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Kuksa N. V., Basenko L. I., Shtokovetska N. O. Effectiveness of Functional Training Using Soft Exosuits in Children with Sma Type II [Ефектившсть функцюнального тренування з використанням м'яких екзоскелетів у дітей із сма II типу] (2025). *Rehabilitation and Recreation*, 19 (4), pp. 51–61. DOI: 10.32782/2522-1795.2025.19.4.5

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105027981298&doi=10.32782%2f2522-1795.2025.19.4.5&partnerID=40&md5=c13235f843ba390dbe5d2d92ba530e0c

Neuromuscular diseases in children, particularly spinal muscular atrophy (SMA), remain a significant medical and social issue requiring a multidisciplinary approach to treatment and rehabilitation. SMA type II (Dubowitz disease) is the most common form among children who survive early childhood, but they require constant rehabilitation support due to progressive loss of motor function and the development of secondary complications. For these patients, the search for new physical therapy methods that can improve motor skills, reduce spasticity, and minimize respiratory risks is particularly relevant. In this context, the use of soft exoskeletons, such as the Mollii Suit, opens new opportunities for supporting physical activity and enhancing the quality of life in children with SMA type II. The aim of the study was to determine the effectiveness of functional training using soft exoskeletons in children with SMA type II to improve their physical activity, motor skills, and overall quality of life. Materials and Methods. The study was conducted at the Sumy Regional Center for Comprehensive Rehabilitation for Children and Persons with Disabilities during 2024-2025. It was based on a case study structure, allowing for a detailed analysis of changes in the child's condition during physical therapy. The participant was a 5-year-old child with a confirmed diagnosis of SMA type II (SMN1 gene mutation) who was able to sit independently, used a wheelchair for mobility, and had preserved cognitive function. To assess the dynamics of motor and respiratory function, the Hammersmith Functional Motor Scale Expanded (HFMSE), Revised Upper Limb Module (RULM), and forced vital capacity (FVC) measured by spirometry were used. The 12-week physical therapy program included 2-3 sessions per week lasting 45-60 minutes with the use of the Mollii Suit and an individualized selection of functional tasks. Results. The rehabilitation program led to clinically significant improvements in the child's motor function. The HFMSE total score increased from 22 to 26 points (+4 points, an 18.2% increase), reflecting improved control of the sitting position, functional arm movements, and the ability to change positions with assistance. The RULM score increased by 3 points (from 23 to 26), indicating better control of both proximal and distal upper limb movements and manipulation precision. Additionally, FVC showed a slight but clinically important increase (from 0.85 L, 57% of the predicted value to 0.89 L, 59%), suggesting stabilization of respiratory function. Conclusions. The implementation of a physical therapy program using the soft exoskeleton Mollii Suit for a 5-year-old child with SMA type II demonstrated a highly individualized approach, taking into account the specific characteristics of motor impairments and the patient's needs. The program is aimed at activating motor functions, improving trunk and upper limb movement control, as well as supporting respiratory function. Thanks to the use of the exoskeleton, better body stabilization, reduced fatigue, and increased motivation of the child to perform exercises in the form of play activities were achieved.

Drushlyak, M., **Semenog, O.**, Ponomarenko, N., Vovk, M., **Budianskyi, D.**, **Semenikhina, O.** Enhancing Information and Media Literacy: Evaluating the Impact of Webinars, Workshops, and Masterclasses (2025). *International Journal of Modern Education and Computer Science*, 17 (6), pp. 65–75. DOI: 10.5815/ijmecs.2025.06.05

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105024764933&doi=10.5815%2Fijmecs.2025.06.05&partnerID=40&md5=42d039b91d69418625dc42cbc5d8d1f4

The focus of the research is on the analysis of the effectiveness of different forms of educational activities in developing youth's information and media literacy (IML), based on the results of the Ukrainian project "MEDIA & CAPSULES",

implemented within IREX's "Learn and Discern" initiative. The study compared the impact of webinar sessions, masterclasses, and information and media workshops on three key IML indicators: information literacy, media literacy, and digital security. An empirical pre-post design was used to assess changes in participants' competencies before and after each type of educational intervention. Statistical analysis revealed that information and media workshops had the strongest overall impact, particularly enhancing media literacy and digital security. Masterclasses were most effective in improving information literacy, while webinars showed moderate improvements across all indicators. The findings highlight the importance of aligning instructional formats with specific educational goals and provide practical implications for educators and curriculum developers working to strengthen youth resilience against misinformation and digital threats. Modern Education and Computer Science Press. All rights reserved.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105022071478&doi=10.1038%2Fs41597-025-06086-2&partnerID=40&md5=599ca01e91eedf4d7c852db6fa6e8359

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.

Dubikovska, A., Górka, M., **Kovalchuk, O.**, Bieńkowska-Wasiluk, M., Świdnicka, 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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105019487989&doi=10.1186%2Fs13358-025-00408-y&partnerID=40&md5=39481b62402769f5db55f59db690e160

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.

Otriazhyi, P., Obadă, 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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105008006940&doi=10.1186%2Fs13358-025-00372-7&partnerID=40&md5=00c050be9a9c2e4be9785504da094533

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.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001332548&doi=10.1038%2Fs41398-025-03333-3&partnerID=40&md5=c5ce0d4d7c920234fcb7ac7b83a7c5ca

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.

Bondarenko, Y., Buhlai, N., Tymofiienko, N., Orlenko, I., Lytvyn, I. Educational Milieu at Universities: Implementation of Inclusive Methods in High School Studies (2025). *Premier Journal of Science*, 14, art. no. 100129. DOI: 10.70389/PJS.100129

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105022431913&doi=10.70389%2FPJS.100129&partnerID=40&md5=58b2e67d1bcf7094bed373d13ee2618f

The issue of implementing inclusive education is wide-ly discussed in the academic community, as inclusive education meets the requirements of ensuring the right to education for all citizens. However, despite numer-ous theoretical proposals for developing an inclusive educational environment, creating a fair, inclusive space in practice has proven

complicated. Research on inclusive education has covered chiefly primary and secondary schools, while inclusive education in higher education has received little attention. Therefore, the purpose of our study was to identify the problems of inclusive education in higher education from the perspective of the student community and to create recommendations for their solution. MATERIALS AND METHODS The study used analytical and bibliographic, graphical, in-duction, deduction, analysis, synthesis, structuring, sur-vey, statistical analysis and logical comparison methods. RESULTS The results of the study revealed insufficient satisfac-tion of the needs of persons with disabilities in higher education institutions, a lack of understanding of the needs of persons with physiological characteristics by the student community, dissatisfaction with the learning environment among all students, the existence of a hostile communication atmosphere among students due to a sense of injustice and the spread of stigma among students with disabilities. CONCLUSION Based on the principles of individualisation, differentiation and accessibility, practical recommendations were developed to improve the conditions for all stu-dents, avoiding stigmatisation of people with disabilities and improving communication and the learning environment.

Prokopenko, O., Trypolska, G., Bashynska, I., Telizhenko, O., Strelcow, W., Kovalenko, Y., Lytvynenko, S., Woźna, 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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105021568599&doi=10.3390%2Fen18215799&partnerID=40&md5=cac17d14f77b35eff93c16065ade2984

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.

Honcharenko, L., Demyanenko, N., **Moskalenko, M.**, Shvets, T., Zakharina, T. Nurturing Command Capacities in Academic Scholars: A Quantitative Survey (2025). *Premier Journal of Science*, 13, art. no. 100105. DOI: 10.70389/PJS.100105

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105018612557&doi=10.70389%2FPJS.100105&partnerID=40&md5=4fbff9e28275ddfa5d40883783cebdcb

BACKGROUND The development of leadership competencies in higher education students is particularly relevant in the context of the transformation of the educational space, the growing role of social interaction, inclusion, and psychological resilience. The need for spe-cialists who cannot only adapt to changes but also initiate them underscores the importance of studying the conditions that foster youth leadership potential. The purpose of the study is to determine the impact of inclusion, counseling, and resilience on the formation of leadership competencies in students of higher education institutions. The object of the study is the process of developing leadership competencies in students. MATERIALS AND METHODS The methodological basis of the study is a quantitative survey using the Likert scale and generalization of data through statistical analysis. The study was ethically re-viewed and approved by the Research Ethics Commit-tees of the three participating Ukrainian universities (approval ID: 2024/REC-0412, February 22, 2024). Before data collection, all respondents confirmed their voluntary participation by providing digitally signed in-formed consent. RESULTS The survey of 187 students from three universities in Ukraine revealed a high level of influence of psychological resilience on the development of leadership skills (81% perceived positive impact), as well as the importance of counseling (72%) and inclusive education (68%). The key socio-pedagogical and psychological factors that ensure the development of leadership potential have been identified, including the quality of the educational environment, interaction style, motivation to achieve, and emotional intelligence. Based on

an analysis of literature and empirical data, a model for an integrated approach to diagnosing leadership competencies is proposed, utilizing psychometric, sociometric, and situational project methods. CONCLUSION The practical significance of the results lies in the possibility of implementing effective educational strategies that promote the development of leadership qualities in students, enhance their ability to make decisions, foster teamwork, and promote social influence.

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), pp. 1–27. DOI: 10.11646/zootaxa.5696.1.1

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105019732566&doi=10.11646%2Fzootaxa.5696.1.1&partnerID=40&md5=e4409af5541f60ce05f91097f282b995

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., Živaljević, 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), pp. 413–420. DOI: 10.1002/oa.70035

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105015209677&doi=10.1002%2Foa.70035&partnerID=40&md5=4c91504410379687a8df63baab58dfc9

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.

Pylypenko, O. V., Pazukha, I. M., Lohvynov, A. M., Tyschenko, K. V., **Saltykov, D. I.**, Shapovalov, O. I., Komanický, V., Shkurdoda, Y. O. Structure and Temperature Effects in Electrical Conductivity of Fexni1−X and Fexco1−X Thin-Film Alloys (2025). *Journal of Vacuum Science and Technology A: Vacuum, Surfaces and Films*, 43 (5), art. no. 053407. DOI: 10.1116/6.0004704

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105013211606&doi=10.1116%2F6.0004704&partnerID=40&md5=b10070d3822c511c857d122f2095f7d8

Thin-film alloys Fe<inf>x</inf>Ni<inf>1−x</inf> and Fe<inf>x</inf>Co<inf>1−x</inf> (0.2 ≤ x ≤ 0.8) were prepared by electron-beam evaporation in a vacuum. The thickness of the samples varied from 20 to 60 nm. The resistivity of as-deposited Fe<inf>x</inf>Ni<inf>1−x</inf> and Fe<inf>x</inf>Co<inf>1−x</inf> thin-film

alloys at room temperature takes values within the range from 20 × 10−7 to 70 × 10−7 Ω m, depending on the concentration of components and thickness. The resistivity of annealed at a temperature of 700 K Fe<inf>x</inf>Ni<inf>1−x</inf> and Fe<inf>x</inf>Co<inf>1−x</inf> thin-film alloys is within the range of 3 × 10−7-20 × 10−7 Ω m. The electron transport properties were found to agree with their crystal structure, which strongly depended on the composition of the alloys. The concentration dependences of resistivity and temperature coefficient of resistance have monotonous characteristics for all samples after heat treatment at 700 K. The temperature coefficient of resistance reaches its minimum value at the maximum Fe content (x = 0.8). It has been found that the temperature dependence of resistivity of thin-film alloys exhibits three characteristic regions due to the low-temperature electron-phonon interaction (T<inf>1</inf> = 125 K-Θ<inf>1</inf>), the electron-magnon interaction (T<inf>2</inf> = Θ<inf>1</inf>-Θ<inf>2</inf>), and the electron-phonon interaction at high temperatures (T<inf>3</inf> = Θ<inf>2</inf>-700 K).

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105004293851&doi=10.1016%2Fj.jasrep.2025.105187&partnerID=40&md5=ebc0a37e21805b7fd99fe666831b636c

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.

Golod, N., **Bespalova, O.**, Kozhemiako, T., Kalmykova, Y., Kalmykov, S. Dynamics of Carbohydrate Metabolism in Persons with Acute Calculous Cholecystitis after Cholecystectomy Under the Influence of Physical Therapy and Occupational Therapy (2025). *Fizicna Reabilitacia ta Rekreacijno-Ozdorovci Tehnologii*, 10 (4), pp. 269–278. DOI: 10.15391/prrht.2025-10(4).04

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105015339732&doi=10.15391%2Fprrht.2025-10%284%29.04&partnerID=40&md5=636c706e8475b85babbf5db64d27a8c8

Purpose. To determine the dynamics of carbohydrate metabolism in individuals with acute calculous cholecystitis after laparoscopic cholecystectomy under the influence of physical therapy and occupational therapy. To perform a comparative analysis of the dynamics of insulin resistance at the acute, post-acute and long-term stages of rehabilitation. Material & Methods. The study included 120 people with acute calculous cholecystitis aged 18 to 74 years who underwent LHC. People received rehabilitation interventions for 12 months. The main strategies of physical rehabilitation for normalization of carbohydrate metabolism of people after LHC were: support (consultation), reduced energy consumption, healthy eating habits, regular physical activity (strength and aerobic exercise), sleep management, reduction of anxiety and depression. Statistical analysis. The obtained results were processed by mathematical statistics methods using the IBM SPSS Statistics 23 program. The input data were checked for normality

of their distribution. For this, the Shapiro-Wilco W-criterion was used. For the indicators that corresponded to the normal distribution, the average (x̄), standard deviation (S) and standard error of the mean (m) was calculated. To assess the significance of the difference, in the presence of a normal distribution of research results, Student's t-test was used for dependent and independent samples; the difference was considered statistically significant at p<0,05. Results. The initial assessment of carbohydrate metabolism in individuals with acute calculous cholecystitis (ACC) demonstrated glucose levels within the normal range, but an increased HOMA-IR index. When assessing the dynamics of carbohydrate metabolism in individuals with ACC 1 month after LHC, no statistically significant (p>0.05) changes were found in the indices either in the control groups or in the main groups. One year after LHC, when assessing the dynamics of carbohydrate metabolism in the control groups according to ACC, no statistically significant (p>0,05) changes were found in any of the control groups. The HOMA-IR index in representatives of the control groups remained above the norm for a year. When assessing the dynamics of carbohydrate metabolism indices one year after LHC in representatives of the main groups with ACC, a statistically significant decrease (p<0.05) in fasting blood insulin and the HOMA-IR index was found in representatives of all main groups relative to the preliminary examination index and compared with the indices of the control groups. Conclusions. Such positive changes in the insulin resistance function one year after cholecystectomy in individuals who received rehabilitation interventions using our technology indicate that the system of exercises using strength exercises and cyclic aerobic exercises and lifestyle modification can influence carbohydrate metabolism even with unfavorable rehabilitation prognosis in individuals with signs of metabolic dysfunction after cholecystectomy. For a significant impact on carbohydrate metabolism in individuals after LHC, a one-month rehabilitation intervention is not enough; statistically significant dynamics in these functions were observed after 12 months of rehabilitation interventions.

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). *International Journal on Culture, History, and Religion*, 7 (SI1), pp. 85–99. DOI: 10.63931/ijchr.v7iSI1.136

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105012535849&doi=10.63931%2Fijchr.v7iSI1.136&partnerID=40&md5=c80ced54cc96100a2ab38fe875b866c7

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 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.

Kuchuk, A., Kobko, Y., Radchuk, A., Knyshov, V., Voloshanivska, T. Ensuring human rights in Ukraine based on the case law of the European Court of Human Rights (2025). *Social and Legal Studios*, 8 (2), pp. 324–338. DOI: 10.32518/sals2.2025.324

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105012903956&doi=10.32518%2Fsals2.2025.324&partnerID=40&md5=50cef7cf7442a7344aa19ef51284624b

The study aimed to analyse how the Ukrainian legal system implements the decisions of the European Court of Human Rights, as well as to identify problems and prospects for improving this process. The article used methods of legal

analysis of the decisions of the European Court of Human Rights, comparison of national legislation with the European Convention on Human Rights, analysis of the statistics of the European Court of Human Rights, research on the implementation of European Court of Human Rights decisions at the national level, hermeneutics to identify terminological gaps, analysis of the implementation of European standards in the national legal system, and deduction to identify key issues in cases against Ukraine. An analysis of the decisions of the European Court of Human Rights revealed numerous systemic human rights violations in Ukraine, particularly in the areas of conditions of detention, unlawful arrests and lengthy court proceedings. Problems with non-enforcement of court decisions and violations of the rights to liberty and dignity have been confirmed by numerous cases, such as Gongadze v. Ukraine and Kharchenko v. Ukraine. Amendments to the Criminal Code of Ukraine following the decisions of the European Court of Human Rights, in particular the limitation of the term of pre-trial detention, have reduced the number of cases of prolonged detention without sufficient grounds. However, the article also pointed to difficulties in the enforcement of European Court of Human Rights decisions, such as lack of resources, political will and insufficient reforms in the judicial sphere. The role of international cooperation and civil society in the process of implementing the decisions of the European Court of Human Rights in Ukraine is critical for the further development of the human rights situation in the country. The practical significance of the article lies in the fact that it provides valuable recommendations for improving human rights practices in Ukraine, in particular in the area of implementing the decisions of the European Court of Human Rights.

Vakolia, Z., Shykitka, H., Potiuk, S., Kazmirchuk, N., **Zelinska-Liubchenko, K.** The Impact of Differentiated Instruction on the Academic Performance of Students with Special Educational Needs (O impacto do ensino diferenciado no desempenho académico dos alunos com necessidades educativas especiais El impacto de la enseñanza diferenciada en el rendimiento académico de los alumnos con necesidades educativas especiales) (2025). *Sapienza*, 6 (3), art. no. e25045. DOI: 10.51798/sijis.v6i3.1005

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105011540309&doi=10.51798%2Fsijis.v6i3.1005&partnerID=40&md5=80a85034a9e95e94850e5f88a60f8d5e

Background: The issue of adapting learning to the students' individual needs is becoming increasingly relevant in modern educational practice. The aim of the study is to determine the effectiveness of different methods of differentiated instruction and their impact on academic performance, motivation, and independence of primary school students. Methods: The study employed Wechsler Individual Achievement Test-4, Academic Motivation Scale, observation and the methods of statistical analysis (Levene's test, Mann-Whitney U-test). Results: The results showed that the average student motivation scores on the Academic Motivation Scale increased from 3.2 to 4.1 after the implementation of differentiated instruction, while student autonomy assessed on the Student Satisfaction Inventory, increased from 3.0 to 4.0. Conclusion: The implementation of differentiated instruction also proved to be effective in improving academic performance, where the students' average score increased from 65 to 80. The practical significance of the obtained results is the possibility of improving educational strategies and the quality of the educational process. Further research may focus on examining the long-term effects of these methods and the integration of new technologies to improve learning effectiveness.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105022220525&doi=10.4081%2Fgh.2025.1418&partnerID=40&md5=c2ae93c7af2569797a4ab7d2fe637e67

This study investigated regional inequalities in cancer incidence in Ukraine and their potential links to environmental pollu tion. 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.

Nesvidomin, A., Pylypaka, S., Volina, T., **Shtyka, Y.**, Rybenko, I. Optimisation of a Developable Surface Model Passing Through a Helical Curve with Variable Pitch (2025). *Machinery and Energetics*, 16 (2), pp. 49–57. DOI: 10.31548/machinery/2.2025.49

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010653526&doi=10.31548%2Fmachinery%2F2.2025.49&partnerID=40&md5=6413843057ff273716a53603d1d6164d

Insufficient consideration of the developable helical surfaces in engineering practice complicates their manufacture and design, especially for variable pitch surfaces. The purpose of the article was to develop an algorithm for designing a helical surface of variable pitch and its mathematical implementation. For this purpose, the methods of differential geometry of curved lines and surfaces were used, as well as the MatLab software environment for computing, data analysis, visualisation and development of algorithms for constructing surfaces based on the results obtained. The basis for the surface construction was a spiral line of variable pitch, which can be specified by various dependencies. The task was to draw a set of rectilinear surface components through this spiral line with a vertical axis, provided that it was a developable surface. An additional condition was that these lines must be inclined at a constant angle to the horizontal plane, i.e. the receptive surface must be a surface of equal inclination of the lines. Usually, the unfolding surface is defined by a spatial curve – an edge of inverse. The set of straight-line tangents to the back edge forms the developable surface. However, in practical problems, it is important to ensure that the scan surface passes through a given curve, for example, a helical line. It has been established that a set of reamer surfaces of the same slope of the constituent parts with different specified angles can be drawn through a given helical line. It was proved that it is easy to obtain a surface compartment bounded by two coaxial cylinders, one of which has a given helical line. The results of the study can be used to improve the technology of manufacturing screws in agriculture, food, mining and construction industries.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105011749317&doi=10.3390%2Fen18143623&partnerID=40&md5=2489f18558ca31b2be90782f7ad1c930

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.

Kolesnyk, A., Brizhata, I., **Tonkopei, Y.**, Sytnyk, O., Voitenko, V. Factor Analysis of Individual-Typological Properties and Psycho-Physiological Development of Children Aged 5–7 Years (2025). *Eastern Ukrainian Medical Journal*, 13 (2), pp. 504–512. DOI: 10.21272/eumj.2025;13(2):504-512

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105009248776&doi=10.21272%2Feumj.2025%3B13%282%29%3A504-512&partnerID=40&md5=0d0d435b015eea4790ea8f050105a05d

Objective: to carry out a factor analysis of neurodynamic, sensorimotor properties, and psychophysiological development of children of preschool and primary school age. Intensive formation of psychophysiological functions, especially memory and attention, is a characteristic feature of the age period of preschool and junior school age. The changes over time in these functions will depend on the individual typological properties of the central nervous system. Therefore, the development of sensorimotor and neurodynamic properties reflects the process of biological formation of the evolutionary formation of cognitive functions, which are influenced by a number of various factors of exogenous and endogenous origin, such as education, upbringing, etc. Taking into account the importance of the influence of neurophysiological mechanisms and their connection with the processes of formation of individual-typological properties, a number of regularities of the peculiarities of the development of psychophysiological functions of 5-7-year-old children were established. Material and methods. 108 children took part in the study: 36 five-year-olds, 34 six-year-olds, and 38 seven-year-olds. The examination was carried out in accordance with the requirements of the WMA Declaration of Helsinki and with the consent of the parents. The research plan includes the determination of neurodynamic and sensorimotor properties of the nervous system on the Diahnost-1M device. The regulatory influence of the autonomic nervous system on the heart rhythm was studied using the Fazahraf instrumental technique. The method included the collection and analysis of electrical potentials, as well as spectral characteristics of regulatory functions, which allows obtaining significant statistical indicators of heart rhythm. This makes it possible to evaluate the interaction between the ANS and cardiac activity, as well as to identify the peculiarities of the functioning of the nervous system in children. Considering the stages of the research and the heterogeneity of the variables, mathematical data processing was multi-level. This is explained by the fact that most of the data, due to significant asymmetry and a small degree of discretization, did not meet the conditions of the law of normal distribution. The use of multi-level processing made it possible to more accurately evaluate the results and take into account all the specific features of the data. To study the functions of attention, we used the generally accepted technique "Correction test" in a modification that allows you to assess the level of concentration, mental productivity, accuracy of task performance, and the amount of attention in children. The study of voluntary visual and auditory memory was determined according to generally accepted methods that allow determining the maximum number of symbols. For this, 10 pictures and 10 words were used, which provides a comprehensive assessment of children's memory. These techniques make it possible to reveal the ability to remember and reproduce information in various forms. Results. It was established that for 5-year-old children, the main influencing factor is heart rate (HR) and their statistical indicators, while a simple visual-motor reaction of choice is an additional factor. When analyzing the 6-year-old examinees, the picture was similar to the 5-year-old, but the influencing factors of neurodynamic indicators were not found in any group of components. Thus, factor analysis in 6-year-old children confirms the stable role of indicators of the cardiovascular system in ensuring mental activity. The allocation of the main components in 7-year-old children had some differences compared to younger children. It is important to note that the index of short-term visual memory became significant in this group. Thus, in 7-year-old children, in addition to indicators of the cardiovascular system, indicators of psychophysiological functions also begin to appear. Conclusions. The study of psychophysiological functions of children aged 5-7 years revealed important regularities that emphasize the importance of cardiac activity as the main factor that ensures mental activity. The heart rate (HR) was a particularly important indicator, which allows us to assess the degree of stress during the performance of intellectual tasks. The results indicate the dependence of the development of psychophysiological functions on the individual-typological properties of the central nervous system and the influence of the educational environment. This opens new opportunities for optimizing educational processes and individualizing approaches to raising and teaching children, which makes this research relevant for pedagogical workers, psychologists, scientists, etc.

Drushlyak, M., **Semenog, O.**, Ponomarenko, N., Vovk, M., **Budianskyi, D.**, **Semenikhina, O.** Development of youth information and media literacy: analysis of

non-formal educational activities (2025). *Eastern Journal of European Studies*, 16 (1), pp. 194–215. DOI: 10.47743/ejes-2025-0109

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010960018&doi=10.47743%2Fejes-2025-0109&partnerID=40&md5=4bb1ed69412696b5dd7c48ec534dc2c5

The development of information and media literacy among young people is particularly crucial in the context of hybrid warfare, disinformation, and growing digital threats. This study focuses on identifying the most effective forms of non-formal educational activities that contribute to strengthening youth competencies in this area. The research is based on the results of the "MEDIA & CAPSULES" project, implemented within the global IREX initiative "Learn and Discern: Media Literacy – National Deployment". The project included webinars, master classes, and information and media workshops, involving students, teachers, and lecturers. To assess information and media literacy, three key indicators were used: information literacy, media literacy, and digital security. Statistical methods (Student's t-test, ANOVA, and regression analysis) indicated that webinars most effectively improve information literacy, master classes enhance digital security, and workshops strengthen media literacy. The findings can inform the development of educational programs and confirm the effectiveness of integrating media education with the principles of digital citizenship in modern educational practices.

Kurova, A., Popovych, I., Shevchenko, N., Lialiuk, G., Chernyavska, T., Kolly-Shamne, A., Yaremchuk, V., **Shcherbak, T.** Dominant Mental States in Juniors' Coping Behavior (2025). *Journal of Physical Education and Sport*, 25 (6), pp. 1113–1123. DOI: 10.7752/jpes.2025.06123

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010522181&doi=10.7752%2Fjpes.2025.06123&partnerID=40&md5=ac4e4e818149f11d27bc8e8ee81c987b

This study aims to identify the psychological correlations of defensive behavior and develop a factor structure of dominant mental states related to coping behavior in junior athletes. Methods: The sample included junior athletes aged 15–19 (M = 17.23; SD = ±3.43), participating in All-Ukrainian, European, and World championships (n = 119). Two validated psycho-diagnostic tools, previously tested on Ukrainian populations, were used to accurately capture the key research variables. Theoretical methods included retrospective analysis, generalization, comparative analysis, and interpretation. Empirical methods involved targeted observation and testing. Factorial ANOVA was applied to reduce the proportionality among research variables. Standard statistical procedures were also performed. Results: The methodological foundations were based on the concept of the athlete's personality as an open and dynamic system, taking into account psychophysiological and age-related growth patterns. The strongest direct correlation was found between "planning" and "emotional stability" (R =.841; p <.001), while the strongest inverse correlation was between "refusal" and "emotional stability" (R = –.838; p <.001). It was summarized that emotional stability is the most loaded and actualized characteristic in the research conditions. The factor structure of dominant mental states of junior athletes' coping behavior was created. Eight factors were established (Σd = 86.293%): F1 "Self-blame coping behavior", F2 "Sensitive coping behavior", F3 "Dependent coping behavior", F4 "Conscious coping behavior", F5 "Tense coping behavior", F6 "Confident coping behavior", F7 "Safe coping behavior", and F8 "Dreamy coping behavior". It was summarized that diagnosing and interpreting dominant mental states of junior athletes' coping behavior gave us a deeper insight into junior athletes' psychology in crisis and extreme situations of life activities. Discussion and conclusions: It was empirically established and theoretically substantiated that dominant mental states of junior athletes' coping behavior are active strategies of defensive behavior in critical situations of sporting activities. It was underscored that dominant mental states of coping behavior reflect the prevalent type of behavior in combination with the most pronounced personality traits that are actualized in the dimensions of defensive behavior. The research findings should be operationalized in the activities of sports subjects working in junior sports.

Prokopenko, O., Järvis, 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), pp. 291–299. DOI: 10.22306/al.v12i2.621

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105009923678&doi=10.22306%2Fal.v12i2.621&partnerID=40&md5=ba510d1927961f3a6051174f016e537e

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 data processing, suburban systems can manage flow dynamically, offering valuable insights for scalable implementations in both urban and suburban logistics.

Cherniakova, Z., Barbashova, I., Kosenko, R., Koreneva, I., Kuzmenko, H. Sustainable Development Principles Integration Into Educational Curricula: Implications and Prospects (Integração dos princípios do desenvolvimento sustentável nos programas de ensino: implicações e perspectivas) (2025). *Nativa*, 13 (2), pp. 330–339. DOI: 10.31413/nat.v13i2.19448

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105014767136&doi=10.31413%2Fnat.v13i2.19448&partnerID=40&md5=c0b02d3c72a5fee773a21459a454cd43

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.

Korovynskyi, I., Volnova, L., Yuryk, O., Borysova, O., Manchuk, V. Cognitive-Behavioral Therapy Methods in the Treatment of Post-Traumatic Stress Disorder and Their Role in Mental Health Recovery (2025). *Georgian Medical News*, 362 (5), pp. 51–60.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010920074&partnerID=40&md5=889f78e77c6b1fff780792eab92b9d1c

The mass traumatization of the population in Ukraine and numerous countries worldwide due to military actions, natural and artificial disasters, and violence creates challenges for the mental health care system, requiring evidence-based approaches to treating post-traumatic stress disorder (PTSD). Cognitive-behavioral therapy (CBT) is recognized as a priority method of psychotherapeutic intervention for PTSD. However, the effectiveness of various CBT methods remains insufficiently studied regarding specific types of trauma and individual patient characteristics. Research Aim: To systematically analyze modern CBT methods in treating PTSD and determine their role in restoring the mental health of patients with different types of traumatic events. Methods: A comprehensive analytical synthesis and meta-analysis of scientific literature from 2019-2025 was conducted using PubMed, SCOPUS, Web of Science, and PsycINFO databases. The PRISMA 2020 methodology was applied to select 70 sources from the initial 212 publications. Risk of bias assessment was performed using the Cochrane Risk of Bias Tool 2.0 and AMSTAR-2. A quantitative meta-analysis of different CBT methods' effectiveness was conducted with calculation of standardized mean differences (Cohen's d) and 95% confidence intervals. Results: Quantitative integration of findings from 45 randomized controlled trials (n=4,267 participants) revealed remarkable effectiveness of CBT methods: prolonged exposure (d=1.24, 95% CI: 1.05-1.43), cognitive processing therapy (d=1.16, 95% CI: 0.98-1.34), trauma-focused CBT (d=1.08, 95% CI: 0.91-1.25). Treatment response rates were 68% for prolonged exposure, 64% for cognitive processing therapy, and 61% for standard CBT. The effectiveness of CBT methods depends on the type of traumatic event, demographic characteristics, and comorbidity. An individualized approach increases treatment effectiveness. Innovative CBT technologies (telemedicine, internet programs, mobile applications) and cultural adaptation of methods increase therapy effectiveness. Conclusions: CBT methods are the priority choice in treating PTSD, affecting symptom reduction and improving quality of life. Their integration with other approaches increases the effectiveness of treating complex cases. Promising directions include research on neurobiological mechanisms, personalization of approaches, and the study of innovative technologies.

Kozeratska, O. Romanova, I. Lanskoi, A., **Vakal, Y.**, Kononenko, O. Exploring the Role of Innovative Technologies in Supporting the Mental Health of Ukrainian Military Personnel with PTSD (2025). *Georgian Medical News*, 362 (5), pp. 160–170.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010856329&partnerID=40&md5=dfc602d4f25a74d0e9a8e6079cdc66ff

Introduction: PTSD manifests as a range of emotional and psychological symptoms that can be debilitating, affecting a person's ability to function in daily life. Objectives: To investigate the effectiveness of virtual reality therapy in improving the mental health of Ukrainian military personnel diagnosed with PTSD. Methodology: An experimental pre-post-test design with 40 Ukrainian military personnel was conducted over six weeks. Data were analyzed using descriptive, inferential, and thematic analyses. Results: Demographically, the experimental group had more females (66.7%) and younger mean age (36.60 ± 1.61 years). PTSD symptoms, measured by the PCL-5, significantly decreased in the experimental group, with a mean change of -16.50 (t = 9.042, p = .000), compared to the control group's -4.74 (t = 2.18, p = .042). Anxiety levels dropped significantly in the experimental group (-4.28, t = 4.31, p = .000) versus the control group (-2.00, t = 3.16, p = .005). Depression saw the most marked reduction in the experimental group (-6.48, t = 5.67, p = .000) compared to -1.08 (t = 1.07, p = .300) in the control group. Conclusion: The study highlights that incorporating VR therapy with traditional PTSD treatments significantly reduces PTSD, anxiety, and depression symptoms among Ukrainian military personnel.

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 (Switzerland)*, 17 (10), art. no. 4610. DOI: 10.3390/su17104610

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105006805296&doi=10.3390%2Fsu17104610&partnerID=40&md5=37d1cba0e7327bc69674a3bfa56d376c

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.

Latina, H., Kalynychenko, I., Tkachuk, O., Danysko, O., Ivanova, T. Integral Evaluation of the Formation of Adaptive Capacity of the Children's Body Under the Condition of Systematic Specific Physical Load (2025). *Fizicna Reabilitacia ta Rekreacijno-Ozdorovci Tehnologii*, 10 (2), pp. 77–86. DOI: 10.15391/prrht.2025-10(2).03

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105005160143&doi=10.15391%2Fprrht.2025-10%282%29.03&partnerID=40&md5=a768fd9ddef17295c9bf4ea637933042

Purpose. The article considers the possibility of using quantitative and qualitative indicators, which characterize in general the adaptive capacity of the children's body under the condition of systematic specific physical load. Material & Methods. The methodology consisted in the formation of so-called matrices of pairwise comparison of indicators, arranged in separate blocks. The comparison was carried out in the form of an estimated ratio of importance in pairs of indicators. Results. Our studies coincide with the results of M. Antomonov and confirm the fact that the characteristics of the integral assessment of the adaptive capacity of the body reflect a few indicators that are grouped in separate blocks and include all factors that affect adaptation processes and have a simple and adequate form of analysis. Conclusions. According to the totality and significance of the experts' answers, it has been established that the block of factors "lifestyle" has the greatest influence on the adaptive capacity of the children's body under the condition of systematic specific physical load. The following blocks share the second place: "athlete efficiency" and "functional state of the cardiovascular and respiratory systems". The third and fourth positions in terms of weight coefficients were occupied by the following blocks of indicators: "neurodynamic properties of a person" and "psycho-emotional state".

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Malyarova, Y. M., Soltyk, I. T., Serbova, O. V. Effective Communication in the «Therapist – Patient» System in a Clinical Institution (2025). *Rehabilitation and Recreation*, 19 (1), pp. 83–92. DOI: 10.32782/2522-1795.2025.19.1.8

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105004595514&doi=10.32782%2F2522-1795.2025.19.1.8&partnerID=40&md5=776bb5499626872ac60a4ed75fd367ef

Effective communication between a therapist and a patient is a key factor in providing high-quality medical care. It influences the level of patient trust, adherence to treatment, therapy effective-ness, and overall satisfaction with medical services. However, communication barriers often arise in the interaction between a doctor and a patient, which can reduce the quality of treatment. Objective of the study. The aim of this study is to analyze the fundamental principles of effective communication between a therapist and a patient, identify barriers, and develop strategies to overcome them. Materials and methods. The study utilized the following methods: analysis of scientific literature on medical communication; a survey of 150 patients to assess their level of satisfaction with communication with a therapist; a survey of 30 therapists (including 20 physical therapists and 10 occupational therapists) to identify challenges in patient interaction; observation of 10 consultations to evaluate therapists' verbal and non-verbal communication; and an experimental communication training program for therapists, with subsequent assessment of its impact on the quality of therapist-patient interaction. Results. The study identified four main groups of communication barriers: verbal barriers – the use of complex medical terminology and the lack of verification of patient understanding; non-verbal barriers – insufficient eye contact, closed posture, and a low level of active listening; psychological barriers – patient fear of diagnosis, low level of trust, and emotional burnout of patients due to the ongoing war in the coun-try; organizational barriers – lack of time for consultations, absence of communication training for thera-pists, and insufficient use of digital technologies in rehabilitation. Conclusions. After conducting a short communication training program, several positive outcomes were achieved: after therapists completed the medical communication training, patient satisfaction with diagnosis explanations increased from 58 to 82%; the use of the «teach-back» technique increased by 30%, improving patient understanding of treatment recommendations; enhanced therapist empathy raised patient satisfaction with therapist interaction from 65 to 89%. The findings confirm the necessity of implementing communication skills training for therapists and other healthcare professionals.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105011185098&doi=10.33782%2Feminak2025.2%2850%29.798&partnerID=40&md5=7f82ad2ad86d95b161df8e34eae30508

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.

Prokhorenko, L., **Kosenko, Y.**, Matusiak, H., Pyslar, A., Los, O., Zavatskyi, Y., Zavatskyi, V., Hoian, I. Interrelationship Between Juniors' Intrinsic and Extrinsic Motivation and Self-Efficacy Parameters (2025). *Journal of Physical Education and Sport*, 25 (4), pp. 727–735. DOI: 10.7752/jpes.2025.04078

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105005971239&doi=10.7752%2Fjpes.2025.04078&partnerID=40&md5=822db3bf774d66a18e572ee85015d2b4

The aim of this study was to identify and substantiate the psychological correlations between junior athletes' intrinsic, extrinsic positive, and extrinsic negative motivations, and their self-efficacy during the stage of their professional development. Methods: The sample consisted of junior athletes aged 15–19 years, with equal representation from individual sports (n = 64) and team sports (n = 64). Gender parity was also maintained, with 64 males and 64 females included in the study. The descriptive characteristics of the junior athlete sample (n = 128) are as follows: mean (M = 16.97), median (Me = 17.00), and standard deviation (SD = ±3.32). Results. Five direct correlations and one inverse correlation of motivation parameters with self-efficacy and self-control were recorded (p ≤.050; p ≤.010). It was emphasized that the strongest correlations graphically comprised the "psychological triangle of sports results": intrinsic motivation with self-efficacy in subject activity and the general scale of internality; self-efficacy in subject activity with the general scale of internality. It was found that the superiority of intrinsic motivation on the general scale of internality and self-efficacy in sports activities confirms its crucial role in achieving competition results. Discussion and conclusions. It was substantiated that intrinsic motivation in juniors' sporting activities aims at achieving sports results for the sake of sports activities, in contrast to extrinsic motivation, which is based on incentives to be active due to external circumstances. It was noted that general internality is a universal dimension that can both encourage junior athletes and hinder them from achieving the desired result. It was proved that the optimal level of motivation, which is accompanied by sufficient self-control, does not allow a competitive situation to go beyond manageable boundaries and can ensure the highest self-efficacy of junior athletes. The empirical findings are of interest to all subjects in junior sports.

Vakal, A., **Govorun, O.**, Gulevets, D., Korchynska, Z., Kushch, Y. The Impact of the Ecosystem on Biodiversity Restoration in the Natural Ecosystems of Ukraine (2025). *Grassroots Journal of Natural Resources*, 8 (1), pp. 945–963. DOI: 10.33002/nr2581.6853.080140

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105005258601&doi=10.33002%2Fnr2581.6853.080140&partnerID=40&md5=a2a9a44e096921caeea60f014c63e76b

Biodiversity research is a key element in natural resource management and conservation, especially in large ecosystems such as biosphere reserves. In this context, the dynamics of changes in the plant species diversity on the territory of the Carpathian Biosphere Reserve were analyzed for 2010– 2023. The research aimed to study the impact of ecological networks on biodiversity and to identify their role in maintaining ecosystem stability and preserving the species composition in the studied area. The state of biodiversity in the Carpathian Biosphere Reserve was evaluated by using the Simpson, Shannon, Brillouin, evenness (Ewens or Pilkington), and restoration indices, which were calculated using the R program for the following plant species: Rhododendron myrtifolium, Leontopodium, Pulsatilla alba Reichen, and Erythronium dens-cani. The study of plant biodiversity in the Carpathian Biosphere Reserve showed the stability of species evenness indices over the years, which indicates the stability of the ecosystem. Positive growth dynamics of recovery indices for all studied species were also noted. The indicator increased from 0.7025 to 0.7323 for Rhododendron myrtifolium, from 0.6024 to 0.6551 for Leontopodium, from 0.5025 to 0.5682 for Pulsatilla alba Reichen, while it remained at 0.7825 for Erythronium dens-cani. Biodiversity restoration strategies should be aimed at ensuring the sustainable restoration and preservation of plant diversity, which contributes to increasing the sustainability of ecosystems and preserving natural resources. The obtained data can serve as a basis for further academic research in the field of nature protection, ecology, and preservation of biodiversity.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105003533213&doi=10.3390%2Fd17040259&partnerID=40&md5=09bbccc02f37bcee8bec7fd1d30d2b2b

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.

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), pp. 558–562. DOI: 10.1002/jqs.3702

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001842696&doi=10.1002%2Fjqs.3702&partnerID=40&md5=e475649ee83b027746d523d89f133885

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.

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). *East European Historical Bulletin*, 2025 (34), pp. 115–124, DOI: 10.24919/2519-058X.34.324621

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001514265&doi=10.24919%2F2519-058X.34.324621&partnerID=40&md5=955eab7ed8001b5deeed864aab05a9b4

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 monastery's 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.

Prokopenko, O., Sitenko, D., Zhanybayeva, Z., Lomachynska, I., Rakhmetova, A. Financial Systems and Their Influence on Entrepreneurial Development: Insights for Building Sustainable and Inclusive Ecosystems (2025). *Journal of Risk and Financial Management*, 18 (3), art. no. 131. DOI: 10.3390/jrfm18030131

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001172314&doi=10.3390%2Fjrfm18030131&partnerID=40&md5=9c85f0900bba25042064a1a14d6275bf

The relationship between financial systems and entrepreneurial development is explored in this paper, specifically how the conditions and characteristics of a country's financial system affect entrepreneurial opportunities within a space of sustainability and inclusivity. The study is conducted using a mixed methods approach consisting of both a systematic literature review and econometric modeling, coupled with qualitative analysis of a subsample of countries to analyze these dynamics. At a fundamental level, it seeks to analyze the dynamics of financial systems, including the regulatory frameworks, market structures, and access to finance, and their role in forming an entrepreneurial landscape and contributing to the development of sustainable and inclusive ecosystems. The results show strong patterns and challenges in how financial systems support entrepreneurship. Areas of investigation include the role of financial institutions and markets in organizing access to finance (including the impact of regulatory barriers on entrepreneurial activities) and the integration of sustainability principles in policy and practice. This study stresses the need to align financial system policies with the goals of sustainable entrepreneurship so as to facilitate inclusive economic growth. Additionally, the research points out directions for how to make finance more accessible, foster more innovation, and remove the inefficiencies of regulation. For policymakers, investors, and researchers, the insights are designed to improve the entrepreneurial ecosystems through targeted investments as well as simplifying the financial processes. Through proactive actions, stakeholders have the ability to utilize entrepreneurialism as a tool for economic growth, societal progress, and ecological sustainability. The findings of this research contribute to the current ongoing discourse in sustainable entrepreneurship by furthering the stream of debate proposing how financial systems facilitate or inhibit entrepreneurial outcomes.

Vasile, Ș., **Kovalchuk, O.**, Venczel, M., Rătoi, B.-G., Haiduc, B.-S. Fishes and Squamate Reptiles from the Pliocene Sites of Bereşti and Măluşteni (Eastern Romania) – A Reassessment of Old But Poorly Known Material (2025). *Geobios*, 88/89, pp. 265–274. DOI: 10.1016/j.geobios.2024.02.007

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85197769157&doi=10.1016%2Fj.geobios.2024.02.007&partnerID=40&md5=e4dd3f913998a9d660f91e7b6177317b

This paper performs a revision of teleost fish and squamate reptile material from the Early Pliocene sites of Bereşti and Măluşteni (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.

Vovchenko, O., **Zelinska-Liubchenko, K.**, Platash, L., Karuk, I., Kravets, N. The Role of Group Interventions in Building Life Competencies of Pre-Schoolers with Special Educational Needs (O papel das intervenções grupais na construção de competências para a vida de crianças em idade pré-escolar com necessidades educacionais especiais El papel de las intervenciones grupales en el desarrollo de las competencias vitales de los preescolares con necesidades educativas especiales) (2025) *Sapienza*, 6 (1), art. no. e25011. DOI: 10.51798/sijis.v6i1.962

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001526849&doi=10.51798%2Fsijis.v6i1.962&partnerID=40&md5=aea1feb0f5797f51566ad057b1c09160

Background: Developing life competencies in preschoolers with special educational needs is essential for social and emotional integration. This study fills a gap in the development of effective methods of group interventions focused on developing social, communicative and cognitive skills. Methods: The study was based on a quasi-experimental design using the principles of constructivism and activity approach. Methods of sensory psychomotor stimulation (ATP), cognitive reflection (CR) and creative mutual learning (TVN) were applied. The results were evaluated through quantitative data analysis and qualitative assessment of behavioural changes. The study involved 60 children with OOP, divided into three experimental and one control group. Results: The results showed that ATP improved motor skills by 50%, social skills by 30%, emotional stability by 25% and cognitive skills by 19.35%. The CR method increased cognitive skills by 45.16%, motor skills by 26.67%, social skills by 16.67% and emotional stability by 15.63%. TVN was most effective for the development of social skills (43.33%), emotional stability (37.5%), motor (23.33%) and cognitive skills (29.03%). Compared to the control group, all experimental methods demonstrated statistically significant results. Conclusions: The results confirm the effectiveness of an integrated approach to developing life competencies in children with OOP. The theoretical contribution is to prove the specific influence of methods on various aspects of development. Practical recommendations include implementing ATP, KR and TVN programs in the educational process and systematically assessing the effectiveness of methods. Further research should focus on the long-term effects of interventions and creating inclusive programs for different age groups.

Prokopenko, O., Matviienko, V., Chunikhina, T., Ohol, V., Jasurkova, A. Transforming Teacher Education: The Influence of Artificial Intelligence on Educational Practices and Human Resource Dynamics (2025), pp. 35–42. DOI: 10.1145/3702386.3702389

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85218353771&doi=10.1145%2F3702386.3702389&partnerID=40&md5=81e196989310de3f83727ec378a0e6ad

This study examines the nature of artificial intelligence (AI) in teacher education practices and the human resource field. Furthermore, it assesses organizational approaches and propositions towards educational challenges given the context of teacher education. Analytically, the study uses secondary data and an econometric modeling approach to integrate AI in teacher education settings. The study samples data from academic, business, and governmental resources to evaluate current trends in integrating AI, emerging issues in teacher education, and the best practices. Based on Structural Equation Modeling analysis that employed Maximum Likelihood and Bayesian estimation, the study analyzes the link between the independent variable, AI implementation, and the dependent variables of human resource practices in teacher education, educational issues, and organizational performance. The study reveals that using AI in teacher education influences human resources management, including staffing, training, and performance measurement. The study focuses on human resource management, especially in teacher education.

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), pp. 32–45. DOI: 10.6000/1929-4247.2025.14.01.05

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85218444395&doi=10.6000%2F1929-4247.2025.14.01.05&partnerID=40&md5=9bd811dc7d9d4442bc2f07e4158e1674

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.

Kovalchuk, O., Tuzyak, Y., Gorobets, L., Yanenko, V., Świdnicka, E., Dubikovska, A., Stefaniak, K., Barkaszi, Z. A New Sarmatian (late Middle Miocene) Vertebrate Assemblage from the Periphery of the Forecarpathian Basin (2025). *Historical Biology*. DOI: 10.1080/08912963.2025.2461156

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85217158343&doi=10.1080%2F08912963.2025.2461156&partnerID=40&md5=e92bbc105b695acef6f9ecce3faa3b32

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.

Skljar, V., Bortnik, A., Zubtsova, I., Klymenko, H., **Vakal, A.** Soil Microbiomes as Component of Pedosphere Biodiversity and Factor in Formation of Crop Yields (Мікробіоми ґрунту як складова біорізноманіття педосфери та чинник формування врожайності сільськогосподарських культур) (2025). *Scientific Horizons*, 28 (1), pp. 100–109. DOI: 10.48077/scihor1.2025.100

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85217024230&doi=10.48077%2Fscihor1.2025.100&partnerID=40&md5=42377c30652454ef5ab9c5e8dc02b571

The study aimed to evaluate the mechanisms of interaction between soil microbiomes and leading crops to optimise yields and product quality in agricultural production. A comprehensive analysis of the physical and chemical properties of soils (chernozems, grey forest and podzolic soils) and the composition of the soil microbiome, including the number of nitrogen-fixing bacteria Rhizobium and Azotobacter, bacteria Bacillus spp, representatives of the genus Streptomyces, and fungi Glomus spp. The highest yields of Kalbex wheat (50 c/ha), Rhodes corn (80 c/ha), and Kingstone soybeans (30 c/ha) were recorded when these crops were grown on black soils. Grey forest soils and podzolic soils showed lower productivity and crop quality. The number of nitrogen-fixing bacteria Rhizobium and Azotobacter in chernozems reached 6 million colony-forming units (CFU) per gram of soil, while in podzolic soils it was the lowest – 3 million CFU per gram of soil. The mycorrhizal fungi Glomus spp. were also most abundant in black soil, with 8 million spores per gram of soil. The study examined the impact of the soil microbiome on the yield of selected crops. A correlation analysis of the microbiome and yields was conducted. The impact of the soil microbiome on crop quality was analysed. The results confirmed that chernozems provide the best conditions for growing crops due to their high biological activity and optimal physical and chemical properties, making them an ideal choice for agronomic practice.

Hryhorov, A., Bondarenko, S., Khrystych, V. Maliarov, M., **Maksymovska, N.** Determination of Replacement Terms of Mineral Motor Oils Based on to their Actual Condition (2025). *Petroleum and Coal*, 67 (1), pp. 16–23.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85215440154&partnerID=40&md5=78affdf8bf8ca2394e0e3844198de802

The article proposes an approach to replacing motor oils according to their actual condition, and not according to the terms recommended by motor vehicle operating manuals and manufacturers, expressed in km. Experimental studies have shown that the most informative actual state of used motor oil is determined by TBN and TAN, which are among the main physicochemical indicators of the quality of motor oils. Based on the fact that, under the condition of TBN=TAN, the used oil can be considered as the one that has lost its properties, the rational terms of its operation were determined. These terms are 2,500-10,000 km longer than the recommended engine oil change intervals. By implementing the proposed approach in the conditions of large motor transport enterprises, it is possible to achieve significant savings in consumables and significantly reduce the period of maintenance of road transport. And this, in the end, will help to reduce the cost of transportation and minimize the harmful impact of road transport on the environment.

Datsko, O., Butenko, A., Hotvianska, A., Pylypenko, V., Nozdrina, N., Masyk, I., Bondarenko, O., Lemishko, S., Litvinov, D., **Toryanik, V.** Influence of Agroecological Methods on Biometric Indicators of Corn (2025). *Ecological Engineering and Environmental Technology*, 26 (2), pp. 264–271. DOI: 10.12912/27197050/199324

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85214651716&doi=10.12912%2F27197050%2F199324&partnerID=40&md5=b4b34978f9b38dbcc0e8568ea188e952

All agricultural producers are fighting for high crop yields. To improve them, scientists and farms are constantly looking for optimal tillage, fertilizers, etc. Biofertilizers, containing so-called effective microorganisms, are more and

more often used to ensure optimal plant nutrition. Many scientists have proven and described their positive effect subject to the use of a particular tillage and with which chemical fertilizers their effect is considered to be the best. To obtain high yields, it is also important to take into account the biometric indicators of plants. This article presents a study on determining the height and diameter of the corn stalk, as well as the height of attachment of the first completed cob. Therefore, in a three-factor experiment, we studied the effect of reversible (plowing to a depth of 25–28 cm) and irreversible types of tillage (subsurface cultivator to a depth of 25–28 cm and disking to a depth of 15–18 and 5–8 cm), as well as the effect of such soil probiotics as LEANUM and VITAMIN O7 (used before sowing and on the leaf) on medium-early and medium-ripened hybrids. It was found that all the studied biometric parameters of both hybrids in 2020–2022 were best affected by flat-cutting cultivation to a depth of 25–28 cm. Soil probiotics significantly affected plant height, mainly when applied by leaf. The height of attachment of the first cob for both hybrids was significantly affected by pre-sowing inoculation with both biofertilizers, as well as foliar dressing with LEANUM once and twice.

Klymenko, I., Lobanov, S., Zaichykova, T., Ilchenko, R., **Vakal, Y.** Psychosocial Rehabilitation of Military Personnel with Post-Traumatic Stress Disorder: the Example of Ukraine (Rehabilitación psicosocial del personal militar con trastorno de estrés postraumático: el ejemplo de Ucrania) (2025). *Salud, Ciencia y Tecnologia*, 5, art. no. 1298. DOI: 10.56294/saludcyt20251298

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85214418064&doi=10.56294%2Fsaludcyt20251298&partnerID=40&md5=051acdcdf5d82e3ca92ab8daf6cbee16

Introduction: given the current events of the Russian-Ukrainian war, post-traumatic stress disorder (PTSD) is one of the most common psychological problems among military personnel, which requires the introduction and use of new techniques of psychological rehabilitation. Objectives: the study aims to develop and test a comprehensive programme for psychological rehabilitation of military personnel and determine its effectiveness. Method: the study was conducted among 30 military respondents diagnosed with PTSD. The experiment used pre-test and post-test data from participants at three different time points: pre-intervention, two weeks post-intervention, and four months post-intervention—main instruments: Military PTSD Checklist and Patient Health Questionnaire (PHQ-9). For mental health assessment, 3 scientifically validated indicators were used for data analysis: PCL-M, PHQ-9, and GAD-7. Results: the results demonstrate the need to implement a comprehensive psychological rehabilitation programme for military personnel. If, at the beginning of the test, they were diagnosed with PTSD, acute depression and anxiety, then after two weeks of implementing the comprehensive programme, the indicators decreased significantly. After 4 months, the scores rose slightly but not significantly. This demonstrates the relevance and importance of using various activities to support the psychological state of military personnel who have experienced difficult and traumatic periods. Conclusions: the conclusions summarise that recovery from PTSD requires a comprehensive approach that should consider the internal and external characteristics of each patient.

Voron, O., Kichuk, Y., Yemelianova, O., Stepanov, S., **Shevtsova, N.** The Use of Google Web Applications to Create a Learning Environment in War Conditions (El uso de las aplicaciones web de Google para crear un entorno de aprendizaje en condiciones de guerra) (2025). *Data and Metadata*, 4, art. no. 336. DOI: 10.56294/dm2025336

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85210504889&doi=10.56294%2Fdm2025336&partnerID=40&md5=fe975bef86f75c74d40bf719cab4a24b

Introduction: in the modern world the digitalization of educational trends offers many mechanisms for implementation. At the same time their use depends on many conditions. The purpose of this article is to study the peculiarities of using Google web applications to create an accessible and interactive learning environment in wartime. The main objective are using Google tools to implement education in wartime, describe the results of their use, finding its efficiency. Method: the realization of this goal involves the use of certain scientific methods. In particular, we are talking about the use of a survey and the method of content analysis of scientific literature, which made it possible to compare the Ukrainian experience with the existing paradigms of perception of Google tools in education. Results: the study results show that Google web applications are an important part of the modern

educational process. All applications have a simple and user-friendly interface. The measurements showed that Google Classroom (33,33 %) and Google Meet (26,67 %) are the most used applications. This proves their important role in organizing online classes both at the organizational and direct learning levels. Teachers also use Google Drive, Google Docs, and Google Forms, which fulfill their function in organizing the modern educational process. Conclusion: the conclusions note that the importance of further research is dictated by the need to take into account new changes and capabilities of the tools.

Popova, L., Veklych, Y., **Kovalchuk, O.**, Mishta, A., Stachowicz-Rybka, R., Gorobets, L., Yanenko, V., Nezdolii, Y. Stupak, A., Stakhiv, M., Yevstropov, A., Lyshenko, M., Rekovets, L., Barkaszi, Z. Within the Boundaries of the Dnipro Ice Lobe: Biotic Dynamics in the Middle Dnipro Area (Ukraine) During Deglaciation and Postglacial Stages (2025). *Journal of Quaternary Science*, 40 (1), pp. 53–70. DOI: 10.1002/jqs.3659

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85205541307&doi=10.1002%2Fjqs.3659&partnerID=40&md5=e24ca760ef78e21d81216481c30056d9

Several new vertebrate and plant taphocoenoses of fluvial origin have been found in central Ukraine, within the area previously covered with till of the late Chibanian Dnipro glacier. These finds represent a timespan from the late Dnipro glacial to the Pryluky interglacial of the regional stratigraphic scheme of Ukraine and fill an important palaeofaunistic gap: arcto-boreal species have been revealed for the first time in deposits of the Dnipro/Kaidaky, Tiasmyn and an intra-Pryluky cold interval. Their appearance in the fossil record marks the most extreme periods of cooling, but even during these extremes arcto-boreal forms did not dominate. Similarly, a few warm-loving species appear only during interglacials. The tundra–steppe semblance of vertebrate fauna remains generally stable during this time. The new findings were also used to test existing correlation models between the stratigraphic scheme of Ukraine and Marine Isotope Stages (MIS). For this, we used the Arvicola interval-zones: the zone of the extinct water vole Arvicola chosaricus, which, in the studied area, covers the Dnipro, Kaidaky and Tiasmyn stages, and of the extant A. amphibius of the Pryluky interglacial and subsequent time periods. In different parts of Europe, replacement between these two species took place from MIS 6–MIS 5 to MIS 5. This indicates that the Tiasmyn with the latest A. chosaricus might represent both MIS 6 and a cold interval within MIS 5. For further refinement of the correlation, we use the newly discovered taphocoenoses with a clear stratigraphic sequence, together with the previously studied Maksymivka locality. They have a clear stratigraphic relation to the Dnipro till, and together with the above-mentioned climatic signal, these proxies support the correlation of the Dnipro glacial with MIS 6, the Kaidaky interglacial with MIS 5e, the Tiasmyn cold interval with MIS 5d, and the Pryluky interglacial with MIS 5c and younger.

Horbolis, L. Shadows of Forgotten Ancestors: Ideological and Artistic Consonance of Literary Text and Ballet (2025). *Alfred Nobel University Journal of Philology*, 30 (2), pp. 208–230. DOI: 10.32342/3041-217X-2025-2-30-11

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105025926203&doi=10.32342%2F3041-217X-2025-2-30-11&partnerID=40&md5=de8952a938ce3bb815c20cb68f04fb78

The study compares the artistic features of Mykhailo Kotsiubynskyi's novella Shadows of Forgotten Ancestors and the ballet of the same name staged at the Lviv Opera (libretto by Vasyl Vovkun). The aim of the article is to determine how the artistic content of Kotsiubynskyi's work is transmitted and reinterpreted in the ballet production by Ihor Nebesnyi and Vasyl Vovkun. The research tasks include clarifying the role of stylistic and figurative factors in shaping the artistic originality of the literary source and its ballet adaptation. To achieve this, the study uses a complex methodological approach: the hermeneutic method allows for the systematic analysis of the structure, imagery, and artistic techniques of both the text and the ballet; intermedial analysis is applied to identify similarities, differences, and unique features that contribute to the realization of the artistic intentions of the writer and the librettist, and to determine the degree of correspondence between the stage interpretation and the conceptual and aesthetic principles of the original. The cultural-historical method enables an understanding of the aesthetic significance of both works in the Ukrainian cultural context of the 20th and early 21st centuries. Principles of reader-response aesthetics support reinterpretation at multiple structural levels, emphasizing conceptual meanings, symbolic centers, details, and artistic techniques in both works. The study reveals how the novella is transformed in the ballet on thematic, semantic, and

figurative levels. It highlights the functional role of music, scenography, choreography, costumes, and other theatrical components in developing the work's themes, building characters, and reconstructing everyday and ritual life of the Hutsul community. The analysis demonstrates poetic exchange between the two works and identifies the crossing of medial boundaries that underline their uniqueness and mutual complementarity. The musicality, impressionistic features, and folkloric-ethnographic dimension of Kotsiubynsky's novella find vivid expression in Nebesnyi's music, choral and solo parts, and the colour and light palette of the performance, thus reinforcing their shared central idea—the grandeur of love. The colour scheme of the novella corresponds to the light-colour paradigm of the ballet. As a synthetic art, the scenography of the ballet emphasizes the multifaceted relationship of the Hutsuls with nature and conveys the distinctive worldview of Carpathian inhabitants. Costumes, stage design, and detailed visual elements, along with refined choreography, individualize the characters and highlight their connection to ancestral heritage. The thematic unity of human–nature–culture is achieved in both works through picturesque landscapes (mountains, forest, river), symbolic elements (e.g., water, wood in the ballet), and the complex emotional experiences of the characters. The Lviv Opera production affirms the relevance and adaptability of Ukrainian literary classics, demonstrating their capacity to be effectively reinterpreted within contemporary stage art.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105025766174&doi=10.1080%2F13596748.2025.2598951&partnerID=40&md5=5f5cc5f61f6ece863ff6d0590f68c4a3

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.

Sarfo, J. O., García-Santillán, A., Adusei, H., Molchanova, V. S., **Drushlyak, M.**, **Semenikhina, O.**, Donyeh, P. S., Zand, S., Zand, F., Najafi, R., Malik, S., Ashraf, F., Malik, N. I., Wongcharee, H., Egara, F. O., Tipandjan, A., Sarfo, J. C., Azam, U., Hassan, M. S., Helmy, M., Vally, Z., Bastos, R. V. S., Achido, T. A., Attigah, D. K. Gender and Age Differences in Behaviours Related to Mathematics Anxiety Across Six Asian Countries (2025). *Journal of Advocacy, Research and Education*, 12 (2), pp. 148–157. DOI: 10.13187/jare.2025.2.148

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105024559756&doi=10.13187%2Fjare.2025.2.148&partnerID=40&md5=1ccb5311e22dae99f3eb4086c1e33b7b

Mathematics anxiety has become a growing concern, impacting not only academic performance but also daily life. This study investigates mathematical anxiety across genders and age groups in Asia using the five-dimensional Anxiety Towards Mathematics Scale. A total of 2,831 responses were gathered from six countries: Pakistan (38.3 %), Iran (10.8 %), Thailand (5.5 %), India (16.1 %), Malaysia (18.1 %), and the United Arab Emirates (11.2%). Most participants (61.8 %) were between 16 and 20 years old, with females representing 58.7 % of the sample and males 41.2%. A confirmatory factor analysis (CFA) validated the five-factor structure of mathematical anxiety,

encompassing anxiety towards evaluation, temporality, understanding mathematical problems, numbers and operations, and real-life mathematical situations. The model demonstrated excellent fit (χ^2 (242, N = 2,829) = 1,887.08, p < .001; CFI = 0.99; TLI = 0.99; RMSEA = 0.049; SRMR = 0.11). Significant gender differences were observed, with females experiencing higher anxiety in daily mathematical situations, while males showed greater anxiety towards numbers and operations. Age differences were also notable, particularly in anxiety related to temporality, where participants aged 16-20 exhibited lower anxiety compared to those aged 21-23. These findings emphasise the diverse impacts of mathematical anxiety across demographic groups, suggesting that tailored strategies are crucial to addressing the specific needs of different populations. We recommend that educational institutions and policymakers develop targeted interventions to address gender-and age-specific challenges.

Berezovsky, A., Gašparič, 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), pp. 23–39. DOI: 10.1127/njgpa/1281

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105023324009&doi=10.1127%2Fnjgpa%2F1281&partnerID=40&md5=805c1564a37b95197d3e58185ab6212a

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 f luctuating salinity levels and redox conditions, which had an impact on the preservation and diversity of invertebrate taxa within the Nikopol Basin.

Volina, T., Nesvidomin, V., Pylypaka, S., **Kalenyk, M.**, Plosky, V., Ausheva, N., Babka, V., Nalobina, O., Andrukh, S., Pavlenko, O. Designing a Gravity Chute Based on the Given Trajectory of Cargo Movement (2025). *Eastern-European Journal of Enterprise Technologies*, 5 (7/137), pp. 48–55. DOI: 10.15587/1729-4061.2025.340389

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105023077382&doi=10.15587%2F1729-4061.2025.340389&partnerID=40&md5=60e77c34d712cd8d27e46404948f2f6d

This study's object is the process of cargo movement along the helical surface of an oblique open helicoid under the action of its natural weight. Such movement takes place in gravity chutes where the cargo descends under the action of its natural weight. Gravity (screw) chutes are used for transportation, separation, and enrichment of material. For a given surface, the problem is solved by composing differential equations of motion of a mathematical point, which is conditionally replaced by cargo, in projections onto the axis of the spatial coordinate system. If the surface is helical, then after stabilization of the motion, it is possible to find the parameters of the helical line – the trajectory of cargo movement. The task implies solving the inverse problem – constructing a helical surface along a given trajectory of cargo descent, which is a helical line. The results are attributed to the use of two accompanying trihedra of the trajectory with a common vertex and tangent orts to the trajectory, which coincide. One of them is a Frenet trihedron whose position is determined by the differential characteristics of the curve, and the second is a Darboux trihedron, the position of which depends on the point of the trajectory on the surface. In addition to the two coincident orts, the remaining four orts are located in the plane normal to the trajectory. The use of these two orts makes it possible to compose differential equations of motion of the load in projections onto a moving Darboux trihedron, one of the planes of which is tangent to the surface. A feature of the solution to the problem is that the trajectory of the load, i.e., the helix, is given by radius r of the cylinder on which it is located and velocity V of the load. Using these data, angle β of its ascent is determined. For example, at r = 0.5 m, V = 2.5 m/s, the angle of elevation is β = 20.7°. Then, a helical linear surface is constructed that passes through the given trajectory.

Kurbatova, T., Sotnyk, I., Kubatko, O., **Prokopenko, O.**, Pysmenna, U., Kozmenko, Y. Convergence and divergence patterns in Ukraine's household solar energy

development: Policy implications (2025). *Problems and Perspectives in Management*, 23 (4), pp. 326–340. DOI: 10.21511/ppm.23(4).2025.24

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105022618581&doi=10.21511%2Fppm.23%284%29.2025.24&partnerID=40&md5=4a73eb6659b35d163f039620a3a06f6e

The study examines regional convergence and divergence in the development of household solar energy in Ukraine during 2016–2022 and explores implications for adaptive energy management and policy coordination. Using β- and σ-convergence models, the analysis investigates whether regional household solar electricity generation demonstrates tendencies toward structural alignment or, conversely, follows autonomous trajectories that indicate the absence of a common attractor. The results reveal a lack of both beta- and sigma-convergence, implying that initial regional conditions exerted little influence on subsequent development and that disparities across regions have persisted or even deepened over time. These findings suggest a divergent and spatially fragmented pattern of solar energy expansion, where regional dynamics are determined not only by differences in economic and institutional capacity but also by disruptions linked to the onset of the full-scale Russian invasion in 2022. The study emphasizes the need for a more adaptive and integrated energy policy that recognizes regional heterogeneity, supports decentralized renewable energy deployment, and strengthens coordination between national and local authorities. Such an approach would enhance the effectiveness of planning and implementation of household renewable energy programs, contributing to a more balanced and resilient low-carbon transition in Ukraine.

Biloshkurska, N., **Omelyanenko, V.**, Yemets, O., Braslavska, O., Matkovskyi, P., **Omelianenko, O.**, Korniienko, T. Comprehensive Human Security Assessment in Sustainable Regional Development: Insights for Innovation Policy (2025). *European Journal of Sustainable Development Research*, 9 (4), art. no. em0315, DOI: 10.29333/ejosdr/16572

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105021499109&doi=10.29333%2Fejosdr%2F16572&partnerID=40&md5=4db7708a93c05bf51553194cfcd54ee0

The study assesses human security within sustainable regional development in Ukraine, focusing on calculating a human security index to compare economic, social, and environmental aspects of development. The methodology standardizes indicators to ensure objective evaluation and assigns weighting factors for the index. Analysis revealed significant regional disparities: Kyiv leads in economic stability, social well-being, and environmental responsibility, while Luhansk scores lowest due to socio-economic challenges. The economic component highlights the dependence of human security on income and stability, with Kyiv and Dnipro performing best. Social security is highest in Kyiv, reflecting better access to healthcare, education, and social protection, whereas Luhansk and Chernivtsi rank lowest. Environmentally, Kyiv and Dnipro lead due to significant investments in protection measures, while Western regions lag. The human security index reflects regional disparities and underscores the need for differentiated state strategies to address low-scoring regions through targeted investment and policy adjustments. Additionally, the index is a valuable tool for monitoring and evaluating sustainable development initiatives.

Lukashova, T., **Drushlyak, M.** Erratum for "Generalized norms of groups: retrospective review and current status" (Algebra Discrete Math. 34(1), 105–131 ((2022). 10.12958/adm1968) (2025). *Algebra and Discrete Mathematics*, 40 (1), pp. 109. DOI: 10.12958/adm2433

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105021444865&doi=10.12958%2Fadm2433&partnerID=40&md5=a065324e3a958390267fc25348e4d394

Borrani, A., Mackiewicz, P., **Kovalchuk, O.**, Barkaszi, Z., Capalbo, C., Dubikovska, A., Ratajczak, U., Sinitsa, M., Stefaniak, K., Mazza, P. P. A. The

Evolutionary History of Rhinocerotidae: Phylogenetic Insights, Climate Influences and Conservation Implications (2025). *Cladistics*, DOI: 10.1111/cla.70015

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105019954524&doi=10.1111%2Fcla.70015&partnerID=40&md5=0f5d796ad662f04ae3672619444cd443

Family Rhinoceroidae 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.

Achkan, V. V., Vlasenko, K. V., **Chashechnikova, O. S.**, Bohdanova, N. H., Protsyk, N. I. Using the Case Method While Training Would-Be Mathematics Teachers (2025). *Journal of Physics: Conference Series*, 3105 (1), art. no. 012001, DOI: 10.1088/1742-6596/3105/1/012001

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105019651214&doi=10.1088%2F1742-6596%2F3105%2F1%2F012001&partnerID=40&md5=2f538e52d7e60c9cc3a35247f6a3fdb0

The article looks into the issue of developing a methodology for using the case method in mathematics teacher training. The study proposes and substantiates the components of using the case method in teaching the methodological disciplines of the would-be mathematics teacher: motivation of educational activity, goal setting, content, methods, forms, and means of learning. Motivation for learning using the case method is provided by modeling the teacher's real professional activity while considering methodological problem situations (cases). To ensure goal setting, an algorithm for case selection is proposed and illustrated depending on the goal of the educational curriculum or the goal of a specific educational class. The research method is the case method, implemented through work with a system of cases for methodological disciplines. The content of the cases covers all modules of the methodological discipline curriculums. Forms of training depend on the types of cases used in the class. Examples of cases of all kinds are proposed, suitable for use within frontal, group, and individual work. Learning means include multimedia presentations, video cases, dynamic mathematics packages, and educational cloud services. The run experiment confirmed the practicality of using the developed methodology when training would-be mathematics teachers for professional activities.

Prontenko, K. V., Bezuhlyi, Y. B., **Krasilov, A. D.**, Zelenyuk, O. V., Nesterov, O. S., Viala, O. M., Denysovets, A. P. Influence of Strength Training on Physical Development and Physical Fitness of Young Men (2025). *Wiadomosci Lekarskie*, 78 (8), pp. 1577–1583. DOI: 10.36740/WLek/209510

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105018398846&doi=10.36740%2FWLek%2F209510&partnerID=40&md5=c48e639fabf1e864334fdc9a7f9334f6

OBJECTIVE: Aim: To investigate the influence of strength training on the physical development and physical fitness of 16–17-year-old young men. PATIENTS AND METHODS: Materials and Methods: The research, which was conducted in 2024–2025, involved 117 high schoolers of 10-11 grades (16-17-year-old young men). Two groups of young men were formed: the experimental (EG, n = 56) and the control (CG, n = 59): the CG young men were

engaged in a generally accepted program; the EG young men were engaged in strength training. Research methods: bibliosemantic, medical and biological methods, testing, methods of mathematical statistics. RESULTS: Results: The positive influence of strength training on the physical development and physical fitness of 16–17-year-old young men was revealed. The EG young men showed significant (p < 0.05-0.001) improvement of such indices as Pignet (by 3.6 c. u.), Brugsch (by 18.9 c. u.), strength (2.5 c. u.), Erisman (by 0.8 c. u.), body weight (by 1.4 kg/m2), as well as results in pull-ups (by 4.5 times), in push-ups (by 7.3 times), in a standing long jump (by 6.6 cm), in sit-ups (by 9.3 times). In the CG, there were no significant changes in all tests (p > 0.05). At the end of the research, most of the EG indicators were significantly better compared to the CG. CONCLUSION: Conclusions: The introduction of strength training in the physical education of senior high schoolers is one of the important factors for improving their health, harmonious physical development, and increasing physical fitness.

Zhyrova, T., **Chystiakova, I.**, **Moskalenko, M.**, Kotenko, N., Aleksandrova, M. Continuing Education: Global Practices and Implementation in Ukraine (2025). *OIDA International Journal of Sustainable Development*, 18 (11), pp. 279–292.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105017091170&partnerID=40&md5=56708573df8b706afb21ebfec3bec46a

In the context of global socio-political, economic, social, demographic, and cultural transformations both at the state and individual levels, the issue of adaptation to rapid changes is becoming urgent. The purpose of the article is to analyse the concepts of lifelong learning, their main ideas and practical implementation. It is also necessary to trace the transformation of the understanding of lifelong learning both at the level of legislative initiatives and the level of value orientations. The object of the study was the views of scientists on the role and significance of lifelong learning in the life of the state, as well as the format of lifelong learning in different countries of the world and the challenges and problems of this form of learning in Ukraine. The basis of the methodology of this study is the application of the principles of logical analysis, methods of analysis of literature and secondary sources, structural-functional and the method of generalization and comparison. Such an adaptation format as lifelong learning is currently recognized as one of the fundamental ones for the near future. Given the pace of globalization, regional threats to sustainability, climate change, and the development of technologies (artificial intelligence, digital media, digital economy), structural changes in the education system are strategically necessary. Urgent challenges for both developed economies and countries with economies catching up with modernization are ensuring digital competence, developing digital thinking, and access to technologies for the opportunity to obtain education, improve and change professional qualifications throughout life, have the opportunity for professional and creative self-realization through learning, and also build one's own educational trajectory for one's own and social good. Lifelong learning as a basic paradigm for the development of modern education is based on several concepts: the theory of transformational learning, the model of empirical learning and critical pedagogy. Today, lifelong learning involves not only obtaining a new profession or improving qualifications, but we also observe a shift in attention to personal motivation, to the possibilities of self-development and the formation of one's own personal educational trajectory for economic success and psycho-emotional satisfaction. The most successful model of lifelong learning is the example of Sweden. Countries such as Germany and the United Kingdom also demonstrate serious achievements in the effectiveness of their lifelong learning system.

Omelyanenko, V., **Omelianenko, O.**, Pawłowski, G., Artiukhov, A., Lytvynenko, S. Technology Transfer Projects Management at Regional Level (2025), pp. 1841–1844. DOI: 10.1109/MIPRO65660.2025.11131985

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016682647&doi=10.1109%2FMIPRO65660.2025.11131985&partnerID=40&md5=fa16862ca15a5dc1e705dd43f301be2e

This article examines the management of technology transfer projects at the regional level, highlighting their critical role in fostering innovation and regional development. Effective project management practices are emphasized as key to bridging the gap between research institutions, businesses and regional authorities. The study explores how technology transfer initiatives contribute to building robust innovation ecosystems, promoting sustainable economic growth and enhancing regional competitiveness. Particular attention is given to the role of public-private partnerships and collaborative frameworks in ensuring project success. Challenges such as resource allocation, stakeholder

engagement and the alignment of regional policies with innovation goals are analyzed. Strategies for addressing these challenges are proposed, focusing on optimizing project outcomes and maximizing long-term benefits. The findings provide practical recommendations for regional policymakers and project managers aiming to strengthen technology-driven development.

Dehtiarova, N., Medvedieva, M., Zakharevych, M., Kibalenko, V., Myhal, V., Pronikova, M. Teaching Algorithmization Through the Creation of Android Applications in a Visual Development Environment (2025), pp. 764–769. DOI: 10.1109/MIPRO65660.2025.11131773

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016677390&doi=10.1109%2FMIPRO65660.2025.11131773&partnerID=40&md5=a613ed69b2ec93dbe903b874aa072935

The formation of algorithmization skills is one of the primary objectives in teaching computer science. A wide range of platforms exists for learning visual algorithm development, one of which is App Inventor. This study describes the technology for utilizing this platform. The authors outline the methodological features of teaching future computer science teachers visual programming using this environment. The study analyzes changes in attitudes toward algorithmization and programming before and after completing the course. The authors formulated the hypothesis that working in a visual programming environment would help students consciously master algorithmization and text-based programming languages. The results of the experimental part of the study confirm this assumption. The results demonstrate the conscious acquisition of knowledge through the use of visual application development platforms. The dynamics of outcome changes and their statistical analysis are presented.

Yurchenko, A., **Khvorostina, Y.**, Ahadzhanova, S., Ahadzhanov-Honsales, K., Bohoslavskyi, S., **Semenikhina, O.** Artificial Intelligence in Mathematics Education: Quantitative Analysis of Publication Activity (2025), pp. 741–746. DOI: 10.1109/MIPRO65660.2025.11131901

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016656137&doi=10.1109%2FMIPRO65660.2025.11131901&partnerID=40&md5=488168dece818a3a22f019ff350c21ed

The rapid development of information technology has led to the widespread integration of artificial intelligence (AI) into various educational processes. AI tools are increasingly used to personalize learning, automate administrative tasks, and provide adaptive feedback to students. Mathematics education, an essential basis for developing analytical and problem-solving skills, has taken on new forms under the influence of AI (intelligent tutoring systems, automated assessment tools, etc.). Given the rapid development of AI, understanding research trends is important to understand the depth of the problem of using AI in mathematics education and identify specific patterns. Our study focuses on the quantitative analysis of researchers"publication activity related to the use of AI in mathematics education. The study aims to identify trends in the number of publications, assess the geographical distribution of research, and identify the journals that publish the most research on this topic. The materials for the study were indexed publications (2021-2024) in the Web of Science database. The main conclusions include a significant increase in publications in 2024. The most active countries in the number of publications are the United States and China, which emphasizes their key role in analyzing the practices of spreading AI in mathematics education. Most publications on AI use in mathematics education are published in Europe and North America. The analysis emphasizes the growing global attention to the use of AI in mathematics education and creates a basis for research collaboration.

Rudenko, Y., Zhurba, K., Bekh, I., **Petrenko, S.**, Bobokalo, A., **Semenikhina, O.** Using Dashboards in the Development of Students" Analytical Thinking (2025), pp. 406–411. DOI: 10.1109/MIPRO65660.2025.11131997

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016632346&doi=10.1109%2FMIPRO65660.2025.11131997&partnerID=40&md5=ac1df568aab3b47d8dce102230a40bcc

The rapid development of information technology has transformed various spheres of society, creating a demand for skills that quickly allow processing and analyzing large amounts of data. Developed analytical thinking as the ability to evaluate a problem at the micro and macro levels enables young people to interpret information, identify patterns, and make informed decisions in a data-driven world. As interactive digital data visualization and analysis tools, dashboards are the potential means for developing analytical thinking, especially in learning. They allow students to explore real-world data sets, track trends, and understand complex relationships through intuitive visual formats. The use of dashboards in the training of young people not only helps to develop digital skills but also to deepen the ability to evaluate information and draw conclusions based on facts critically. Our study has confirmed the development of students"analytical thinking (positive impact on logic, objectivity, integrity of judgment, establishing cause-and-effect relationships, and forecasting) during the development, creation, and use of dashboards in studying technical and economic disciplines. Pedagogical experience in teaching students to use Looker Studio and Tableau is summarized, and the outcomes of a pedagogical experiment are presented.

Zhmud, O., **Dehtiarova, N.**, Viunenko, O., Hryhorenko, V., Lantukh, I., Didkivskyi, O. Development of Responsible Attitudes Towards AI-Generated Results Among Future Computer Science Teachers (2025), pp. 396–400. DOI: 10.1109/MIPRO65660.2025.11131748

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016632130&doi=10.1109%2FMIPRO65660.2025.11131748&partnerID=40&md5=89518bb97d0059a6b22de0a80cb482fd

AI-powered platforms have become ubiquitous, and their use, particularly in educational institutions, has emerged as a significant issue. Students often turn to ChatGPT for solutions and then submit the generated responses as their own work. This has brought academic integrity into sharp focus. Another dimension of the problem is that students often lack the ability to formulate effective prompts and to critically evaluate the output. The authors conducted a survey on the use of language models by students. The results revealed a contradiction: while AI platforms are a product of progress and widely used across various domains, many instructors prohibit their use by students. The core issue lies in the way students interact with AI-generated content: they do not verify its accuracy or evaluate it critically. As a response, the authors introduced a selective course. This course taught students how to formulate queries correctly, how to evaluate information, verify its reliability, and assess sources. Education must respond swiftly to societal and technological changes and prepare students for real life. Therefore, it is reasonable to teach students how to use AI-generated content appropriately and transparently. It is also important to understand that information produced by AI is not always accurate. As such, a course that covers the regulatory framework and step-bystep guidance on working with AI tools is highly relevant and can be implemented in universities. An experimental study was conducted before and after the course was introduced. Students who completed the course improved their performance: the percentage of students with a high level of proficiency increased to 36 %. They began verifying sources, correcting AI-generated content, and engaging in critical thinking. This paper presents the course content, the results of the experimental study, and outlines directions for further research.

Hrona, N., **Semenog, O.**, Kharchenko, I., **Ostroha, M.**, Momot, R., **Semenikhina, O.** ChatGPT in Native Language Teaching: Local Ukrainian Experience (2025), pp. 747–752. DOI: 10.1109/MIPRO65660.2025.11131900

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016618553&doi=10.1109%2FMIPRO65660.2025.11131900&partnerID=40&md5=ce776736a6ba69a1e91d80cab790b9a4

Artificial intelligence (AI) in education has significantly shifted the emphasis from traditional teaching to individual learning. AI technologies, such as chatbots, text generators, and automatic assessment platforms, open up new perspectives for flexible language learning for both teachers and students. While large language models are becoming more and more helpful in teaching foreign languages, as evidenced by a significant number of studies, the lack of established methods for using AI in teaching the native language can lead to a decrease in the efficiency of the educational process or even to harmful consequences of its use. The study aims to analyze the experience of using AI, particularly ChatGPT, in teaching the native (Ukrainian) language. We will systematize the practices of using AI in

language education, describe our experience of using ChatGPT in teaching Ukrainian, and present the results of surveys evaluating the use of ChatGPT in teaching the native language to students of different Ukrainian universities.

Drushlyak, M., **Lukashova, T.**, Ielizarenko, D., Nadtochyi, O. Transformation of Homework in Mathematics in the Digital Era (2025), pp. 582–590. DOI: 10.1109/MIPRO65660.2025.11131775

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016618276&doi=10.1109%2FMIPRO65660.2025.11131775&partnerID=40&md5=c2a12c6e4d2c681d678cc43805283730

The article focuses on the issue of the digital transformation of mathematics homework due to the need for implementing education 4.0. it is argued that the digital transformation of homework, aligned with the four-level SAMR model (Substitution, Augmentation, Modification, Redefinition), represents a systemic approach in education and allows for the intensification, visualization, enhancement, and modernization of homework without negating the benefits accumulated through traditional mathematics teaching. the emphasis is placed on the necessity of continuously evaluating the effectiveness of digital mathematics homework in terms of educational goals, with an unwavering focus not on the implementation of digital technologies per se but on improving students' learning outcomes. the results of a survey of mathematics teachers in the Sumy region (Ukraine) with more than four years of online teaching experience confirm a positive impression of using digital platforms for mathematics homework. the survey highlights an increase in student outcomes with digital homework, the advantages of using digital homework, and students' positive attitudes towards digital tasks. it also underscores the possibility of transitioning from traditional tasks to organizing inquiry-based learning, automated and adaptive knowledge assessment, and the use of cloud services, all of which contribute to improving the quality of education. the conclusion is that digital homework reveals its pedagogical potential only through effective and efficient integration with educational technologies, teaching strategies, and student learning practices.

Rozumenko, A. O., Rozumenko, A. M., **Yurchenko, A.**, Stotskyi, I. V., Bespalyi, V. R., **Semenikhina, O.** The Influence of Geometry Visual Tasks on Students" Learning Motivation (2025). pp. 576–581. DOI: 10.1109/MIPRO65660.2025.11131938

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016606377&doi=10.1109%2FMIPRO65660.2025.11131938&partnerID=40&md5=8d127675acefc9de259e4ac4ede8785a

The visual component of the educational process has been strengthened. The methodological searches for the effective use of visual tasks as tasks have become more relevant, facilitating the perception, analysis, and assimilation of information and stimulating students"cognitive activity, especially while studying complex maths and nature disciplines. The article proposes a system of geometry visual tasks that positively affects the development of students"learning motivation. The experimental study used the topic "Quadrangle"and the dynamic mathematics program GeoGebra. Visual tasks were developed by taking into consideration the specifics of the planimetry educational material. The visual tasks system includes three types: highlighting the essential features of a geometric object and realizing its non-essential features; recognizing the general in the object and highlighting specific differences; and constructing an object according to its significant features. The task system was implemented in practice considering the gradual complication of the content, formulation's variability, and differentiation depending on the students"authentic learning opportunities. The research proved the effectiveness of using the proposed geometry visual tasks system for increasing students"learning motivation with different levels of mathematical preparation.

Rudenko, Y., Sytnyk, L., Pasichnyi, R., Bieliaieva, O., Dehtiarova, N., Barabash, A. Analyzing the Results of a Study of the Effectiveness of Developing Students" Cybersecurity Skills (2025). pp. 390–395. DOI: 10.1109/MIPRO65660.2025.11132016

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016602113&doi=10.1109%2FMIPRO65660.2025.11132016&partnerID=40&md5=0190eae3e8aaa7572dec67e3d9669c85

Recognizing the risks associated with the growing digitalization of the world, the article substantiates the need to improve students"cybersecurity skills and describes the experience of their development in Ukrainian universities. By questioning first-year students, the actual level of cybersecurity is revealed and the results are analyzed. Problems have been recorded in the following areas: knowledge of cybersecurity rules (most respondents have a general understanding of the concept of cybersecurity), the ability to distinguish between risky situations (on average, 3 out of 5 situations described by students were not labeled as dangerous), digital personal protection (problems with understanding the concepts of "password strength', "protection against DDoS attacks', "phishing"were identified). Recognizing the risks associated with the growing digitalization of the world, a cybersecurity improvement program for first-year university students was implemented for three months in 2024 for an experimental group (155 first-year university students). The program included training in the elective module "Personal Cybersecurity"and participation in the project "Creating a Safe Digital Space". The results of the program implementation are presented and statistically confirmed, which showed an increase in the level of cybersecurity skills of the participants of the experimental group compared to the control group.

Omelyanenko, V., Pidorycheva, I., Revtiuk, Y., **Omelianenko, O.**, Voronenko, V. Empowering Industrial Development Through the Smart City Paradigm (2025). pp. 1881–1884. DOI: 10.1109/MIPRO65660.2025.11131745

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016564756&doi=10.1109%2FMIPRO65660.2025.11131745&partnerID=40&md5=35eea55df94b34370689df6a7469a73d

This article explores the impact of smart city development on industrial growth, focusing on the transformative potential of digital technologies in urban environments. Smart cities leverage IoT, AI, and advanced infrastructure to enhance industrial efficiency, foster innovation and promote sustainable economic growth. The study examines how the integration of smart city solutions creates opportunities for industrial sectors to adapt to modern challenges and adopt more energy-efficient, resource-conscious practices. Attention is given to the role of urbanization and smart infrastructure in establishing competitive industrial ecosystems. By analyzing these dynamics, the research highlights strategies for aligning smart city policies with industrial advancement. The findings provide valuable insights for decision-makers in both urban planning and industrial sectors, emphasizing the mutual benefits of collaborative innovation.

Shyshenko, I. V., **Chkana, Y. O.**, **Martynenko, O. V.**, **Udovychenko, O. M.**, Udovychenko, I. M., **Semenikhina, O.** The Impact of Digital Media on the Development of Students' Mathematical Literacy: Service-Learning Opportunities (2025). pp. 709–714. – DOI: 10.1109/MIPRO65660.2025.11132000

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016563888&doi=10.1109%2FMIPRO65660.2025.11132000&partnerID=40&md5=6b20c816135d8859449a744e1f2d82a3

According to PISA 2022, 42% of Ukrainian students fail to achieve the basic level of mathematical literacy, indicating their low ability to analyze and interpret data. Thus, the need to enhance the mathematical literacy of Ukrainian students remains highly relevant. Literature reviews and surveys show that most Ukrainian students spend considerable time consuming entertainment content through digital media. Distance learning, necessitated by the crisis in Ukraine, has further increased the use of digital platforms, although often without adequate focus on their educational potential. In response, we used service-learning to integrate digital media into the educational process. Examples of its implementation are presented in the article. The experiment involved a group of future mathematics teachers and secondary school students. The aim was to engage students in learning mathematics and address their educational losses through carefully selected mathematical content delivered via digital media. For future mathematics teachers, the experiment served as a tool to develop their digital literacy and pedagogical skills. The

statistical analysis of the results demonstrated the effectiveness of using digital media to address students"learning losses through the organization of service-learning with future mathematics teachers.

Dehtiarova, N., Zhmud, O., **Boriak, O.**, Dehtiarova, D. Fostering a Responsible Attitude Towards Intellectual Property and Copyright Among Participants of the Discussion Club (2025), pp. 1454–1458. DOI: 10.1109/MIPRO65660.2025.11131759

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016558388&doi=10.1109%2FMIPRO65660.2025.11131759&partnerID=40&md5=8101e38312194faa6ece912cb9e2f6bf

The article explores the issue of fostering a responsible attitude towards intellectual property and copyright. Responsibility for violations of regulations should be cultivated in educational institutions. However, ordinary users should also be knowledgeable about copyright and intellectual property issues. Therefore, the authors introduced a teaching method called a discussion club. This method involves analyzing situations in which the legality of actions must be determined. This approach enables subject integration: informatics and law. Additionally, the club welcomed participants regardless of their specialization or education. The results of the study confirmed the relevance of the chosen topic and aligned with initial expectations. Based on participant feedback, on average, the proportion of individuals who developed or deepened their understanding of copyright, intellectual property, and academic integrity rose from 27 % to 85 %. An additional positive outcome was the engagement of professionals from diverse fields and age groups, which contributed to the enhancement of social skills and a greater sense of personal responsibility in the digital space. For specialists from various fields who completed their studies many years ago, participating in such meetings is often emotionally uncomfortable. To address this, the events were designed to be inclusive and welcoming to individuals of all ages and professions.

Drushlyak, M., **Yurchenko, A.**, **Khvorostina, Y.**, Soroka, M., Gorovoy, I., **Semenikhina, O.** Mobile Planetarium as a Means for Popularization of STEM Education (2025). pp. 591–596. DOI: 10.1109/MIPRO65660.2025.11131812

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016532839&doi=10.1109%2FMIPRO65660.2025.11131812&partnerID=40&md5=2038bdfa91ae071e0ef9d96dba563398

Modern society is increasingly dependent on technological progress, driven by specialists in IT, natural and mathematical sciences. The declining interest of young people in mastering these fields raises concerns among educators and highlights the importance of STEM education popularization. STEM integrates science, technology, engineering, and mathematics, focusing on the practical application of knowledge and the development of critical thinking in youth. This article summarizes approaches to STEM education popularization and analyzes the experience of using a mobile planetarium at Sumy State Pedagogical University named after A.S. Makarenko (Ukraine) as a tool for STEM popularization. The research findings confirm that using a mobile planetarium significantly enhances students' interest in STEM education, demonstrates the importance of interactive and visual teaching approaches, helps overcome stereotypes about the difficulty of STEM subjects, and makes learning more engaging and effective.

Rudenko, Y., **Drushlyak, M.**, **Shamonia, V.**, Diemientiev, Y., **Semenikhina, O.** Partnership Pedagogy and the Pygmalion Effect in the Digital Learning Environment (2025), pp. 735–740. DOI: 10.1109/MIPRO65660.2025.11131802

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016523210&doi=10.1109%2FMIPRO65660.2025.11131802&partnerID=40&md5=f0157604a464b0369a798c8388dde21e

Achieving successful interaction in the 'teacher-student' system and constructively collaborating within it is an important task of modern education, which, starting in 2020, often takes place in the context of the digital learning environment (DLE). Solving this task today is linked to the pedagogy of partnership (joint activity between the teacher and student to achieve shared educational goals). The object of study also includes soft approaches that ensure students' success in learning. One such approach is the 'positive attitude of the teacher,' which manifests in the Pygmation effect (a phenomenon where a teacher's expectations regarding a student's success influence their actual learning outcomes). While the pedagogy of partnership is actively studied in the context of DLE, manifestations of the Pygmalion effect have only been observed in traditional educational processes. The purpose of this study is to identify or disprove the connection between the pedagogy of partnership and the Pygmalion effect in DLE conditions. In this article, we specify the principles of the pedagogy of partnership that can be adapted to the DLE environment and explore the manifestations of the Pygmalion effect in student learning. We also present the results of our own study on the connection between the pedagogy of partnership and the Pygmalion effect in the DLE context. The pedagogical experiment involved students from two universities. We confirmed the Pygmalion effect in the study of the 'Multimedia Technologies' course. Based on the experiment results, recommendations are provided for teachers who aim to achieve the Pygmalion effect when implementing the pedagogy of partnership in the DLE context.

Zaikina, A., Surin, D., Shukatka, O., Oliinyk, N., Kharchenko, S., **Semenikhina, O.** Design and Implementation of a Curriculum on Digital Health Tools for Future Physical Therapists (2025), pp. 418–423. DOI: 10.1109/MIPRO65660.2025.11131860

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016521558&doi=10.1109%2FMIPRO65660.2025.11131860&partnerID=40&md5=bef630f664d45a3e5bf5e77ebe5309ef

The integration of digital health technologies into healthcare systems is transforming the delivery of medical services and rehabilitation. This transformation creates a need for future healthcare professionals, including physical therapists, to master digital health tools (DHT) and use them effectively in clinical practice. This study aims to substantiate, develop, and implement a curriculum focused on training future physical therapists to use DHT, ensuring their readiness for contemporary healthcare environments. The research involved three key stages: a comprehensive review of current literature on DHT use in healthcare and physical therapy; the design of a curriculum aligned with the educational and professional program 'Physical Therapy, Occupational Therapy'; and the implementation of the curriculum. In addressing the need for skilled healthcare workers in the digital era, the study emphasizes the importance of developing a comprehensive curriculum for mastering digital health tools. The study concludes that integrating such curricula into university programs is a vital step toward improving the quality of physical therapy education and ensuring the preparedness of graduates for digitalized healthcare systems.

Fabian, M., **Herman, V.**, Varekh, N., **Kumeda, O.**, Hotsalyuk, A. Linguistic Support as a Key Element in the Development of Distance Multimedia Educational Systems: Composition and Structure (O suporte linguístico como elemento-chave no desenvolvimento de sistemas educacionais multimídia a distância: composição e estrutura) (2025). *Relacoes Internacionais no Mundo Atual*, 2 (48), art. no. e-7690, pp. 22–42.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016513140&partnerID=40&md5=f6aa0155cd6228ddeb279c160c5f424b

Objective: of the article is distance multimedia learning systems. Methods: To solve the tasks and test the working hypotheses, the study used a set of theoretical methods and techniques adequate to the nature of the object under study: methods of system analysis, which were used at the stage of identifying the problem area, determining its relevance, setting goals and developing solutions; methods of terminological analysis, which were used in a

comprehensive study of various scientific works on the research problem; methods of algorithmization and programming used to develop a data description format; methods of empirical research to obtain data on the functioning of the pattern recognition system and the automated assessment system. Results: The concept of a distance multimedia learning system is defined and the application of distance multimedia learning systems in higher education in the field of design is considered; the structure and composition of distance multimedia learning systems are studied; specific features of learning using distance multimedia learning systems are studied and identified; the specifics of user personalization in the multimedia space are considered; a format for describing data in distance multimedia learning systems is developed; principles of using a didactic model of a multimedia component in the linguistic support of distance multimedia learning systems are introduced. Conclusion: The definition of the concept of distance multimedia learning systems is given, the relevance of distance multimedia learning systems in relation to the educational environment is analyzed, methods of organizing distance education are studied, the principles of working with the learning system are structured; distance multimedia learning systems, the influence of multimedia on the student are structurally studied, options for the development of e-learning by means of multimedia, virtual and augmented reality, artificial intelligence technologies and neural networks are shown; the importance of independent work both in the multimedia system and for learning in the field of creative areas of learning is determined; principles and stages of creating distance learning complexes are developed, a number of criteria for assessing the quality of learning systems are derived, the importance of developing usability, adaptability and interactivity of the system is analyzed, and the composition of the specialists necessary to improve the quality of developing distance multimedia learning systems in the field of creative areas of learning is determined; principles for creating distance multimedia learning systems have been formulated, a set of linguistic support tools has been proposed: an information model of an image recognition system, an automated assessment model, a data description format has been developed to enable automated monitoring of creative practical assignments of students.

Butenko, A., Datsko, O., Hotvianska, A., Nozdrina, N., Kovalenko, V., Rumbakh, M., Lemishko, S., Kozhushko, N., **Toryanik, V.**, Kriuchko, L., Davydenko, G. Assessment of the Effectiveness of Biofertilizers in the Cultivation of Common Buckwheat (Fagopyrum Esculentum) in an Organic Crop Rotation System (2025). *International Journal of Ecosystems and Ecology Science*, 15 (3), pp. 1 - 8, Cited 1 times. DOI: 10.31407/ijees15.301

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105016132367&doi=10.31407%2Fijees15.301&partnerID=40&md5=b354b9a026237da2764099ff7faf00e0

This study evaluates the effectiveness of biofertilizers in enhancing the productivity of common buckwheat (Fagopyrum esculentum Moench) within an organic crop rotation system in the Sumy region of Ukraine. A two-year field experiment (2022–2024) assessed the impact of the biofertilizer Leanum applied through seed inoculation, foliar spraying, and their combination on two buckwheat varieties: Selianochka and Simka. Key productivity indicators – including the number of grains per plant, grain mass per plant, 1000-grain weight, and overall yield – were analyzed. The results demonstrated that biofertilizer application significantly improved all yield components, with the highest productivity observed in the Selianochka variety under combined treatment, achieving yields up to 2.6 t/ha. The findings highlight the crucial role of biofertilizers in improving crop yields and soil health in organic farming systems, supporting sustainable agricultural development and food security, especially under the current land use constraints in Ukraine.

Pyrtko, M., Abalmasova, V., Atalawei, M. E., **Govorun, O.**, Muntian, L. The Impact of environmental management on the sustainable development of territorial communities (2025). *Rivista di Studi sulla Sostenibilita*, (1), pp. 89–104. DOI: 10.3280/riss2025oa19474

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105014984914&doi=10.3280%2Friss2025oa19474&partnerID=40&md5=34dfbb2c699a381e086e18faeaa96b20

Environmental management of territorial communities is important for preserving natural resources and mitigating environmental risks, which contributes to achieving sustainable development goals (SDGs). The aim of the study is to assess the effectiveness and impact of environmental protection expenditure (EPE) as an important tool of environmental management on the sustainable development of territorial communities. The study employs regression analysis, correlation analysis, and comparison methods. The study identified the most effective areas of EPE by territorial communities. These include: other activities in the field of ecology and protection of natural resources, environmental protection measures at the expense of special-purpose funds, protection and rational use of natural resources. The effectiveness of such areas was determined through a regression analysis of the impact of EPE on the environmental indicators of the relevant regions. The volume of pollutant emissions into the atmosphere is most affected by expenditures on other activities in the field of ecology and protection of natural resources with a regression coefficient of -0.542787. Environmental protection measures at the expense of special funds have a significant impact on total waste generation (-0.782511) and on the volume of polluted wastewater (-0.443516). Regression analysis did not reveal a statistically significant impact of any of the variables on the I-III hazard class waste generation and the number of cases of malignant neoplasms. The environmental policy of territorial communities should focus on the identified effective areas of expenditure and revise expenditures that do not contribute to improving environmental indicators. It should be noted that the volume of expenditures is not the most important factor in efficiency – the quality of planning and management is of key importance. The findings may be useful for territorial communities to improve the environmental management system in terms of managing the effectiveness of expenditures on environmental protection.

Skyba, O., Savina, N., Yu, T. Assessment of the Impact of Healthcare System Indicators on the Countrys Economy (2025). *Rehabilitation and Recreation*, 19 (2), pp. 182–193. DOI: 10.32782/2522-1795.2025.19.2.17

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105014731097&doi=10.32782%2F2522-1795.2025.19.2.17&partnerID=40&md5=0a1b602624a442bb8918aaab11dc8052

The purpose of the article is to determine the impact of healthcare system indicators on a key measure of economic performance – GDP by type of economic activity in «Healthcare and Social Assistance» for further policy-making on preserving and improving the health of the population. Material and Methods. Analytical, mathematical (regression analysis method), statistical (summary and grouping of observation data; calculation of summary indicators and their analysis) research methods, method of system approach and epidemiological analysis are used in the work. The information base for the epidemiological analysis was the express issues of the State Statistics Service of Ukraine and the World Bank data. Results. The study evaluates the changes in the volume of Ukraine's GDP and GDP by type of economic activity in the sector of «Health Care and Social Assistance». The periods are identified when the GDP growth rate by activity in "Health Care and Social Assistance" exceeded the GDP growth rate of Ukraine, which was observed, in particular, during the COVID-19 pandemic. Key healthcare system indicators influencing economic performance, particularly GDP by type of economic activity in «Healthcare and Social Assistance» are determined. A linear regression model is developed, demonstrating that the most significant factors contributing to GDP growth in the type of activity «Health Care and Social Assistance» include indicators of healthy life years, average life expectancy, total healthcare expenditures, and R & D expenditures. Forecasting is conducted based on healthcare system indicators affecting GDP by type economic activity in «Healthcare and Social Assistance» for further development of policies aimed at preserving and improving public health. Conclusions. The results of forecasting GDP growth by type of activity in «Healthcare and Social Assistance» indicate the need to increase the indicators of total health care expenditures and research and development expenditures, taking into account their average growth rates. By applying thisapproach and aligning with socio-economic priorities, GDP growth for type of activity in «Healthcare and Social Assistance» sector is expected to grow by 8.44% in the short term while ensuring long-term innovation in the healthcare system.

Kyselov, V., Pidhirnyi, O., Akimova, A., Kuryliuk, S., Aksiutin, V. Systemic Vision of Students' Sports and Physical Activities within the Educational Landscape: Contemporary Patterns (Visión Sistémica de las Actividades Físicas y Deportivas de

los Alumnos en el Panorama Educativo: Modelos Contemporáneos) (2025). *Health Leadership and Quality of Life*, 4, art. no. 708. DOI: 10.56294/hl2025708

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105014096829&doi=10.56294%2Fhl2025708&partnerID=40&md5=bdf674c868b3b88968f9191514ee6796

Introduction: the integration of physical education, health and fitness, and mass sports activities into the training of higher education students is essential for promoting their overall well-being and resilience. However, this integration faces multiple challenges that require ongoing evaluation and strategy adjustments. Objective: this study aims to assess how sports, mass sports, and physical education activities are implemented in higher education institutions (HEIs) under current conditions. Method: a bibliosemantic method was used, involving a content analysis of scientific articles and publications from 2015 to 2025 related to physical education in HEIs. Special attention was given to the challenges associated with distance learning and inclusive education, as well as to effective practices applied in Ukrainian and European HEIs. Results: the analysis identified both challenges and successful practices in integrating physical education into HEIs. It underscores the importance of a balanced approach that combines traditional and innovative methods to enhance student engagement and health outcomes. Conclusions: the study offers practical insights for educational management, informing the development of curricula and strategies that promote active lifestyles and physical wellness among students.

Makarenko, I., Sieromakha, N., **Lastochkina, O.**, Mukhina, A., Raievska, Y. Implementation of Inclusive Education in Ukraine: Current State and Prospects for Development (2025). *OIDA International Journal of Sustainable Development*, 18 (11), pp. 123–132.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105013117268&partnerID=40&md5=2b6a11b2b5005bfcaa3208dfd93fa79d

In the context of a full-scale war, inclusive education in Ukraine takes on a new meaning, as it requires adaptation to extraordinary circumstances, including infrastructure destruction, forced displacement, and digital inequality. The relevance of the study is due to the need to find effective models for ensuring educational participation of students with special educational needs in the landscape of humanitarian crisis. The aim of the study is to assess the effectiveness of blended learning as a tool for implementing inclusive education for children with special educational needs (SEN) in war conditions. The methodology is based on a mixed approach, which includes statistical data analysis, online parent surveys, and expert interviews with teachers and school administrations in Kharkiv, Chernihiv, and Zaporizhzhia regions. The results showed that the most effective model was blended learning with elements of digital adaptation and psychosocial support, particularly in regions with a high level of digital readiness. It was determined that the success of inclusive interaction depends on the level of digital infrastructure, flexibility of management decisions, and parental participation. Visualized indicators of coverage, satisfaction, and online support allow summarizing the advantages and challenges of such a model. The practical significance of the study lies in the formation of conceptual guidelines for building adaptive digital inclusion at the level of educational institutions. Recommendations are proposed for the integration of digital platforms, the creation of crisis management protocols and the involvement of users in the process of creating inclusive services.

Bahatska, O., **Kovalenko, A.**, Barantsev, Y. Linguo-Axiological Dimensions Of The Washington Post's War Narrative On Russian-Ukrainian Conflict (2025). *Analele Universitatii Ovidius Constanta, Seria Filologie*, 36 (1), pp. 127–145.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105012986880&partnerID=40&md5=df2a47fbf47a7f83e3fa90690e2723d0

This study examines the concept of war narrative, a discursive construct intrinsically linked to military and media discourse. We define war narrative as a narrative form that (1) represents armed conflict through narration and persuasion strategies, (2) elucidates conflict logic, and (3) proposes argumentative and axiological interpretations to influence audiences. Our research investigates the axiological modality expressed in the Washington Post's war narrative, analyzing key rhetorical devices such as metaphor, metonymy, euphemism, logical attribution, and irony. Particular attention is given to evidentiality strategies, which delineate authorial voice from reported information.

The analysis of evidentiality is conducted along two axes: morphological-syntactic and lexical-semantic. The former yields a typology of syntactic structures in complex sentences with indirect discourse, revealing narrative flexibility in service of pragmatic goals. The latter identifies lexical markers indicating the provenance of reported information. This dual approach illuminates the multifaceted role of values within the Washington Post's war narrative, contributing to our understanding of how media discourse shapes public perception of armed conflicts. Our findings have implications for the study of journalistic practices, narrative theory, and the intersection of linguistics and media studies in conflict reporting.

Shevtsova, N., Androshchuk, A., Syno, V., Aleksandruk, I., Maliuhao, O. Teaching German Within Digital Paradigm of Education: AI-based Approaches and Tools (La enseñanza del alemán en el paradigma digital de la educación: Enfoques y herramientas basados en IA) (2025). *LatIA*, 3, art. no. 340. DOI: 10.62486/latia2025340

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105012366158&doi=10.62486%2Flatia2025340&partnerID=40&md5=09429dc9dda484e4a8b95c639ec6586f

In view of the increased popularity of AI tools in teaching foreign languages, particularly German, and the corresponding concerns that arose, this article explored the futuristic prospects of learning German with AI. It examined how these technologies had revolutionized the learning process and what learners could expect in the future. The study's methodology was based on a systemic paradigm and involved the use of content analysis and elements of case studies, relying on a wide array of literature sources extracted from general and specialized scientometric databases. The findings showed that AI in language teaching represented a powerful approach to engaging students and enhancing learning outcomes. The most innovative methods, such as the integration of massively multiplayer online role-playing games (MMORPGs) into educational processes, yielded the most effective results. The study attempted to outline the correlation between various AI-based teaching approaches and existing educational theories that characterized the contemporary educational landscape. Furthermore, it proposed an appropriate schematic model that could serve as a foundation for further research in the field, including studies with an interdisciplinary focus.

Merzlikin, I. Small Reserves as Targets for Alien Species Invasions: The Case of Mykhailivska Tsilyna (Ukraine) (2025). Theriologia Ukrainica, 29, pp. 65–81. DOI: 10.53452/TU2904

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105012297884&doi=10.53452%2FTU2904&partnerID=40&md5=90c99a80f8fee10bbe34036b6ead0dd9

The issue of vulnerability of small protected natural areas to invasion by alien species and their occupation of leading positions within the structure of biotic communities is examined. Given the popularity of micro-reserves and the actual dominance of small-sized protected objects within Ukraine's system of protected areas, this problem is considered using the example of the Mikhailivska Tsilyna Nature Reserve (202.5 ha). The reserve was designed to represent northern variants of steppe communities but is surrounded by large areas of cultivated fields and a system of forest belts. Changes in the native mammal fauna within the reserve and the invasion of alien species since its establishment in 1928 were studied. At the time of the reserve's establishment, fauna reconstructions indicate the presence of 17 mammal species, of which only 1 species (domestic horse) was alien. In 1980– 1982, 31 species were recorded, including 17 alien ones (55%), of which two were domestic species, one was an alien (brown rat, Rattus norvegicus), and 14 near invaders. As of 2024, 35 mammal species occurred in the Reserve, including 13 aboriginal species and 22 species that invaded it later, including two domestic species, one introduced species (Nyctereutes procyonoides), and 18 (51%) shortinvaders. Thus, for over 96 years, 38 mammal species have been recorded in the Reserve, including three domestic species, three are alien species (brown rat Rattus norvegicus, muskrat Ondatra zibethicus, and raccoon dog Nyctereutes procyonoides), and 15 short' invaders (40% of all species). The appearance of alien species may be influenced not only by large-scale human activities (ploughing of surrounding lands, planting forest belts, and creating ponds) but also by minor actions (stocking ponds, repairing dams, and building sheds). However, the latter not only attract newcomers but also facilitate their establishment. The small size of the Reserve has allowed forest species and species with a wide range of habitats to establish throughout its territory. The process of new species

appearing in the Reserve's ecosystem due to near invaders continues to this day. Further overgrowth of steppe areas and fallows with trees and shrubs on the new territory, added to the reserve five years ago, increases opportunities for new alien species.

Korost, I. I. The Set of Sites of the Territory and Vicinity of the Bilsk Hillfort: Main Results of the Initial Stage of Research (Комплекс пам'яток території й округи Більського городища: головні підсумки робіт на початковому етапі дослідження). (2025) *Arheologia (Kyiv)*, (2), pp. 111–146. DOI: 10.15407/archaeologyua2025.02.111

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105011513362&doi=10.15407%2Farchaeologyua2025.02.111&partnerID=40&md5=0e04ba1a5606e7b199651c0c8411adff

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. shcherbakivskyi) on the possibility of identifying the bilsk hillfort with the ancient city of gelonus, which herodotus wrote about, are highlighted and analysed.

Zhadlenko, I., Morenko, O., Nikolenko, L., **Lastochkina, O.**, Mykytenko, M. Digital Transformation of Education as a Space for Supporting Learners with Special Needs – Challenges and Prospects for Inclusion (La transformación digital de la educación como espacio de apoyo a los alumnos con necesidades especiales: retos y perspectivas para la inclusión) (2025). *Seminars in Medical Writing and Education*, 4, art. no. 704. DOI: 10.56294/mw2025704

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010948757&doi=10.56294%2Fmw2025704&partnerID=40&md5=8d3e11b3d3316d0a0b045d79e123b074

Introduction: digital technologies and processes of digitalization of education have contributed to the realization of the principle of equal access to education. This study focuses on the implementation of inclusive education within the framework of digital transformation as a response to the special educational needs of perfectly integrated students. Method: the following methods were used in the study: a questionnaire, a pedagogical experiment, a comparative analysis of graduates' educational outcomes before and after the use of educational technology, and mathematical data processing according to Pearson's criterion. Results: a systematic categorization of traditional and digital models of inclusion in inclusive pedagogy was conducted, and the prospects for using proactive digital inclusion approaches in pedagogical practice were explored. A system of criteria and sub-criteria for self-analysis of the effectiveness of digital inclusive methods in modern education has been developed. The conclusions of the self-analysis indicate the inadequacy of the didactic capabilities of educational resources, low flexibility of interfaces of educational platforms, inadequate service support, insufficient qualifications of teachers in inclusive education, as well as inadequate targeting systems in the process of integrated learning. A statistical study of the effectiveness of the use of modern educational technologies in teaching children with special needs has shown positive dynamics in

the essence of educational achievements of a significant number of students. Conclusions: the use of advanced technologies provides broad prospects for the organization of integrated learning and involves the development of complex hardware, methodological and technological solutions for this category of students.

Dubikovska, A., Górka, M., Skyrpan, M., Bieńkowska-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), art. no. e2516023. DOI: 10.1080/02724634.2025.2516023

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010678536&doi=10.1080%2F02724634.2025.2516023&partnerID=40&md5=0af3710dc5afb5aa3e1a43b3ccb765d7

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 Sphyraenidae, 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., Bieńkowska-Wasiluk, M., Dubikovska, A., Świdnicka, E., Stefaniak, K., Khekalo, O., Barkaszi, Z. Oligocene flatfishes (Teleostei, Pleuronectiformes) of the Outer Carpathian Basin (2025). *Journal of Vertebrate Paleontology*, 45 (1), art. no. e2520490. DOI: 10.1080/02724634.2025.2520490

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010507252&doi=10.1080%2F02724634.2025.2520490&partnerID=40&md5=93f76edb0f5d22ce05cb8c5657f33dd5

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 Krępak, 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.

Nesvidomin, A., Pylypaka, S., Volina, T., **Kalenyk, M.**, Botvinovska, S., Hryshchenko, I., Spirintsev, D., Kolodnenko, V., Borodai, S., **Zakharova, I.** Mathematical Description of Bending a Surface of Revolution Into a Helical Conoid (2025). *Eastern-European Journal of Enterprise Technologies*, 3 (1), pp. 30–37. DOI: 10.15587/1729-4061.2025.328825

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105010296368&doi=10.15587%2F1729-4061.2025.328825&partnerID=40&md5=21911f9a6cbd7bd865709aec3a361f43

The object of this study is the process of theoretical gradual bending of a catenoid into a helical conoid coil. A helical conoid or a straight closed helicoid is formed by the helical motion of a segment around an axis, and this segment intersects the axis at a right angle during movement. It cannot be bent into a plane, but by gradually reducing the pitch it can be transformed into a known surface of revolution - a catenoid. With such deformation, the lengths of the lines and the area of the coil as a whole do not change, that is, the deformation occurs similarly to unfolded surfaces. Such deformation is based on the theory of bending surfaces of a separate section of differential geometry. According to it, any helical surface can be bent into a surface of revolution and vice versa. Bending the non-folded surface of a helical conoid into a catenoid is a classic example of differential geometry. This approach makes it possible to find an approximate flat workpiece for manufacturing a screw coil. This task is resolved by approximating the obtained catenoid by a truncated cone. The sweep of the truncated cone will be the approximate sweep of the screw turn. This is the peculiarity of finding the approximate sweep, which in engineering practice is calculated by other formulas. This is also the essence of the reported results. In the work, parametric equations were derived that describe a one-parameter set of intermediate surfaces during bending of a screw conoid due to a gradual decrease in the surface pitch to zero. In the given example, one turn of the screw is considered, put on a shaft with a radius r = 0.125 m and limited by an external radius R = 0.25 m with a surface pitch H = 0.5 m. The dimensions of the truncated cone, which replaces the catenoid, are r = 0.148 m for the smaller base, R = 0.262 m for the larger base, and H = 0.05 m for the height of the cone. The specified dimensions of the cone are sufficient to find its exact sweep, which will be approximate for the turn of the screw conoid.

Chkana, Y. O., **Martynenko, O.**, **Yurchenko, A.**, Gorovoy, I., **Semenikhina, O.** A Bibliometric Exploration of Research in Mathematics Education (2020–2024) (2025). *Eurasia Journal of Mathematics, Science and Technology Education*, 21 (7), art. no. em2659. DOI: 10.29333/ejmste/16561

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105009899502&doi=10.29333%2Fejmste%2F16561&partnerID=40&md5=83473563d575db56881fc1a567d2c32f

The rapid development of technology in society makes research in mathematics education relevant. However, their comprehensive analysis is complicated due to some factors (different scientific journals and publishers, many documents, etc.) The article aims to analyze the publication landscape to understand the current state of mathematics education, identify key trends, and formulate strategies for further development of this field. The research method was bibliometric analysis. The data for this study were obtained from the Web of Science core collection on December 3, 2024. The objects of analysis were the number of publications, authors, geographical and institutional distribution of publications, citation of publications, and We analyzed publications from 2020 to 2024 and used the VOS (visualization of similarities) methodology in the VOSviewer computer program. We obtained the following characteristics of the publication landscape: quantitative trends for articles, reviews, conference materials, the most active authors, the most cited publications, and the top 5 countries with the most significant number of such publications. We identified key areas of research in mathematics education based on networks and predicted vectors for further development of mathematics education.

Tytarenko, I., **Pavlenko, I.**, Taraban, Y., Pavlenko, V., Ramos, D. Digitization of Architectural Heritage Objects in Wartime: An Underground Space Protection Case Study (2025). *Lecture Notes in Mechanical Engineering*, pp. 117–129. DOI: 10.1007/978-3-031-94223-5_11

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105009319589&doi=10.1007%2F978-3-031-94223-5_11&partnerID=40&md5=7f17d745284a413b71918a9cb5b570f6

Under the conditions of the long-term and full-scale russian's military aggression in Ukraine, the problem of preserving and fixing the architectural heritage became critically relevant, especially for surviving frontline cities like Sumy, Kharkiv, and others. The rapidly growing interest of the international community in historical heritage stimulates scientists to fix the architectural identity for settlements by implementing modern approaches and recording the historical architectural and urban environment. For this purpose, laser scanning and photogrammetry with

subsequent 3D modeling are widely used to preserve EU countries' architectural and historical heritage. The developed applied research focuses on the fixation and digital reconstruction of architectural objects using a wide range of up-to-date software. The proposed methodology includes recording preserved historical sites and architectural objects in the frontline cities of Ukraine. This involves collecting and analyzing archival, historical, and cartographic sources with detailed analysis. The research process applies the synchronization of geographical and historical maps and street planning schemes. Moreover, a study of the planning system of settlements and architectural objects was carried out to find the location of lost historical structures. Photogrammetric scanning and a point cloud are also applied for architectural heritage objects. A detailed analysis of the scanned objects was made. As a result, a digital model of an existing cultural heritage object for underground space protection was created for the center of Sumy city. This model allows for further study of a cultural heritage object and its adaptation to modern urban space needs to overcome military threats.

Ivanytska, S. "Write Back More Often, Even With Short Letters": Epistolary Of Borys and Maria Hrinchenkos to Serhii Yefremov, 1907–1910 (2025). *Manuscript and Book Heritage of Ukraine*, 2025 (1), pp. 38–61. DOI: 10.15407/rksu.36.038

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105009224325&doi=10.15407%2Frksu.36.038&partnerID=40&md5=13a61865920e1edd9488f5de9d5cb633

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 objec- tives are to assess the source potential of this epistolary, to identify new information that these 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 me-thods 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 episto-lary studies in the field of Hrynchenko studies is analyzed. The main issues discussed in Borys Hrinchenko's letters and the style of his correspondence are highlighted. Conclusions. Ac-cording 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 "signifi-cant Others" whose memory he kept in his academic life.

Prokopenko, O., Järvis, M., **Omelyanenko, V.**, Maslov, A., Lopes, H. The Convergence of IoT, Cyber-Physical Systems, and Mechatronics in Industry 4.0 Digitalization (2025). *Lecture Notes in Mechanical Engineering*, pp. 48–65. DOI: 10.1007/978-3-031-94484-0_5

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105009219358&doi=10.1007%2F978-3-031-94484-0_5&partnerID=40&md5=f45a7b07f30c950dc114da37b665b495

Internet of Things, Cyber Physical System, and Mechatronics brought about the fast evolution of Industry 4.0, which transformed industrial landscape. This paper analyses the effects of these technologies on the level of industrial productivity, economic effectiveness and output of innovation within six countries, Estonia, Ukraine, Portugal, the USA, the UK and China, in the period 2020—2024. The impact of Internet of Things adoption, Cyber Physical Systems integration, and usage of Mechatronics are studied on the thrust of industrial transformation using a panel data econometric model. The ICT infrastructure and respective R&D investment are also studied for their effects on industrial transformation. The results show that China and the USA are the most advanced in Industry 4.0 adoption, with a meaningful penetration of the Internet of Things, reflected in industrial productivity index scores of 81.45 and 79.12, respectively. Portugal and the UK show steady progress, with strong ICT and R&D investments driving consistent efficiency and innovation growth. Although there are numerous gains to be made in mechatronics

integration and automation strategies, Estonia and Ukraine currently lag behind. Findings stress that, besides balanced investments, Industry 4.0 needs of regulatory support and proper digital skills development to be fully exploited. Based on the study, it becomes clear that investment in digital transformation is significant, but only an effective state policy on large industrial enterprises, prepared infrastructure, and individuals' ability to adapt to new labor processes can be effective. Future works on regional discrepancies, sector specific approach and new technologies (AI and blockchain) could be useful in improving adoptability of Industry 4.0.

Moyseyenko, I., Odobetska, I., Kovalenko, A., Mozalov, V., **Rud, O.** *Analysing Fake News through Linguistics: Detecting Manipulation Tactics Análisis lingüístico de las noticias falsas: Detección de tácticas de manipulación* (2025) *Metaverse Basic and Applied Research*, 4, art. no. 162. DOI: 10.56294/mr2025162

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105008812113&doi=10.56294%2Fmr2025162&partnerID=40&md5=dcd1d1e215096f172f8be15620825b58

Introduction: the purpose of this study is to look at how fake news in English is written and how it affects people's opinions. This topic is necessary because disinformation now has a major impact on our views about the COVID-19 pandemic, politics and climate change. Method: the research includes several strategies like content analysis, discourse analysis, psycholinguistic techniques and comparative analysis. Samples of fake news articles that totaled 75 were selected from different social media sites and were compared with other news stories on the same subjects. Results: it has been shown that fake news often uses strong language, makes exaggerations, states things in a clear way and alludes to respected authorities for support. The most commonly used techniques are playing on people's fears, changing the facts and using language that divides people. If we compare these articles to authenticate news, we notice many differences in their style, tone and what they try to achieve. Conclusions: fake news becomes more emotional and easier to share because of the features of language used in them. It points out that developing skills to spot misleading news and creating automated systems to catch misleading content is very important and it asks for further research from experts in other fields.

Burov, O., Lavrov, 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). *Communications in Computer and Information Science*, *2523 CCIS*, pp. 3–13. DOI: 10.1007/978-3-031-94153-5_1

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105008682591&doi=10.1007%2F978-3-031-94153-5_1&partnerID=40&md5=385a5000b29793b8b1efea9347a2d795

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.

Zhumbei, M., Khairulin, O., Buniak, N., Sapohov, M., **Parfilova, S.** Enhancing the Educational Process through AI and Gamified Learning Mejorar el proceso educativo mediante la IA y el aprendizaje gamificado (2025). *Metaverse Basic and Applied Research*, 4, art. no. 164. DOI: 10.56294/mr2025164

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105008233230&doi=10.56294%2Fmr2025164&partnerID=40&md5=24ecbb3fbca610e2656112b24bdfd160

AI provides a wide range of tools for creating personalised learning paths and unlocking each student's potential. The study aims to investigate the effectiveness of integrating AI tools into the educational process to form personalised learning paths. In the study context, the methods of self-assessment, analysis of learning outcomes, and statistical calculation of pedagogical experiment data processing were used. Criteria for the effectiveness of integrating AI into the educational process to develop personalised learning paths have been formed. Based on the outlined criteria and levels of their implementation, the most effective ones are identified through self-assessment. The tools for implementing these AI-based learning tools are outlined. The higher education students for whom the AI-based learning tools were used were divided into clusters according to their professional training: humanities, social sciences, and engineering. The pedagogical experiment compared the learning outcomes of the control group that used randomly selected AI tools and the experimental group that used AI-based learning tools, distributed according to the clusters of professional training. Based on the statistical comparison of learning outcomes, it was determined that the experimental group shows better results. Therefore, the preliminary analysis of AI-based learning tools and their further application by the clusters of professional training is practical.

Turytska, T. G., **Lyashenko, V. P.**, Lukashov, S. M., Lukyanetz, E. A., Chaus, G. G. Histomorphological changes in the rat cerebral cortex following long-term caffeine consumptio (2025). *Fiziolohichnyi zhurnal* (Kiev, Ukraine : 1994), 71 (3), pp. 73–80. DOI: 10.15407/fz71.03.073

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105008105673&doi=10.15407%2Ffz71.03.073&partnerID=40&md5=82fea703d922099c77774f808d3713a1

Investigating the effects of coffee and caffeine on the frontal cortex is essential for understanding how these widely consumed dietary compounds influence higher cognitive functions such as decision-making, behavioral regulation, planning, and social interaction. This study used transmission electron microscopy to assess the ultrastructural changes in the frontal cortex of adult rats following long-term oral administration of either pure caffeine or coffee. While the overall cytoarchitecture remained preserved in both experimental groups, subtle subcellular alterations were observed, with more pronounced structural changes in nerve fibers than in somata. Myelinated axons displayed increased diameter, accumulation of neurofilaments, and elongated mitochondria. Most mesaxon curls remained structurally organized but showed signs of loosening. Neuronal somata largely preserved organelle integrity; however, occasional autophagolysosomes and dilated rough endoplasmic reticulum were detected. Vascular components, particularly endothelial cells, maintained their general structure, though exhibited occasional membrane discontinuity and increased caveolae formation, while arterioles showed elevated smooth muscle tone and a higher density of actin filaments, indicating remodeling. Caffeine exposure resulted in slightly more pronounced mitochondrial and axonal alterations, suggesting higher metabolic stress. Importantly, while the coffee and caffeine groups shared many similarities, caffeine exposure resulted in slightly more pronounced mitochondrial and axonal changes, suggesting higher metabolic demand or stress response. In conclusion, long-term consumption of caffeine or coffee induced mild ultrastructural modifications, particularly in mitochondria, endoplasmic reticulum, and vascular endothelium, without overt neuronal damage. This may reflect early adaptive or stress-related responses. These findings highlight the importance of distinguishing between the effects of caffeine and those of complex coffee mixtures on brain structure and function.

Chastnyk, O., Heida, O., **Bahatska, O.**, Lutsiv, S., Pavliuk, O. Advancing Higher Education in Ukraine: Key Trends Shaping the Third Millennium (2025). *OIDA International Journal of Sustainable Development*, 18 (10), pp. 67–76.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105007775105&partnerID=40&md5=802b965f4e30afea125beac703d23f9f

The main trends of the higher education system's development in terms of globalisation, digitisation, labour market integration, and academic integrity are examined in this paper. Emphasis is placed on how digitalisation, AI interdisciplinary approach, and personalisation contribute to a significant shift in the face of modern educational teaching models. The necessity conditions the relevance of the study for the adaptation of educational institutions to

rapid technological and social changes, particularly in martial law and the post-war reconstruction of Ukraine. The article seeks to present an analysis of the main challenges and prospects for modernisation of the educational process, giving an estimate of how digital technologies, artificial intelligence, and new learning formats influence the quality of education. Materials and Methods: Descriptive analysis, comparison and contrasting approach, regulatory document analysis, and statistical data were employed in the course of this research. As shown by its results, higher education has reached a transformation phase that includes blending learning, integrating different educational platforms, and an ever-increasing role of distance education; universities increasingly have to change and adapt to challenges within the labour market. It also reveals new approaches toward assessment, knowledge, and improving mechanisms for maintaining academic integrity while implementing sustainable development within the education process.

Bazurin, V. M., Pursky, O. I., **Chashechnikova, O. S.** Application for Statistical Processing of Pedagogical Experiment Results: A Component-based Approach (2025). pp. 1347–1351. DOI: 10.1109/ICICT64420.2025.11004909

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105007440104&doi=10.1109%2FICICT64420.2025.11004909&partnerID=40&md5=1c96c8540cdbbebb772aaf10acc24508

Pedagogical scientists often need to process the results of a pedagogical experiment. The purpose of the article is to reveal the features of the architecture and structure of the application for statistical processing of the results of a pedagogical experiment. To statistically process the results of a pedagogical experiment, we have developed an application that provides the calculation of Mann-Whitney, Pearson, and Student criteria. For the application, we chose the modular architecture, which is a hierarchical structure. Due to the component-oriented approach, it is possible to modernize and expand the application's functionality. The application can read data from a text file, an XLSX file, a database, or a table in the main form of the application.

Kuzikova, S., Yalanska, S., Lukomska, S., Fomenko, K. Peculiarities of Traumatic Experience and Posttraumatic Growth of Adolescents and Young Adults During Wartime (Особливості травмівного досвіду та посттравматичного зростання осіб підліткового і юнацького віку в умовах воєнного стану) (2025). *Insight*, (13), pp. 601–618. DOI: 10.32999/2663-970X/2026-13-24

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105006914370&doi=10.32999%2F2663-970X%2F2026-13-24&partnerID=40&md5=e4d57b1d7d3007805a33c1bfd7d8f9fc

The aim of the research is to identify the psychological characteristics of traumatic experience and posttraumatic growth of adolescents and young adults during wartime. Methods. A comparison of traumatic experience and stress tolerance of adolescents and young adults was carried out. The total sample included 151 individuals, of whom female (n = 78; 51.66%) and male (n = 73; 48.34%). In the age range, we have the following distribution: from 10 to 12 years old (n = 48; 31.79%), from 13 to 15 (n = 52; 34.44%), and from 16 to 17 years old (n = 51; 33.77%). Participants described their traumatic events using the PTSD symptom questionnaire "PCL–5" (Blevins et al., 2015), "Posttraumatic Growth Questionnaire" (Tedeschi, Calhoun, 1996), and "Meaning of Life Questionnaire" (Steger et al., 2006). The presence of a traumatic event (criterion A according to the posttraumatic stress disorder method "PCL–5"), which was found in 91.39% of respondents, was important for our study. Results. Among the traumatic events, the most common were the death of relatives and friends and injuries. It was found that deaths and injuries have become common phenomena in war conditions. They are perceived as individual grief, but due to their mass nature, they are not considered a collective tragedy (as was the case after the de-occupation of Kyiv, Kharkiv, and Kherson regions). According to the results of the diagnosis, PTSD was detected in 12.78% of the studied sample, which is generally consistent with the general world data in this field, including children, adolescents, and adults. Conclusions. The presence of a traumatic event and the severity of individual PTSD symptoms does not indicate PTSD as a medical diagnosis, not the least role in this is played by stress resistance and posttraumatic growth with the creation of new meanings of traumatic events. It is explained that after the end of hostilities, the situation may change and the so-called delayed PTSD will be actualized. A low level of posttraumatic growth was found in younger

adolescents and a moderate level in older adolescents and young adults. It can be assumed that the indicators of posttraumatic growth will change over time after the trauma and will depend on the course and duration of wartime.

Nesvidomin, A., Pylypaka, S., Volina, T., Ruzhilo, Z., **Kozlova, O.**, Shuliak, I., Pylypaka, T., Kremets, Y., Nalobina, O., Rebrii, A. Mathematical Descripton of Winding Helicoid Section Construction Based on the Predefined Structural Parameters (2025). *Eastern-European Journal of Enterprise Technologies*, 2 (1(134)), pp. 6–12. DOI: 10.15587/1729-4061.2025.324542

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105006901464&doi=10.15587%2F1729-4061.2025.324542&partnerID=40&md5=1c59043bf86bb039f7c837f3ee7a6580

The object of this study is a helical sweeping surface or a helicoid torso and the process of its design according to predefined structural parameters. Helical surfaces are widely used in engineering practice. They have become widespread in devices for transporting various materials, as well as in agricultural machinery. The problem is that when they are manufactured, the technique of their formation from the point of view of analytical description is not always taken into account. Helical surfaces can be linear and nonlinear. Linear surfaces, or helicoids, are formed by the helical motion of a straight-line generatrix around an axis, and the generatrix can intersect it or be coincident. If the straight-line generatrix intersects the axis at a right angle, then the helicoid will be a helical conoid, which is very common in technology under the name of a screw. Certain conditions are imposed on the helical motion of the straight-line generatrix of a helicoid torso. Its main advantage among other helicoids is the possibility of constructing an exact sweep. All other helicoids cannot be swept. For their manufacture, an approximate sweep is found, which is deformed into the desired shape. At the same time, the energy intensity of the process of deformation of this sweep into the finished product increases due to overcoming significant plastic deformations. As a result of this research, dependences were established that make it possible to construct a set of helicoid torsos that pass through the predefined helical line. The results are based on the differential characteristics of the surface. These are their distinctive features from known results, according to which only one helicoid torso corresponds to the predefined helical line. This paper shows the practical application of the helicoid torso as a supporting turn of the narrowing screw of a forage harvester with a radius of R = 0.25 m of the outer edge and r = 0.125 m of the inner one.

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

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105006737494&doi=10.33782%2Feminak2025.1%2849%29.775&partnerID=40&md5=5a57d46395ed6e3d869360afb73e6008

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 (Poséymia). 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 (druzhyna). The jewelry unearthed at the settlement originates from other regions of residence of the Slavic population – the Novgorod Slovenes, the Uliches, and the Tivertsi. 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.

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), pp. 428–437. DOI: 10.12911/22998993/203917

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105005185608&doi=10.12911%2F22998993%2F203917&partnerID=40&md5=03d2cf7e7fb3c8cf97f6606a372c3f44

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 0.6–1.0mmin the arable horizon and to 24.0–25.8 mm in the meter horizon. During the sunflower's germination period, thedensity of the arable layer soil remained within the optimal range across all soil treatment methods, with valuesfor plowing ranging from 1.14 to 1.24 g/cm3, deep loosening – 1.17–1.26 g/cm3, no-till treatment with a heavycultivator at 12–14 cm – 1.22–1.28 g/cm3, and disc cultivation at the same depth – 1.20–1.27 g/cm3. The densityof the arable horizon under sunflower increased more significantly at plowing than at no-till treatments from plantemergence to harvest. The yield of sunflower seeds in the variant with plowing was the highest – 3.28 t·ha-1. Soiltreatments without turning the soil, both deep at 35–40 cm and shallow at 12–14 cm, led to a significant decreasein sunflower seed yield by 0.40–0.71 t·ha-1 at LSD<inf>05</inf> – 0.04 t·ha-1. The coefficient of energy efficiency was lowestat plowing under sunflower – 2.6. As the energy intensity of the sunflower yield decreased at no-till soil treatmentswithout turning the soil, it increased to 3.0–3.3.

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), pp. 80–100. DOI: 10.55221/2693-2229.2628

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105005120308&doi=10.55221%2F2693-2229.2628&partnerID=40&md5=7bbe1071abc91a842e73a595be5a3bf8

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.

Rudenko, Y., **Drushlyak, M.**, Naboka, O., Proshkin, V., **Semenikhina, O.** Development of Youth Information Hygiene Skills: The Gap Between the Self-Assessment and Real State (2025), pp. 81–104. DOI: 10.1007/978-3-031-82243-8_5

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105005040317&doi=10.1007%2F978-3-031-82243-8_5&partnerID=40&md5=f5139b7631a1291052cd23eb19c331d4

All strata of the population become the objects of destructive informa-tional and psychological influence, and, especially, young people, who, on the one hand, are the most active users of technologies and Internet resources, generators of the development and spread of social networks and video channels, and, on the other hand, due to their age-related psychological characteristics and lack of life experi-ence, they are the most vulnerable category of society. The reasons for this conclu-sion are that young people, on the one hand, are the generation that has been surrounded by IT since birth, and for whom it is natural to live and interact in an information environment, using IT and consuming information flows in excessive quantities, mostly from social networks. On the other hand, young people are confident in their own actions in cyberspace and their digital literacy, media com-petence, and cyber security skills. The stated contradiction led to the study, the purpose of which was to compare the self-assessment of young people and the development of their actual information hygiene skills (the ability to distinguish fake from the truth, to identify real cyber threats, etc.). Sumy, Donetsk region, and Kyiv (Ukraine) educational institutions became the experimental base. According to the study results, an average gap of 40-60% was found. Qualitative analysis of empirical data revealed the reasons for the established gap: lack of awareness of the insufficient development of one's own information hygiene skills and self-confident attitude to information flows in cyberspace. Separate consequences of such a gap were revealed: almost defiant behaviour in the cyber environment, which is manifested in ignoring informational dangers, irresponsible consumption of infor-mation of dubious quality, dissemination and further dissemination of false data, biased assessment of facts, trusting attitude to manipulative techniques, etc.

Kyselov, V., Sakhnenko, A., Vorona, V., **Skripka, I.**, Yeremenko, L. Comprehensive Training for Young Football Players: Technical, Physical, and Psychological Readiness for Global Competitions (2025). *Sport TK*, 14, art. no. 45. DOI: 10.6018/sportk.662211

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105004998845&doi=10.6018%2Fsportk.662211&partnerID=40&md5=ac59bf806f84ba6f5aec0f74e240d8fe

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.

Nadutenko, M., Nadutenko, M., **Semenog, O.**, Fast, O. Application of Digital Method for Processing Distributed Digital Linguistic Resources (2025). *Lecture*

Notes in Networks and Systems, 1338 LNNS, pp. 732–755. DOI: 10.1007/978-3-031-89296-7_37

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105003632035&doi=10.1007%2F978-3-031-89296-7_37&partnerID=40&md5=0ab306d1e2a503b147073f6faa21acba

This article addresses the challenge of effectively processing and utilizing distributed digital linguistic resources to enhance the teaching of philological disciplines. Current efforts emphasize the application of digital methods, including statistical, corpus-based, and lexicographic techniques, integrated with artificial intelligence (AI) tools, such as machine learning and neural networks. The proposed solution centers on the development of a virtual lexicographic laboratory, the "Multimedia Dictionary of Infomedia Literacy," which offers an innovative digital approach to language education, linguistic research, and telecommunication applications. The primary idea is to employ these digital and AI-driven methods to analyze and organize vast amounts of linguistic data, making them accessible and useful for educational purposes. This approach has been tested in educational environments, demonstrating effectiveness in advancing academic resilience, particularly among doctoral students engaged in philological research. Key results indicate that the digital methods facilitate deeper engagement with language content, offering tools that adapt to individual learning needs and enhance the processing of large datasets. Case studies, including the Science4Brave Cluster, highlight the role of these tools in fostering critical thinking and academic resilience in times of crisis. Significantly, the laboratory's tools have shown value in telecommunication by supporting the transmission and analysis of linguistic information, adapting content for efficient communication across digital platforms. This work underscores the potential of digital and AI-enhanced methods in processing linguistic resources, advancing language learning, and contributing to the broader discourse on the role of technology in modern linguistics.

Lobanov, S., Voshkolup, H., Zhylin, M., Medvedieva, O., **Usyk, D.** The Effect of Emotional Regulation for the Successful Treatment of Emotional Dependence in Young People (2025). *International Journal of Statistics in Medical Research*, 14, pp. 126–135. DOI: 10.6000/1929-6029.2025.14.13

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105003431461&doi=10.6000%2F1929-6029.2025.14.13&partnerID=40&md5=0ee0181c8c4faad413486d367209ffc0

Regulation of one's own emotional state is of great importance for a person's mental health. The issue under research is related to determining emotional regulation approaches for the success of the treatment of emotional dependence in young people. Methods. It was possible to achieve the set goal based on the use of methods of analysis, observation, the Spann-Fischer Codependency Scale, and the Student's coefficient. The emotional regulation approaches developed by the authors included social recovery, analysis of someone else's problem and behaviour, problem solving, and art therapy. Results.It was found that the therapy had a positive effect on the respondents, enabling them to primarily develop the self-confidence skills (96%). Also, to develop a lack of need for constant approval (92%), and consideration of their own interests (93%). It was found that the level of the respondents' emotional dependence decreased to a low level (84%) from the beginning of the study. The respondents noted that art therapy (53%) and socialization (47%), which became the basis of the treatment approaches, had almost the same positive effect. Conclusions.The practical significance of the article is related to the possibility of using effective approaches to regulating emotional dependence in young people. The research prospects will be aimed at comparing the impact of the developed approaches to regulating emotional dependence in young people and middle-aged people.

Myroslavskyi, S., Derevyanko, B., Nikolenko, L., Rudenko, L., Hanych, O. Legal Possibilities of Simplifying the Procedure of Concluding Contracts for the International Sale of Goods and Further Unification of their Content (2025). *International Trade Law and Regulation*, 31 (1), pp. 47–62.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105002072053&partnerID=40&md5=c996a37158f99e38df07f35a35542f6c

The purpose of the article is to analyse the views of researchers who studied relations arising from contracts for the International Sale of Goods, the norms of the United Nations Convention on Contracts for the International Sale of Goods (CISG), the Incoterms® Rules, and on the basis of this analysis to propose directions for unification of such contracts and simplifying the procedure of theirconclusion; to formulate recommendations for participants in contractual relations and international trade organisations. The conclusion of the study indicated the possibility and expediency of providing recommendations or appeals to the representatives of the International Chamber of Commerce (ICC), the UN Center for the Simplification of Trade Procedures and Electronic Business Operations (UN/CEFACT), the national chamber of commerce and industry, the legislative or executive authorities of their own the state, international and national public organisations, business entities and their associations exporters and importers.

Yemets, Z., Smoliarchuk, M., Demchuk, L., Koreneva, I., **Omelyanenko, V.** The Ecosystem of Modern Cities in the Context of Sustainable Development (2025). *Studies in Big Data*, 164, pp. 477–484. DOI: 10.1007/978-3-031-75095-3_37

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105002052482&doi=10.1007%2F978-3-031-75095-3_37&partnerID=40&md5=191fdd2fee87a69b3fb9812b3379b6a1

There are physical surroundings, biological elements and technological advances that are important for sustainable progress in contemporary urban areas. For smart management of urban ecosystems in the face of climate change, we need a plan that combines eco-efficiency, economic sustainability, and social justice principles. Successful cities depend on smart urban planning, green spaces, energy-efficient buildings, efficient water resource management, and cutting-edge transportation and energy technologies. To keep cities healthy, we need to use resources wisely, protect plants and animals, and reduce the amount of greenhouse gases released into the air. Also, people who live in cities should be involved in making decisions and help from the government to make the environment better and make life better for everyone. We can make public transportation better, encourage using renewable energy, build green buildings, and help with eco-friendly activities in education and culture. Overall, effective management of the modern urban ecosystem in sustainable development requires an integrated approach that combines technical, economic, social, and environmental aspects to ensure harmony between humans and nature.

Okhrimenko, O. I., Rohovenko, M. M., Pop, O. Y., Marchuk, A. V., Hrynyk, I. Y., **Stakhova, L. L.**, Bilozerska, S. I. Coping Behavior of Students as a Means of Overcoming Stressful Situations Under Martial Law (2025). *Wiadomosci Lekarskie*, 78 (2), pp. 281–287. DOI: 10.36740/WLek/201320

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105002001611&doi=10.36740%2FWLek%2F201320&partnerID=40&md5=f778b8c5674f41bf4dae7bc5064c6296

OBJECTIVE: Aim: The aim is to study the peculiarities of students' coping behavior in stressful situations under martial law. PATIENTS AND METHODS: Materials and Methods: During the 2023-2024 academic year, the research was conducted based among 3rd-year students (n = 82) aged 20-22 years, including women (n = 42) and men (n = 40). Research methods: bibliosemantic, diagnostic, system analysis and generalization, statistical. The diagnostic work involved using the following methods: "Coping Inventory for Stressful Situations" and "Strategic Approach to Coping Scale." RESULTS: Results: It has been found that the problem of students being in a stressful situation of war is directly related to their coping behavior. It has been found that female students' indicators of emotion-oriented coping strategies are more pronounced than those of male students (p 0.05) high level of expression of the following models of behavior to overcome stressful phenomena: search for social support (women - 57.1 %; men - 55.0 %), social contact (women - 54.8 %; men - 52.5 %), precautionary actions (women - 52.4 %; men - 50.0 %). CONCLUSION: Conclusions: The effectiveness of any coping strategy depends on the current situation in students' lives and their existing personal resources. In stressful situations, students' coping behavior is effective, and the following coping strategies are rational: emotion-oriented, search for social support, and problem-oriented. This confirms students' productive personal standpoint, allowing them to adapt to any stressful situation under martial law.

Drushlyak, M., **Lukashova, T.**, **Shamonia, V.**, **Semenikhina, O.** Artificial Intelligence in Education: Chatgpt-Based Simulations in Teachers' Preparation (Sztuczna inteligencja w edukacji: symulacje oparte na ChatGPT w przygotowaniu nauczycieli) (2025). *Informatyka, Automatyka, Pomiary w Gospodarce i Ochronie Srodowiska*, 15 (1), pp. 144–152. DOI: 10.35784/iapgos.6180

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001997422&doi=10.35784%2Fiapgos.6180&partnerID=40&md5=0232ba98118b4697ffc138d1fc31d34d

Today, the problem of using artificial intelligence (AI) in education is essential. Recent studies have detected several chal lenges in using AI for correct assessment, academic integrity, etc. So, the problem of finding positive practices for using AI in education needs to be studied more closely. We perceive ChatGPT as a digital tool for teacher training, which makes it possible to simulate students' problem-solving processes and analyze them critically. It is shown that ChatGPT makes mistakes in solutions, so the generated false answers become an essential training tool in teacher training. It became the base for experimental teaching. The research aims to substantiate the effectiveness of using ChatGPT as a simulation environment to develop pre-service teachers' critical thinking. The statistical analysis of the experiment results proved that ChatGPT is an effective digital tool for developing mathematics and computer science teachers' critical thinking.

Shestopal, N., Kovelskaya, A., Boiko, A., **Zviriaka, O.** The Implement of Physical Therapy on the Psycho-Emotional State of the Individuals After the Gunshot Wound of the Upper Limb (Vplyv fyzikálnej terapie na psychoemocionálny stav osôb po strelných poraneniach hornej končatiny) (2025). *Zdravotnicke Listy*, 13 (1), pp. 79–86.

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105001874405&partnerID=40&md5=14554b46676f657261e89c51b7618737

Theoretical background: Unfortunately, as a result of hostilities in Ukraine, there is an increase of the number of victims with combat injuries of the upper limbs. Objective: To evaluate the effectiveness of the developed program for the using of physical therapy (PT), based on the principles of the International Classification of Functioning (ICF), for people after gunshot wounds of the upper limbs (GWUL). Research sample and method: The study involved 68 men who were physically trained professional military personnel with multiple GWUL, who were divided into an experimental group (EG, n = 34) and a control group (CG, n = 34). Patients of EG group were rehabilitated according to the developed PT program, CG patients – according to the standard program of the medical facility. The duration of the PT was 3 months. The research was conducted before and after the PT course. Visual analogue scale ratings (VAS), The Hamilton Anxiety Rating Scale (HARS) and Patient Health Questionnaire (PHQ-9) was used for comprehensive examination of patients in both groups. Results: It was found that after PT, the pain intensity indicators (p < 0.01), manifestations of anxiety (p < 0.05) and depression (p < 0.01) were significantly better in patients from EG than in CG group. Conclusions: The application of the developed PT program, based on the principles of the ICF, reduces the intensity of pain in the wounded limb and improves psycho-emotional state of servicemen with GWUL and can be used in specialized institutions to improve the recovery results of this category of patients.

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), pp. 22–38. DOI: 10.1504/IJGEI.2025.143350

https://www.scopus.com/inward/record.uri?eid=2-s2.0-105000428797&doi=10.1504%2FIJGEI.2025.143350&partnerID=40&md5=5c24d623da20614c4c0290468234d437

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.