applying the X-ray fluorescence analysis method for metals and alloys makes it possible to find out the elemental composition of the finds and determine specific characteristics pertaining to their provenance. Conclusions. The archaeological complex of the Romny culture near the Kamin village is a settlement complex of the Siverians community, including a core fortification, several settlements, and a burial mound. Their research has spanned over five decades. Initially, the remains of a burial mound and several settlements were discovered, which are now localized on the ground. The final site to be explored was a core fortification that had previously been occupied by a monastery of the Cossack era. The presence of the core fortification enables the combining of the known settlements and burial objects into a single complex, as well as determining its place among the synchronous sites of the Romny culture of Putyvl and Seim river region (Poseymia). The resource zone of this community was formed by the presence of a balanced natural environment, which is represented by a forest massif, a wide floodplain of the Seim and Kleven rivers, as well as the availability of soils suitable for agriculture. A specific range of occupations, including woodworking, fishing, and trade, characterizes the material culture of the local population. Some finds may be associated with the existence of professional military men (druzhyina). The jewelry unearthed at the settlement originates from other regions of residence of the Slavic population—the Novgorod Slovenes, the Uliches, and the Tivertsy. This settlement is located near the crossing site over the Seim, which is known from Early Modern Period sources, which could also have facilitated the engagement of the local populace in commercial activities. The find of a Kufic dirham dated to the first half of the 10th century and three lead weight pieces are associated with trade operations.

Bosyi, O., Levytska, L., Cherednyk, L., **Protsenko, I.**, Yeldinova, S. Students' Educational Care in Higher Education Institutions: An Innovative Aspect (2025). *Eduweb-Revista de Tecnologia de Informacion y Comunicacion en Educacion*, 19 (1), P. 85–104. DOI: 10.46502/issn.1856-7576/2025.19.01.6

The article analyzes the innovative system of educational work in an educational institution and proposes innovative approaches to improving the educational sector. The purpose of the article is to reveal the innovative component in the educational system of educational institutions and experimentally verify the effectiveness and importance of the innovative system of educational assistance in higher education institutions for education. The methodological basis of the study is presented at four hierarchically subordinate levels: philosophical, general scientific, specifically scientific and technological. The structural elements of the innovative system of educational assistance in an educational institution, its components, and the main ways of professionalization are developed. We highlight the main innovative principles of education in educational institutions. The main innovative principles and methods of education in educational institutions are highlighted. An experimental study was conducted to confirm the effectiveness and importance of the innovative system of educational work in higher education institutions for education. As a result of the experiment, positive changes allow us to speak about an increase in the level of student learning.

Klok, S., Kornus, A., Kornus, O. Long-Term Changes in Temperature, Precipitation, and Moisture Conditions in the Kyiv Region: Evidence from the Boryspil Weather Station (1976–2019) (2025). *Journal of Geology Geography and Geoecology*, 34 (1), P. 136–147. DOI: 10.15421/112513

This study focuses on the analysis of data from the meteorological station in Boryspil, Ukraine, for the period from 1976 to 2019, regarding air temperature and precipitation. Long-term monthly and annual trends were established through statistical processing and visualization using time series and graphs. It was found that both global and local air temperature trends demonstrate a steady increase, albeit with a slight slowdown in recent years. Seasonal temperature variations were characterized, showing accelerated warming in spring and summer. The stabilization of minimum temperature values after 2000 was identified, accompanied by an increase in January, March, August, September, and December. Maximum air temperature trends were analyzed, revealing a downward tendency over the last decade, despite pronounced increases in July, August, and September. A contrasting stability in maximum temperature levels from January to March was established. The average annual precipitation in Boryspil was estimated at 566.2 mm, with a monthly rate of approximately 47.2 mm and an average of 194 days with precipitation per year. The precipitation distribution was characterized as relatively stable throughout the observation period, despite periodic extremes. Moisture conditions were assessed using Ivanov's humidity coefficient and Selyaninov's hydrothermal coefficient, calculated based on the ratio of annual precipitation to evaporation and the sum of precipitation and active temperatures. A steady negative trend in the humidity coefficient was identified, indicating a transition from excessive to insufficient moisture. A deterioration in moisture conditions was determined, particularly after 2003, based on the dynamics of the hydrothermal coefficient. A correlation analysis was conducted, revealing a statistically significant relationship between the hydrothermal coefficient, the humidity coefficient, and key climatic indicators such as average air temperature and relative humidity. The maximum correlation values were found between the humidity coefficient and average air temperature ($r = -0.72$) and relative humidity ($r = 0.83$). It was confirmed that the impacts of global warming manifest at the local level through alterations in thermal regimes and precipitation patterns, influencing agricultural practices and economic sectors. The urgent need for climate research was emphasized to ensure effective monitoring and adaptive responses to climate change. It was highlighted that understanding local manifestations of global climate trends facilitates proactive adaptation measures.

Olitskyi, V. Manifestations of the Conflict Between the Monk Community of the Hlynska Hermitage with the Soviet Authority at the End of the 1950s – the Beginning of the 1960s. (2025). *Skhidnoievropeiskyi istorychnyi visnyk-East European Historical Bulletin*, 34, P. 115–124. DOI: 10.24919/2519-058X.34.324621

The purpose of the article is to clarify the causes and nature of the conflict between the monastic community of the Hlynska Hermitage and the Soviet authorities at the end of the 1950s and the beginning of the 1960s, to study the forms of resistance of the monastic community and the reaction to them by state authorities, and to determine the consequences of this confrontation. The research methodology is based on the principles of objectivity and systematicity. To achieve the goal and objectives, general scientific methods have been used - analysis, synthesis, generalization, induction, deduction, as well as special methods of historical research - classification and criticism of sources, problem-chronological, comparative historical. The scientific novelty consists in the fact that for the first time, the manifestations of the conflict between the monastic community of the Hlynska Hermitage and the Soviet authorities on the eve of the monasterys' closure have become the object of a separate scientific study. Conclusions. The monastic community of the Hlynska Hermitage used passive and active forms of resistance. Passive forms include assistance to pilgrims, provision of food, lodging, and failure to take measures recommended by the

authorities to stop such assistance. A form of active resistance was the sabotage of Soviet elections, the refusal of individual monks to commemorate the Soviet regime during church services. This was prompted by an internal ethical and spiritual call, since praying for a godless regime that actively destroyed the Church and closed monasteries and temples seemed contradictory. The monks' resistance was spontaneous and unorganized, but in terms of ideological significance it was of serious importance to the authorities. The authorities actively responded to any attempts by the monastic community to resist the established order, using various means of influence - from formal control to pressure and direct persecution of dissenting monks. The confrontation between the monastic community of the Hlynska Hermitage and the Soviet authorities had significant consequences for the monastic community, as a significant part of the monks were expelled, and the monastery itself was under constant surveillance.

Kharchenko, Y., Kurash, N. Development and Implementation of an Online Chemistry Course: Advantages, Challenges and Experimental Results (2025). *Information Technologies and Learning Tools*, 105 (1), P. 18–36. DOI: 10.33407/itlt.v105i1.5887

The article explores issues related to the use of electronic educational resources (EER) in the educational process, with a particular focus on the study of Chemistry. It presents an analysis of both Ukrainian and international experiences in utilizing EER for organizing distance learning. The findings indicate that electronic educational resources create learning conditions in which students, through the use of digital technologies, become active participants in events and processes, fully interacting with a learning environment that simulates real-world objects and processes. The authors examine the specific features of developing and using an online course to study Chemistry in vocational education institutions. Such a course allows the integration of various electronic resources into a single platform, providing visualization and interactivity in learning a subject that is often challenging for students, as is the case with Chemistry. The article describes the experience of creating an online Chemistry course, detailing the algorithm for its design and course structure. Examples of educational materials, assignments, and the services used for their development are provided. This online course offers several didactic opportunities, such as the ability to dynamically update content, methods, tools, and training formats, demonstrate laboratory experiments, analyze virtual experiments and observations, and implement various types of knowledge assessment for students. The use of an electronic course meets the educational needs of modern students. The article also analyzes the results of initial and final surveys conducted among vocational and technical educational institution students who participated in the study and used the online course to learn chemistry. The analysis of initial survey results revealed that traditional textbooks were considered unengaging and lacking interactivity, whereas post-experiment surveys indicated that most students found the online course more interesting. The analysis of students' academic achievements showed positive progress in mastering the educational material. The main advantages and identified shortcomings of the online course are also discussed.

Drushlyak, M., Lukashova, T., Shamonina, V., Semenikhina, O. ChatGPT-Based Simulation Helps to Develop the Pre-Service Mathematics Teachers' Critical Thinking (2025). *International Journal of Instruction*, 18 (1), P. 153–172. DOI: 10.29333/iji.2025.1819a

The development of IT affects society in general and the education sector in particular. The emergence of AI (in particular ChatGPT), which is constantly being improved, already causes specific problems in the organization and administration of the educational process. Still, the peculiarities of its functioning make it possible to perceive ChatGPT as learning means in the pre-service mathematics teachers' training. The article presents the results of a study that answers the following questions: (1) "Can ChatGPT be a digital platform that generates pupils' answers (secondary school)?- Yes"; (2) "Are students (pre- service mathematics teachers) prepared to check answers that ChatGPT generates?- Yes"; (3) "Does checking

answers that ChatGPT generates affect the development of students' critical thinking?- Yes". The study involved a pedagogical experiment in which authors described how ChatGPT generates solutions to math problems and what mistakes it makes. We ensured that students sometimes find mathematical mistakes in the answers generated by ChatGPT, but repeated use of ChatGPT shows its positive impact on the development of pre- service mathematics teachers' critical thinking.

Karintseva, O., Kubatko, O., Derykolenko, O., **Omelyanenko, V.**, Sulym, V., Yaremenko, A. Economic and Environmental Drivers of Physical Safety in Central Europe (2025). *International Journal of Global Energy Issues*, 47 (1/2), DOI: 10.1504/IJGEI.2025.143350

Physical safety is not only about the actual safety of humans but also their mental health and calmness. The article examines the key drivers of people's physical safety, well-being and satisfaction with life. The study covers seven Central European countries during 2011-2018. The random effects estimations for the panel data are used for empirical estimations. The study found that crime/violence, unemployment and noise from neighbours negatively impact individuals' physical safety. The empirical results proved that an increase in median income by 1000 euros in Central European states promotes an increase in life expectancy by 0.7 years. However, if unemployment rises by 10%, the decline in life expectancy would range from 0.7 to 1.19 years. The paper proves that the marriage factors like indicators of moral factors are an inevitable part of a healthy society. Noise from the neighbours is considered to be an object of irritation and reduces the level of physical safety of EU citizens. Thus, governments need to stay on top of the problems mentioned above to cope with them.