МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
КАФЕДРА ІНОЗЕМНИХ МОВ ТА ЛІНГВОДИДАКТИКИ
ЛІНГВІСТИЧНИЙ НАВЧАЛЬНО-МЕТОДИЧНИЙ ЦЕНТР

МАТЕРІАЛИ

XVIII ВСЕУКРАЇНСЬКОЇ НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ СТУДЕНТІВ, АСПІРАНТІВ ТА ВИКЛАДАЧІВ ЛІНГВІСТИЧНОГО НАВЧАЛЬНО-МЕТОДИЧНОГО ЦЕНТРУ КАФЕДРИ ІНОЗЕМНИХ МОВ ТА ЛІНГВОДИДАКТИКИ

«TO MAKE THE WORLD SMARTER AND SAFER»

25-26 квітня 2024 року

Сумський державний університет
(вул. Харківська, 116, м. Суми, Сумська обл., 40007)

Суми
2024

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY STATE UNIVERSITY
DEPARTMENT OF FOREIGN LANGUAGES AND LINGUODIDACTICS
FOREIGN LANGUAGE TEACHING CENTRE

CONFERENCE PROCEEDINGS

OF THE EIGHTEENTH ALL UKRAINIAN SCIENTIFIC PRACTICAL STUDENTS', POSTGRADUATES' AND INSTRUCTORS' CONFERENCE OF LANGUAGE CENTRE OF THE DEPARTMENT OF FOREIGN LANGUAGES AND LINGUODIDACTICS

"TO MAKE THE WORLD SMARTER AND SAFER"

April 25-26

Sumy
2024

To Make the World Smarter and Safer: Матеріали XVIII всеукраїнської науково-практичної конференції студентів, аспірантів та викладачів Лінгвістичного навчально-методичного центру кафедри іноземних мов та лінгводидактики СумДУ (25-26 квітня 2024 р.) / за заг. ред. професора Таценко Н.В. – Суми : СумДУ, 2024. – 168 с.

У матеріалах подані тези XVIII Всеукраїнської науково-практичної конференції студентів, аспірантів та викладачів Лінгвістичного навчально-методичного центру кафедри іноземних мов та лінгводидактики СумДУ. До збірника ввійшли наукові дослідження, присвячені актуальним проблемам сучасних інноваційних технологій та процесів у науці, техніці та різних сферах людської діяльності.

Для молодих науковців, викладачів і студентів усіх факультетів.

За зміст статей і правильність цитування відповідальність несе автор

SECTION 1 THE IMPORTANCE OF LEARNING FOREIGN LANGUAGES IN THE MODERN WORLD. LINGUISTIC RESEARCH OF THE PRESENT.

TIPS ON HOW TO LEARN ENGLISH EFFECTIVELY

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Today, the English language is gaining more and more importance worldwide. Knowing English gives confidence in any field, so many people start learning this language to fluently speak it. However, some people need help in learning a foreign language. There are many ways to learn English effectively.

In our opinion, the following tips are the most effective:

1) *Surrounding with the language*. It is beneficial to listen to English music and read English books to get to learn vocabulary in context. One can watch their favorite movies or TV series in English or watch them with subtitles. This method helps learners to get used to the rhythm and flow of the language by creating an effective learning environment.

2) *Setting aside dedicated time each day to practice English*. Consistency is more effective than sporadic, intense study sessions. Find at least 10 minutes a day to learn the language because learners always need to develop and learn new words or grammatical constructions.

3) *Learning a few new words daily and using them in sentences*. This gradual approach will help to expand the learner's vocabulary over time. This method is a simple yet powerful technique for steadily expanding vocabulary and enhancing language skills over time.

4) *Practicing Speaking*. Speaking is crucial for language development. Find language exchange partners, join language meetups, or practice with native speakers online. Do not be afraid to make mistakes – it is part of the learning process.

5) *Using Language Learning Apps*. Leverage language learning apps and online platforms that provide interactive exercises, quizzes, and lessons. Examples include Duolingo, Babbel, and Memrise.

6) *Reading Aloud*. Reading aloud helps improve pronunciation and fluency. It also reinforces understanding of sentence structures and intonation. Reading is a great way to get the finer, nuanced points of English expressions as learners encounter a variety of writing styles, vocabulary choices, and grammatical structures. Reading allows learners to absorb idiomatic expressions, cultural references, and context-dependent language usage.

7) *Writing daily in English*. This written source could be a diary, short stories, or even just one's thoughts. Though expressing one's thoughts in English can seem challenging, writing regularly will help reinforce grammar and vocabulary.

8) *Changing the language on one's phone or computer*. This technique will help in learning vocabulary and memorizing the spelling of words. This practice may initially feel challenging or overwhelming, but with persistence, learners gradually become more comfortable with the language and reap the benefits of this immersive approach.

9) *Participating in online forums, blogs, or discussion groups where English is the primary language*. Engaging in conversations on topics one is interested in can be enjoyable and educational, offering valuable language practice, exposure to diverse perspectives, and opportunities for personal and intellectual growth.

10) *Writing posts on personal pages on social networks* (chat rooms, instant messages applications, Instagram, Facebook, Twitter, et al.) in English. This practice will help practice spelling and grammar while engaging with others online.

Thus, learning English is a challenging process. Although we have provided tips to make learning easier, learners need to spend a lot of time learning the language perfectly. Despite the complex process, remember to rest. Acknowledge and celebrate small victories along the way. Learning a new language is gradual, and recognizing one's achievements motivates the learner. Undoubtedly,

learners must be persistent and initiative in learning English. If learners follow these tips, they can improve their English and show the world their spoken English.

THE INFLUENCE OF LEARNING FOREIGN LANGUAGES ON A PERSON'S COGNITIVE ABILITIES

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Learning foreign languages is a common practice in the modern world. In addition to the opportunity to communicate with people from other countries, learning languages also has numerous cognitive benefits.

The following are cognitive abilities that develop when learning foreign languages:

Memory. Learning new vocabulary and grammar requires the brain to remember and store large amounts of information. It strengthens the memory and improves the ability to remember other information.

Attention. Learning a foreign language requires focused attention on new sounds, words, and grammatical structures. It improves the ability to concentrate and maintain attention for a long time.

Flexibility of cognitive processes. Switching between native and foreign languages requires the brain to be flexible and able to quickly adapt to new situations, which improves overall cognitive flexibility.

Executive functions. Learning a foreign language requires the use of executive functions such as planning, organizing, and controlling. It improves these functions and facilitates better decision-making.

Metacognitive skills. Learning a foreign language involves thinking about one's own learning processes and strategies. It develops metacognitive skills that help people understand their strengths and weaknesses and learn more effectively.

Numerous studies have confirmed the positive impact of learning foreign languages on cognitive abilities. For example, a

study published in the journal "Neuropsychologia" found that people who learn a foreign language have better memory, attention, and executive functions than those who do not learn languages.

Another study, published in the journal "Bilingualism: Language and Cognition", found that bilinguals have advantages in cognitive flexibility and metacognitive skills compared to monolinguals.

Learning foreign languages has numerous cognitive benefits. It improves memory, attention, flexibility of cognitive processes, executive functions, and metacognitive skills. These benefits can have a positive impact on various aspects of life, including studies, work, and personal relationships.

Thus, learning foreign languages is not only a way of communication, but also a valuable tool for the development of human cognitive abilities.

THE VITAL ROLE OF FOREIGN LANGUAGES IN MEDICINE AND GLOBAL COLLABORATION

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In today's challenging conditions the role of foreign languages is more crucial than ever. The ability to comprehend and communicate in a foreign language can open doors to opportunities for global collaboration, assistance and support. Learning a foreign language encourages empathy and understanding of different cultures, fostering a sense of global unity and cooperation. Through language people can bridge cultural gaps, gain new perspectives and work together. Mastering foreign languages offers access to knowledge and educational materials. As a result placing emphasis on investing in foreign language education and proficiency can significantly benefit both individuals and communities in times of hardship.

Foreign languages play a crucial role in the field of medicine. It enables healthcare providers to effectively communicate with patients. This communication is important for accurate diagnosis, explaining treatment options and addressing

any concerns. Accessing and understanding research papers, clinical trials and medical literature written in different languages allows medical professionals to stay updated with the latest findings in their field. It facilitates knowledge sharing and improves patient care.

Effective collaboration requires the ability to communicate with colleagues from different countries and cultures. Proficiency in foreign languages empowers healthcare professionals to engage in global conferences, workshops, and research collaborations, facilitating effective communication with patients staying updated with research, fostering global collaboration and accessing international resources. These language skills contribute to better patient care, advancing medical knowledge and improving healthcare systems worldwide.

AI FOR LANGUAGE LEARNING

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In a world where technology is rapidly evolving, artificial intelligence is becoming an increasingly integral part of our daily lives. Despite the many opportunities it has brought, the idea of artificial intelligence is often associated with fear or distrust. However, artificial intelligence can be extremely beneficial and helpful, even in areas such as language learning.

Today, learning a language is an integral part of personal development, employment, traveling, acquiring new knowledge, and communicating with people from different countries. However, it can be challenging for many people due to limited time, resource availability, or simply lack of motivation. Despite this, due to the rapid development of artificial intelligence technology, language learning has become more accessible, engaging, and effective.

Let us take ChatGPT, created by OpenAI, as an example [1, p. 3]. I have selected practical methods of learning with the help of ChatGPT, which, I believe, will help you in learning the language, namely:

1. Make a plan: ChatGPT can make a customized language learning plan. Describe your language level in detail (if you don't know your level, you can also ask the chat to take a test to check your level) and specify the amount of daily workload to make the plan work perfectly for you.

2. Create dialogs: Create a dialog plan that includes the topic you are interested in. For example, if you are interested in traveling, you can talk about your travels or ask the "interlocutor" what countries he recommends to visit. It will help you improve your real-time foreign language comprehension skills.

3. Read and learn vocabulary: Use ChatGPT to generate textual content on various topics and read them. After that, you can write new words and ask them to explain their meaning.

4. Practice grammar: Ask the AI to give you grammar exercises on the topic you want to learn or practice. This will improve your language level.

5. Have fun: Use ChatGPT to create interactive and fun learning experiences. For example, you can ask the chatbot to learn words in a game mode.

6. Analyze mistakes: This is the best tip, in our opinion. After any exercise, you can ask the chat to correct your mistakes. This will help you to see problem areas or things you need to work on. The main thing is not to be afraid to make mistakes.

To use AI as efficiently as possible, you need to be as clear as possible about the question or task you want to solve. This will ensure a more accurate and understandable answer. To get the most useful information, you should use queries relevant to the topic you want to learn.

In addition, we would like to highlight the advantages of learning a language with AI. Communicating with a bot may be easier for some people. For example, students generally felt more comfortable conversing with the computer than a student partner or teacher [2, p. 1]. Also, chatbots are willing to repeat the same material with students endlessly. With the help of AI students have an opportunity to use a variety of language structures and vocabulary that they ordinarily would not have a chance to use. We will

conclude by saying that chatbots could provide quick and effective feedback on students' spelling and grammar.

So, learning English using AI can be very useful, but it can only partially replace professional foreign language courses. It is worth considering both approaches and combining them to maximize your foreign language learning potential.

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EMPOWERING ENGLISH TEACHERS WITH ARTIFICIAL INTELLIGENCE

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Thanks to the rapid advancements in Artificial Intelligence (AI) technologies, we have an exclusive opportunity to revolutionize teaching methods and empower teachers with innovative digital tools for the effective teaching and learning process. AI offers a myriad of ways to enhance pedagogy and personalize learning experiences.

This research investigates various AI applications in English language education, ranging from automated grading systems to personalized learning platforms, and analyses their impact on teaching practices and student outcomes. Here are a few examples showcasing the impact of AI in English classrooms.

Automated writing evaluation systems streamline the grading process, providing timely feedback to students and reducing teachers'

workload. For example, Pigai can provide formative writing assessment and automated feedback with the goal of supporting improvements in students' writing performance: grammar, spelling and organization, allowing teachers to focus on providing more targeted feedback on content and style.

Intelligent tutoring systems offer personalized instruction, catering to individual learning styles and pace. They offer personalized lessons based on students' language proficiency levels, learning styles, and progress. Through interactive exercises, virtual simulations, and real-time feedback, students experience accelerated language acquisition and greater confidence in their English communication skills.

Chatbots and virtual assistants engage students in interactive language practice, while adaptive learning platforms adjust content to students' proficiency levels. Chatbot for language practice may supplement classroom instruction. Students are engaged in conversational English practice sessions with the Chatbot, reinforcing vocabulary, grammar, and pronunciation skills in a fun and interactive manner. This leads to increased students' engagement and enthusiasm for language learning, as well as improvements in speaking and listening proficiency.

Adaptive Learning Platform can cater to the diverse needs of adult learners enrolled in English language courses. The platform can assess students' language proficiency levels through diagnostic tests and tailor lesson content accordingly. Students may have access to personalized study plans, interactive multimedia resources, and targeted practice exercises. This results in learners' satisfaction with their learning experiences and individualization of the study process.

Of course, integrating AI into English language teaching is not without its challenges. Ethical and privacy concerns, technological limitations, resistance to change, and equity and access issues must be carefully considered and addressed to ensure equitable and effective implementation. Nevertheless, by enhancing instructional efficiency, providing individualized learning experiences, facilitating formative assessment and feedback, AI

equips educators with the tools they need to meet the diverse needs of their students.

In conclusion, the integration of AI into English language teaching holds immense promise for empowering educators, enhancing pedagogy, and enriching learning experiences for students. By embracing this technology, we unlock new possibilities and propel English language education into the digital age.

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IN-PERSON PARTICIPATION IN TESOL 2024 INTERNATIONAL CONVENTION & EXPO: DISCOVERING NEW TRENDS IN THE TESOL FIELD

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From the 20th to the 23rd of March, 2024, I was honored to attend the in-person international conference "TESOL-24 International Convention & Expo" in Tampa, Florida (USA) as an exchange participant of *the Methods of Training Pre-Service English Teachers* exchange program sponsored by the U.S. Department of State's Bureau of Educational and Cultural Affairs Office of English Language Programs through the English Access Microscholarship Program.

The Convention is the largest professional development event in the TESOL field. This year it united thousands of leading specialists in teaching English from different parts of the world with hundreds of education sessions, and more than 60 exhibitions. It offers professional development opportunities to English language educators at all levels from around the world. In lively interactive sessions, educators develop a global perspective through the

exchange of ideas and practices. Participants integrate knowledge of current trends in the field while developing a professional network [1].

The diverse and thought-provoking keynote presentations gave the attendees new perspectives on future trends in EL teaching in the world. The opening keynote speech *Diving with a Purpose: Preserving Heritage and Challenging Assumptions* was presented by Tara Roberts, who is a National Geographic Explorer and a storyteller documenting her travels and the stories of the divers, historians, archaeologists, and communities she met along the way for the critically acclaimed National Geographic Society-funded podcast series, *Into the Depths*. She was named the 2022 Rolex National Geographic Explorer of the Year, becoming the first Black American to ever receive the honor.

The Presidential Plenary *Our Stories Informing Our Theories: Preparing, Persevering, and Envisioning* was presented by Shelley K. Taylor, 2023-2024 TESOL International Association President. This keynote reflects on the connections between our lived experiences and their impact on our conceptualizations of (next-gen) TESOL practices. Shelley K. Taylor explores the role of the practitioner at three stages – preparing for the profession, persevering in it, and envisioning possible futures for TESOL – and also considers the practical implications of these stages.

At the end of the Convention in the closing keynote speech *To the Newest Among Us: A Love Letter to What We Do and to Whom We Serve* the inspiring educators, authors and DEIA Champions Kass and Cornelius Minor explored the ways to ensure that every student in every school has access to what they need to participate fully in every community that they call home. The presenters highlighted the role of educators in today's global world when we share culture and thinking and experiences across dozens of platforms daily. This sharing has inspired many, but it has caused some to recoil in fear – the ways of thinking, being, and living that they knew are changing. This thinking is an inspiring policy that limits resources, hamstrings teachers, and harms children and families – especially those who are new to our communities and new

to English. How do we honor English language teaching in an ecosystem that does not always value English language learners? [3].

Being an inclusive educator and community organizer who is deeply involved in local, inquiry-based teacher research and school community development Kass Minor is also the author of *Teaching Fiercely: Spreading Joy and Justice in Our Schools* which was presented during the Convention [4]. In her book, she delivers an inspiring and practical exploration of what it means to be a just teacher in a system that actively incentivizes injustice. The author explains how to build joyful experiences even in the face of inevitable injustice and demonstrates how to accept the seemingly conflicting experience of joy in the face of heartbreak; how to be a catalyst for change, unlearning the patterns of school that have marginalized children while becoming aware of tenets of justice as they manifest in educational spaces. Also, the following strategies and techniques are provided: strategies for creating human-centered care and joy, in which thoughts, actions, and decisions are drawn from within the school community; techniques for creating student-centered experiences within standards-based classrooms and how to raise the level of family involvement in your students' education and improve communication between family and staff.

Kass and Cornelius Minor are the founders of *The Minor Collective*, a community-based movement, both on the ground and virtual, led by them in partnership with kids, families, teachers, and school leaders. It is designed to foster sustainable change in schools *The Minor Collective* believes the greatest catalyst for sustainable change within a school community is driven from its heart: the classroom community. A skilled teacher who centers their praxis on student-driven instruction is the most important pathway for creating shifts that lead to sustainable, equitable change – a pathway that underscores a liberated education for all people [4].

During the convention, the participants had a unique opportunity to take part in seminars, workshops and panel discussions on current trends in EFL teaching from experts in this field (among them D. Larsen-Freeman, Gabriel Díaz Maggioli, Thomas Farrell, Laura Baecher, Julie Kasper, Luis Javier Pentón

Herrera, and others); there was an exhibition of the latest educational, scientific and methodical publications from world-famous publishing houses, including National Geographic, Ellie, Cambridge University Press, TESOL, Pearson, University of Michigan and others.

The delegation of Ukrainian educators also presented the results of their participation in the project *Professional Development for Instructors of Pre-service Teachers* (TESOL Faculty United for Ukraine) [2], among which is the handbook of English analytical and critical reading for pre-service English teachers "*Reading and analyzing short stories: focus on SEL*" by Yuliia Korobova and Hanna Podosynnikova.

The priority areas of the convention's work were global problems of EL teaching: SEL and formation of intercultural competence; AI in teaching English; modern approaches and methods of teaching oral and written communication, organizing school practices of pre-service teachers of the English language, etc.

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THE INFLUENCE OF ARTICULATION ON SPEECH PERCEPTION

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The articulation of speech sounds, specifically the place of articulation within the vocal tract, plays a crucial role in how these sounds are perceived by listeners. The positioning of articulators like the lips, tongue, and velum creates acoustic signatures allowing listeners to distinguish sounds.

Articulations produced in the front region of the mouth, such as bilabial consonants like /p/ and /b/, as well as labiodental fricatives like /f/ and /v/, generate acoustic properties that make them highly distinguishable. Studies show that listeners adeptly categorise these front articulations, even in non-ideal listening conditions [1, p. 160].

In contrast, the articulation of sounds in the middle region of the oral cavity, including alveolar consonants like /t/, /d/, /s/, and /z/, involves a more subtle constriction that impacts the spectral characteristics of the sound [1, p. 47]. The precise timing and location of this constriction influence the perception of these sounds.

Back articulations like the velar consonants /k/ and /g/ are produced through constriction at the rear portion of the oral cavity. The resulting low-frequency resonances contain more diffuse perceptual cues compared to front and middle articulations [2, p. 297]. The coarticulatory effects of back articulations can enhance cues for nearby sounds, further cementing their role in perception.

Beyond isolated places, coarticulatory overlap across regions impacts acoustic processing. Individual production or perception differences can further modulate this process. Factors such hearing impairment may bias reliance toward specific articulatory cues during perception.

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ROLE OF ENGLISH IN THE MANAGEMENT PROFESSION

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The significance of this topic cannot be overstated, as in today's globalized world, proficiency in English is now more important than ever for achieving success in various careers, particularly in management. English serves as the language of international communication and trade, offering numerous

opportunities for managers to advance their careers and collaborate with partners from all over the world.

More than 1.4 billion people around the world live in countries where English is an official language. About one out of every five people worldwide speaks English. Approximately 90% of electronic information globally is stored in this language as well.

English plays an important role in management by helping with communication. It really helps managers communicate effectively with clients, colleagues, employees and partners from other countries. Knowing English makes it easier to negotiate, write contracts, give presentations, and handle other business communication tasks. Also, English skills help managers understand international standards and trends in their industry.

Moreover, being good at English is very important for working in big international companies. A lot of these companies require their employees to be good at English so they can easily talk with colleagues all over the world, work on projects with teams from different countries and do business with partners and clients from other countries. This helps these companies become more known globally.

Another important part of how English helps in management is getting access to information and resources. There are lots of useful things like professional materials, research studies, training programs and other valuable resources that are mostly in English or mostly available in English.

Basically, being good at English is really important for a successful career in management. It helps you find new chances, compete globally and grow professionally.

THE IMPORTANCE OF LEARNING FOREIGN LANGUAGES IN THE MODERN WORLD. LINGUISTIC STUDIES TODAY

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Knowledge of foreign languages is the key to success in today's world, where communication in foreign languages and processing huge amounts of information is gaining more and more

importance. In general, a person who knows languages is a well-rounded personality, has better abilities to learn new things, is freer and more confident in communicating with people.

So, for example, English is the official language of international business and trade, the Internet and technology, science and the arts. 80% of the business language space is occupied by her. Each of us encounters it more and more often in communication with partners at work and on vacation.

German is the language of technology and finance. Over the past five years, the demand for it has grown significantly, many German partners and investors have appeared. Goods from Germany are intensively imported, for example, furniture, electronics, cars.

French is the official or administrative language in various communities and organizations (European Union, United Nations).

One of the key problems of general linguistics is the problem of methodology, that is, methods of language research. It is known that any branch of human knowledge should have certain research methods along with the object and subject of study. Linguistics has created its own (special) methods throughout the history of its development.

Each method singles out such an aspect of language as the object of research, which is defined as the most important in this theory of language.

The methods are differentiated into general (observation, induction, deduction, hypothesis, analysis, synthesis, comparison, idealization, experiment, formalization, modeling, etc.) and special (comparative-historical, typological, comparative, structural, functional, constructive, discourse-analysis).

Common to all sciences are the initial approaches to the study of phenomena - induction and deduction. they are often called methods.

Learning any foreign language opens up new opportunities for us, enriches our spiritual world. By knowing a foreign language, a person automatically moves to a higher social rank, as he becomes a competitive applicant for a high-paying position.

REDUCTION IN INFORMAL ENGLISH

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In the fast-paced realm of online chats and social media, users often resort to shortened words, acronyms, and innovative substitutions to convey messages swiftly and efficiently. In connected speech, sounds can be reduced, change their characteristics, or disappear completely if they are unstressed. This process is called reduction. Reduction plays an essential role in shaping the phonetic structure of a language, as well as its grammar and vocabulary. This form of linguistic economizing not only speeds up communication but also requires less cognitive and physical effort from both the sender and the receiver. The digital age has only accelerated this process of lexical reduction. For instance, phrases like *«Can't find my phone»* become simply *«Can't find phone»* and complex multiword lexemes are reduced to their bare essentials (e.g., *«app»* for *«application»).*

There is a great formal variety of structural reductions in English lexis without any clearcut rule of what is to be removed and what is to remain within the reduced variant. Nevertheless, since the initial part of lexemes in English carry more important information than their final part it is the final part of simple lexemes which usually disappears in the process of reduction [3]. In addition to this, structurally reduced units usually preserve consonants since they are more important information carriers and have a lower degree of predictability than vowels [2].

Complex lexemes are streamlined into acronyms or initialisms for efficiency in communication, with acronyms being spoken as words and initialisms spelled out. Simple lexemes, in informal digital contexts, are often shortened through clipping or substitutive reduction (e.g., *«l8r»* for *«later», «ur»* for *«you are»*), saving time and space in typed messages. The paper highlights these processes of clipping and substitutive reduction as central to enhancing language economy in casual communication.

Clipping is a multifaceted field of study within the English language, characterized by its prevalence across various social, age, and professional demographics. Much like how distinct groups develop their own unique slangs or jargons, they also engage in the creation of clippings, tailoring language to their specific needs and identities.

Clipping is the process of shortening the original word retaining the same meaning and word class [4]. It denotes the formation of a new word-form, with the same meaning as the original lexeme, by lopping off a portion and reducing it to a monosyllabic or disyllabic rump [1]. We concur with the perspective that clipping reduces a lexeme's length while preserving its original meaning. However, following further insights, it's noted that the specific meanings of clippings can deviate from their original, more general meanings. For instance, *«cred»* specifically refers to credibility in a peer context, unlike its more general counterpart. Similarly, *«exam»* is strictly about knowledge testing, a narrower interpretation compared to *«examination»*. This shift in meaning, along with the efficiency of clippings, may cause the original terms to become obsolete, with the clipped forms becoming standard (e.g., *«bus»* for *«omnibus»*, *«car»* for *«motorcar»*). These clipped forms fully assimilate into the language, acquiring all characteristics of regular words and may undergo further semantic shifts or additional clippings, leading to new etymological variants (e.g., *«vegan»* from *«vegetarian», «shade»* from *«shadow»*). Clipping can intersect with other linguistic processes, such as when a word is both shortened and modified with a suffix (e.g., *«ammo»* from *«ammunition»),* and might include spelling changes that do not significantly impact pronunciation (e.g., «*delish»* from *«delicious»*).

Online communication frequently employs numbers as replacements within words, transforming them into shorter forms (for example, *«great - gr8»; «tomorrow - 2morrow»).* Often, this practice of reducing the structure of words is paired with replacing letters with numbers (such as «*cos - because*; *dija - did you»*) or a mix of letters and numbers (like *«together - 2getha»; «for you – 4u»*). This

approach primarily changes the spelling while keeping the pronunciation the same or very close to the original.

Certain highly informal contractions, *like «ain't», «wanna», «gonna»* and *«going to»* are best reserved for casual exchanges. Their use is discouraged in academic or professional contexts, where they are deemed unsuitable.

Accelerated by the digital age, the reduction has become prevalent in online communication, with users employing shortened words, acronyms, and creative substitutions for efficiency. This linguistic economizing facilitates quicker communication with less effort, often leading to the trimming or substitution of the latter parts of words, as these are generally less informative than initial segments. Moreover, consonants, being crucial for conveying information, are typically preserved. Processes like clipping and substitutive reduction, adapting complex lexemes into more manageable forms, underscore the adaptive nature of language to digital communication's demands.

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FEATURES OF ENGLISH DIALECTS IN THE UK

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The United Kingdom is known for its linguistic diversity, which is reflected in the variety of English dialects spoken across different regions.

Standard English serves as a formal mode of communication and represents the grammatical and pronunciation standards that are taught in educational institutions and used in official contexts across the country. Cockney English, which originated in the working-class communities of London's East End, is characterized by a distinct pronunciation that involves dropping the "h" sound and the use of rhyming slang. Estuary English, on the other hand, evolved from the areas surrounding the River Thames and is considered more mainstream. It features a softened accent and vocabulary that share similarities with Cockney English. Welsh English includes phonological, grammatical, and lexical peculiarities that are unique to Wales and blend with the conventions of Standard English. Scottish English encompasses an array of dialects that have distinct features in pronunciation, vocabulary, and grammar, shaped by regional nuances. Irish English reflects the historical and linguistic heritage of Ireland and features variations across the country. It integrates elements from the Irish Gaelic language alongside its distinctive grammatical structures and vocabulary [4].

The UK hosts a multitude of regional variations beyond these notable dialects, each with its unique flavor shaped by historical, cultural, and geographical influences. These 9 dialects are widespread in the UK, and in our research, we will analyze them in detail.

First, it is necessary to emphasise what a dialect is. A dialect refers to a particular variation of a language that deviates from the standard form of the language and is characterized by differences in grammar, vocabulary, and pronunciation [2].

Standard English is known as the "neutral" or "prestige" form of the language and is typically used by educated speakers in formal contexts. It is the standard form of written English and is used in official documents, education, and media throughout the UK. Although it doesn't have any distinct regional features, it may vary in vocabulary and pronunciation depending on regional influences.

In England, the accent commonly known as Received Pronunciation (RP) is considered to be the accepted form of English. This accent, along with Standard English (SP), is closely associated

with the language used by the middle and upper classes of English society and is also referred to as Queen's English or BBC English due to its historical associations [3]. Speakers of Standard English in the south of England tend to use contracted negatives of the type: *I haven't got it* or *She won't go*. In most grammatical descriptions of Standard English, it is stated that the indirect object precedes the direct object. For example, *She gave the man a book* or *She gave him it.* [3] In the south of England, the forms with to seem to be the most common, particularly where the direct object is a pronoun like *him, her, it, or them*. However, in the educated speech of people from the north of England, other structures are also possible, as demonstrated in the following: *She gave it him* – is very common indeed, and is also quite acceptable to many southern speakers [1]. Standard English typically uses the third-person singular pronouns "he," "she," and "it" with the corresponding verb form ending in "-s". *He sings* and *She dances.*

Cockney English is a well-known British dialect originating from East London. It is a distinct way of speaking that is associated with working-class Londoners. Unfortunately, Cockney English has been stigmatized in Britain and is often viewed as inferior by many. What is special about this dialect? Cockney speakers may drop the initial /h/ sound in words, especially in words like "*house*" and "*hat.*" *"Ow's your 'ealth?"* instead of *"How's your health?"* Cockney speakers often replace the /th/ sound with an /f/ or /v/ sound, particularly in words like "*think*" and "*that.*" Cockney English frequently uses a glottal stop (replacing the /t/ sound with a closing of the glottis) in place of the /t/ sound in the middle or end of words. Cockney speakers often use rhyming slang, where a word or phrase is replaced with a rhyming word or phrase, though the rhyme itself is often omitted in usage, making it cryptic to outsiders. They use *"Adam and Eve to"* for the word *"believe"*. Then we have the sentence "*Would you Adam 'n' Eve it?*" Additionally, Cockney English may feature unique vocabulary not commonly used in Standard English. "*Mate*" is used to refer to a friend, "*blinding*" to express approval, or "*gobsmacked*" to convey being astonished [3].

Estuary English is commonly described as a blend of Received Pronunciation (RP) and working-class London speech, commonly known as "Cockney". It serves as a middle ground or "neutral" dialect, allowing individuals from lower-class backgrounds to sound more socially elevated and those from higher-class backgrounds to sound more down-to-earth. This linguistic fusion reflects the societal trend of leveling social distinctions in the UK. However, when individuals from privileged backgrounds adopt Estuary English, they can face criticism, as seen in the negative reactions from the British media towards politicians like Ed Miliband and former Prime Minister Tony Blair, as well as certain members of the royal family, who have been observed using such forms [3].

Estuary English speakers often replace the dental fricatives /th/ (/θ/ and /ð/) with the dental fricative /f/ or /v/, similar to some varieties of Cockney. L-vocalization refers to the phenomenon where the pronunciation of the /l/ sound in certain positions resembles more of a /w/ sound. For instance, words like "*milk bottle*" may sound closer to "*miwk bottoo*". H-dropping which is to omit [h], so that hand or heart becomes [ænd] or [a:t]. If we talk about T-glottalization: the replacement of the /t/ sound with a glottal stop, particularly in intervocalic or syllable-final positions, is a feature shared with Cockney. It comes to use a glottal stop [ʔ] (a catch in the throat) instead of a /t/ sound in certain positions, as in take it off [teik iʔ ɑf], quite nice [kwaiʔ nais][3].

Overall, Estuary English occupies a linguistic middle ground between RP and Cockney, blending elements of both while also exhibiting its own unique features. It is characterized by its adaptability and ability to reflect social and cultural shifts in contemporary British society.

Welsh English is spoken by people in Wales and is influenced by the Welsh language, Celtic languages, and English dialects from neighboring regions. It may exhibit features such as a sing-song intonation, lenition of consonants, and Welsh loanwords. Welsh English varies across different regions of Wales and may coexist with Welsh-speaking communities [3].

Certain consonant sounds in Welsh English may differ from those in other varieties of English. Some germination between vowels is often encountered, e.g. *money* is pronounced [ˈmɜ.nːiː]. In northern varieties influenced by Welsh, *pens*, and *pence* merge into /pɛns/ and *chin* and *gin* into /dʒɪn/. Intonation in Welsh English is very much influenced by the Welsh language. Welsh English incorporates words directly borrowed from the Welsh language, particularly for place names, geographical features, and cultural concepts. For example, carreg = stone; clennig = a gift of money; eisteddfod (plural eisteddfodau) = a cultural festival; glister = a drink of milk and water [3].

Scottish English encompasses various dialects spoken in Scotland, influenced by Scots Gaelic, Old English, and Norse languages.

It includes features such as rolled /r/ sounds, distinctive vocabulary, and differences in pronunciation compared to other varieties of English. Scottish English dialects can vary significantly depending on geographic location and social factors.

As far as grammar is concerned, different types of Scottish English show different degrees of grammatical deviation from southern British English. The modal will tends to stand for both *shall* and *may*. Passive is often formed with get, e.g. *I got told off*. It is often used for compulsion, e.g. *you've got to speak to her.* The abbreviation form *am+not* is *amn't* as in *Amn't I right* [3].

One of the phonologic features of the dialects is the pronunciation of the sound /r/ in the syllable coda (the end of the syllable), which makes the accent rhotic. The dialect lacks vowel length contrast that is why *full* [ful] and *fool* [fu:l] are homophones. The retention of the /wh/ sound in words like *which* or *whale*.

Irish English is spoken in Ireland and is influenced by the Irish language as well as English dialects from neighboring regions.
It features distinct pronunciation patterns, vocabulary choices, and grammatical structures. Irish English dialects can vary between different regions of Ireland and may also be influenced by socio-economic factors.

Irish English incorporates vocabulary from Irish Gaelic, as well as unique slang and colloquial expressions. Some words and phrases are specific to Irish culture and may not be widely understood outside of Ireland. For example, [æ] is usually realized as [a] (like Hungarian á) or words like face and goat contain monophthongs. Also, there is a single reduced vowel, the schwa, therefore *abbot–rabbit–grab it* rhyme, *starlet = starlit* ['sta:rlət], addition=edition, -ing is pronounced [ən], so *lying = lion* [1].

The United Kingdom is home to a rich tapestry of dialects, each with its own unique phonological, lexical, and grammatical features. The diversity of UK dialects reflects the country's rich linguistic history and cultural heritage. They continue to play a vital role in shaping local identity and cultural expression throughout the UK.

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PROTECTION AGAINST LINGUISTIC DISCRIMINATION IN THE EUROPEAN COURT OF HUMAN RIGHTS

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Linguistic discrimination, or unequal treatment based on language, violates human rights principles upheld by the Council of Europe and protected under the European Convention of Human Rights (ECHR). This type of discrimination infringes human dignity,

denies opportunities for advancement, and deprives people of participating fully in society.

The key case law of the European Court of Human Rights (ECHR) is the case "Relating to certain aspects of the laws on the use of languages in education in Belgium v. Belgium (1968)" . The Court recognized the rules restricting the admission of French-speaking children to Dutch-medium schools as discriminatory and violation of the right to education under Article 2 of Protocol No. 1.

The Court has also considered language discrimination in relation to requirements to use regional languages in official documents for citizens of Slavic countries (Bulgakov v. Ukraine, 2004) and in relation to Latvian-speaking persons born outside Latvia who intend to obtain citizenship (Petropavlovskis v. Latvia, 2015). The ECtHR analyzes the issue through the prism of discrimination even if it does not find violations in such cases.

The ECtHR evolves interpretation of ECHR provisions related to discrimination, education, private life, and minority identity; enables addressing claims of unequal treatment based on language despite the fact that there is no explicit reference to "linguistic discrimination". Therefore, this term can be defined as unequal or unfair treatment to a person on the basis of his/her language, linguistic peculiarities, race, ethnicity, national origin, etc.

It can be concluded that tackling linguistic discrimination requires comprehensive anti-discrimination laws and policies at national and international levels. Nevertheless, the European Court of Human Rights jurisprudence continues to be instrumental in shaping European human rights standards regarding languages.

ICTs IN TEACHING AND LEARNING ENGLISH

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Nowadays, English is becoming more and more popular in the world. To make the process of developing English skills easier, more productive, more creative and more interactive the teachers of the department of Foreign Languages and Linguodidactics and students of the faculty of Electronics and Information Technologies of Sumy

State University use in English classes a wide range of effective Information and Communication Technologies (ICTs). Here is the list of the most effective ones:

1. British Council Educational Platform. It includes grammar, and vocabulary sections, and suggests tasks for different levels. This site also has Business English section and students can improve their listening, reading, writing, speaking skills for the future jobs and study business topics in order to work more effectively.

2. Pearson Educational Platform. This website has organized their own language learning community through social channels, blogs, webinars, interactive books. All these opportunities provide not only benefits, but also motivation and satisfaction. Moreover, the language courses, tools of assessment and certifications are linked together by one simple global scale.

3. The New York Times Learning Network. This site has been helping people learn English since 1998. This digital resource has sections such as Quizzes & Vocabulary, Contents & Challenges, Accessible Activities and short videos on YouTube channel.

4. Cambridge Dictionary. Translation, pronunciation, synonyms, antonyms and examples of thousands of words can be found here.

5. Quizlet. This phone application helps students learn through flashcards and game-based quizzes.

In conclusion, Information and Communication Technologies rapidly and greatly transform teaching and learning processes and as a result students get better language outcomes.

BRIDGING BORDERS: THE ROLE OF ENGLISH LANGUAGE IN INTERNATIONAL ACADEMIC PARTNERSHIP

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Nowadays, foreign language mastering has emerged as a fundamental element in the smooth integration of young individuals into the global landscape. Acquiring proficiency in foreign languages unlocks a great amount of opportunities for

fostering effective international dialogue and deeper mutual understanding.

Sumy State University presents a wide range of initiatives for international collaboration of students such as exchange programs, grants, internships and other issues. Since March 2022, the institution-to-institution collaboration model has been organized between Sumy State University and the University of Liverpool under the "Twinning Initiative" project [1], aimed at supporting Ukrainian universities. Throughout this period, students are actively involved in scholarly inquiry, grant programs, academic mobility and professional cooperation. Also, universities have access to media facilities, libraries and other academic resources of each other.

The latest project implemented between two universities was the "UK-Ukraine Research Twinning in Digitalization and Digital Transformation" [2], which included a six-week scientific internship in Great Britain for ten young researchers. This collaboration involved delving into common research topics, sharing insights, and accessing scholarly resources. Moreover, participants had the opportunity to take part in seminars, lectures, and conferences. A notable seminar titled "Visual Communication" highlighted the role of visual communication within research, explaining foundational principles and varied visual formats. There were also sessions focused on "Career Decision Making", describing structures and opportunities which help to reflect on career decision-making processes. An important meeting was the seminar titled "Articulating your Research Skills", which suggested information on how to properly develop skills and transmit them. Additionally, there was a focus on "Developing Research Collaborations", which presented a lot of conversation models how to build trustworthy and long-lasting scientific collaborations. Another significant session was "Powerful Posters", which was focused on how to create a prize-winning poster and maximize your conference experience. Therefore, these diverse activities contributed to the participants' personal and professional development and enriched their knowledge in relevant areas.

Joint supervision of doctoral theses has also been implemented as a part of the collaboration between Sumy State

University and the University of Liverpool. Co-supervision enables PhD students to benefit from the expertise and support of representatives from both academic institutions, thereby broadening research perspectives. This long-term cooperation aims to enhance scientific discourse and elevate the international reputation of research efforts.

All the aforementioned collaborative events were conducted exclusively in English. This underscores the importance of language in international activities, where English serves as the lingua franca. Language competence becomes a key factor for successful knowledge exchange, partnership formation, and implementation of joint projects. Such skills enable students and researchers to communicate effectively with international partners, understand, and adapt to various cultural and scientific contexts. Thus, language proficiency, particularly in English, plays an important role in supporting and developing international cooperation and scientific research.

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AI AS A MASTERMIND OF TEACHING ENGLISH

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AI represents a transformative shift in education. By leveraging advanced algorithms, AI can tailor learning experiences to individual students, addressing their unique needs and pace.

It provides instant feedback on grammar, vocabulary, and not only, helping learners on the spot. AI-powered platforms offer a vast

array of resources, including interactive exercises, games, and simulated conversations. This technology can analyze student performance to identify areas for improvement, ensuring a more focused and effective learning process. Additionally, AI tutors are available 24/7, offering flexibility that traditional classrooms cannot match. They can also bridge language gaps by providing multilingual support. AI enhances engagement through personalized content that keeps learners motivated.

Its capabilities to learn, adapt, and make decisions surpass human capacity, so let’s have a look at some differences between human’s brain and artificial intelligence. Firstly, the learning styles: our brains learn from experiences and mistakes, AI learns from data. Secondly, creative sparks: we can come up with new ideas, write stories, or paint pictures, AI can't do that yet, but it can be a great partner here. Thirdly, feelings: we have emotions, AI doesn't feel emotions, but it can learn to recognize them. Next, thinking outside the box: we can solve problems in new ways, like using a shoe as a hammer, AI usually follows the rules it's given, but it's getting better at thinking creatively too. And finally, development: our brains keep learning and changing and AI is constantly improving as well.

It also supports teachers by automating administrative tasks, allowing them to focus more on the teaching process. Ultimately, AI is redefining how English is taught, making it more accessible, efficient, and enjoyable for learners worldwide.

SECTION 2 ACHIEVEMENTS IN THE FIELD OF HIGH TECHNOLOGIES TO IMPROVE LIFE IN THE MODERN WORLD

FUTURE PROSPECTS OF 3D PRINTED ELECTRONICS

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The convergence of additive manufacturing [AM], commonly known as 3D printing, with electronics manufacturing presents a transformative opportunity for the electronics industry. This emerging field, known as 3D printed electronics [3D PE], signifies a departure from traditional planar electronics manufacturing towards a paradigm of 3D design and rapid direct manufacturing, thereby enabling the creation of novel electronic devices with unparalleled functionality, improved performance characteristics, and enhanced design flexibility [1].

A particularly promising aspect of 3D PE is its potential to revolutionize device miniaturization and integration. Through the layer-by-layer deposition of functional electronic components directly onto a substrate, 3D PE facilitates the development of highly miniaturized and intricately designed circuits. Consequently, this advancement paves the way for the realization of microfluidic devices, wearable electronics, and integrated sensors with superior functionalities compared to their planar counterparts. Furthermore, 3D PE permits the seamless integration of various electronic components within a single print, thereby enabling the creation of highly complex and miniaturized systems [2].

The integration of various functionalities into a single printed structure, commonly referred to as heterogeneous integration, is another promising direction in 3D PE. This approach involves the simultaneous printing of electronic components along with other functional materials such as sensors, actuators and microfluidic channels. Unlike traditional methods that are limited to flat surfaces, 3D PE enables the fabrication of electronics with complex geometries and functionality, allowing engineers to design electronic

devices that perfectly conform to product contours, thereby improving form factors and improving the user experience. For example, 3D-printed antennas [3] can be conformally printed on curved device surfaces, avoiding the need for bulky antenna designs.

In addition, 3D PE facilitates the development of customized and personalized electronics due to its inherent flexibility. This capability opens up possibilities for personalized medical devices, such as customized hearing aids [4] or prosthetic limbs with integrated sensors, as well as consumer electronics tailored to individual preferences. In addition, 3D PE can enable on-demand electronics manufacturing, facilitating rapid prototyping and on-site fabrication of customized devices.

The field of materials science plays a pivotal role in shaping the future of 3D PE. The development of novel printable inks and materials with tailored properties is imperative for unleashing the full potential of this technology. Researchers are actively exploring conductive inks based on various materials, including nanoparticles, polymers, and even biomaterials [5]. These advancements will expand the repertoire of printable electronic components, such as capacitors, resistors, and transistors, while enhancing their performance characteristics. Additionally, the development of multifunctional materials combining conductive, sensing, and structural properties heralds the advent of truly integrated and intelligent electronic devices.

Scalability and cost-effectiveness are critical considerations for the widespread adoption of 3D PE. While the technology holds immense promise, current printing processes tend to be slow and expensive, constraining its application for mass production. Advancements in printing techniques, such as high-speed multi-material printing, are essential to bridge the gap between rapid prototyping and large-scale manufacturing. Furthermore, the development of cost-effective printable materials and streamlined printing processes is pivotal for rendering 3D PE commercially viable.

The environmental impact of electronics manufacturing is a growing concern, and 3D PE offers a sustainable and

environmentally friendly solution. This technology inherently reduces material waste by adopting an additive manufacturing approach. Moreover, the development of biocompatible and biodegradable materials for 3D PE holds promise for creating environmentally friendly and disposable electronics.

Looking ahead, the future of 3D PE hinges on several key research and development areas. One critical focus is on the development of high-resolution printing techniques [6] that enable the fabrication of electronics with finer features and improved performance. Additionally, research on multi-material printing processes will be pivotal for creating truly integrated and multifunctional electronic devices. Furthermore, advancements in material science are imperative to develop printable materials with properties that match or surpass those of conventional electronic components.

In conclusion, 3D PE offers a transformative vision of the future of electronics. This technology affords unparalleled design freedom, facilitates miniaturization and integration, and enables the creation of customized and personalized electronics in record time. The development of new materials, enhancements in printing technologies, and a focus on scalability and sustainability are crucial factors in realizing the full potential of 3D PE. As a research and development progress, 3D PE stands poised to revolutionize sectors ranging from consumer electronics and wearable technology to medical devices and environmental monitoring systems.

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FUTURE DEVELOPMENTS IN IT

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Future developments in IT opens the door to a world of possibilities and advancements that promise to shape the way we live, work, and connect. As we stand on the brink of technological evolution, the trajectory of IT seems poised to redefine our future in profound ways.

One of the most anticipated developments is the rise of artificial intelligence (AI) and machine learning. These cutting-edge technologies are set to revolutionize how computers process information, make decisions, and adapt to changing circumstances. The potential applications are vast, from enhancing data analysis and automation to powering innovative solutions in healthcare, finance, and beyond.

In the realm of IT development, software engineers, developers, and programmers collaborate to design and build solutions that address a myriad of challenges. From crafting user-friendly applications to developing complex algorithms, the IT development process is a fusion of creativity and precision.

Agile methodologies have become a cornerstone in IT development, promoting iterative and collaborative approaches. This

allows teams to adapt swiftly to changing requirements, ensuring the end product aligns with user needs and market demands.

The advent of cloud computing has revolutionized how IT development is approached. Cloud platforms provide scalable infrastructure, fostering innovation by reducing development costs and accelerating time-to-market for products and services.

Security is a paramount concern in IT development, with the constant evolution of cyber threats. Developers must implement robust measures to safeguard sensitive data, ensuring the integrity and confidentiality of digital systems.

The rise of DevOps practices has further streamlined IT development processes by fostering seamless collaboration between development and operations teams. Continuous integration and continuous delivery (CI/CD) pipelines enable faster and more reliable software releases.

Open-source development has gained prominence, promoting collaboration and knowledge sharing across the global developer community. This approach accelerates innovation, as developers build upon existing frameworks and contribute to shared repositories.

The Internet of Things (IoT) is another exciting frontier in IT. With the proliferation of interconnected devices, everyday objects are becoming smarter and more responsive. Homes, cities, and industries are integrating IoT to create intelligent systems that optimize efficiency, reduce waste, and improve overall quality of life.

The future of IT also holds the promise of quantum computing. Unlike traditional computers that rely on bits, quantum computers leverage quantum bits or qubits, allowing for exponentially faster processing of complex calculations. This breakthrough has implications for solving problems in cryptography, optimization, and scientific research that were once deemed insurmountable.

Blockchain technology, initially associated with cryptocurrencies, is evolving beyond its roots. The decentralized and secure nature of blockchain has the potential to transform various

industries, including finance, supply chain, and healthcare, by providing transparent and tamper-proof record-keeping.

Cybersecurity will continue to be a paramount concern as IT advances. As technology becomes more integral to our daily lives, safeguarding digital assets and personal information will be critical. Innovations in encryption, biometrics, and secure communication protocols will be essential to stay ahead of emerging threats.

The convergence of technologies, often referred to as Industry 4.0, is a trend that will define the future IT landscape. This includes the integration of AI, IoT, big data, and cloud computing to create intelligent and interconnected systems that drive innovation across sectors.

In conclusion, the future developments in IT hold immense potential to reshape our world. Embracing these advancements responsibly, with a focus on ethical considerations and sustainability, will be crucial as we navigate the exciting journey into the digital era.

ELECTROSPINNING: A RAPIDLY DEVELOPING METHOD OF MANUFACTURING MEMBRANES FOR BIOMEDICAL APPLICATIONS

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Modern strategies for bone and tissue regeneration impose high demands on membrane usage during surgical interventions. These membranes serve crucial functions in the human body and are subjects of growing scientific interest [1].

Fibers in the form of continuous threads or elongated objects are very common in nature; for example, spiders rely on webs or fibers to catch prey. These fibers, intertwined with each other, form membranes - nothing more than discrete, thin surfaces that mitigate the penetration of chemicals that come into contact with them.

One of the most relevant approaches to membrane manufacturing today is the electrospinning method. While electrospinning was discovered in the last century, it gained particular popularity at the beginning of the 21st century when

researchers worldwide began showing interest in nanoscale properties and technologies. The term "electrospinning" was introduced in 1994, whereas before that, the term "electrostatic spinning" was used. Academic and industrial research on nanofibers is an area of intense global interest in both basic and applied science [3].

The growing interest in this method is propelled by the possibility of obtaining materials with superior properties using a wide range of polymers, thus expanding the application of membranes. Membranes obtained from various materials by electrospinning have the potential for use in various biomedical applications, such as hemodialysis, wound healing, bioseparation, and the formation of electrically conductive tissue (such as nervous tissue), among others. In addition to these applications, they can be effectively utilized for waste/wastewater treatment, medical procedures, drug delivery, air filtration, and energy storage [4].

Despite certain limitations such as low nanofiber production rates, low product yields, and relatively high costs, the electrospinning technique is distinguished by its simplicity, versatility, cost-effectiveness, high productivity, and importance in industrial and biomedical research, all without requiring high temperature or pressure.

Thus, the electrospinning method, due to its numerous advantages over other methods of forming nanofibers, has recently become increasingly popular in the manufacture of membranes for use in various fields. This has posed challenges for scientists to overcome the drawbacks of this process and optimize the operation of the electrospinning device on an industrial scale. For example, the use of volatile solvents in the polymer solution leads to health and safety issues, which also limit the scalability of the process to an industrial level [5].

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HOW NOT TO BE AFRAID OF ARTIFICIAL INTELLIGENCE AND MAKE IT WORK FOR YOU

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The sphere of artificial intelligence (AI) is experiencing rapid growth over the last few years. The charts show that in the last four years, the market size of artificial intelligence products has tripled. By the end of this year, it is estimated to reach almost three hundred million dollars. Furthermore, by the end of the year 2030, its market size is expected to be close to two trillion dollars [1, 2]. Some people believe that these technologies should be prohibited or highly regulated. The main problem is that artificial intelligence can replicate a lot of actions of a real human. Moreover, it is not only able to complete the same tasks, but it is also able to do it much faster and it doesn't need time to rest. These facts do mean that if artificial intelligence continues to develop, some jobs will be completely replaced by it.

Of course, no one wants to lose their job, especially to be replaced by something so new to our understanding. I believe that this is not the first time when people had to face such a dilemma. It is natural for us to seek ways of making our lives easier. A few

centuries ago, some jobs were replaced by a mechanical calculator, and just half a century ago the first personal computer was introduced to the public. In the beginning, people were skeptic about those inventions. But eventually, they embraced the innovation and made their work productivity much higher. At the moment, we face the same dilemma. We must accept this fact and start looking for new opportunities. But now, when AI has only been publicly available for just a few years, everyone needs to learn how to work with it.

Given the potential of artificial intelligence, many countries and wealthy individuals are investing in startups related to this field. It was estimated that in 2023 there were around 130 billion dollars invested in different startups around the world. Approximately one-third of these funds were directed into the United States and a little less than one-third to China. But if we take a look at the number of AI startups by the regions of the world, North America and Europe currently contain more than two-thirds of all AI startups [2]. In addition, the total amount of funds invested in United States AI companies from 2013 up to the end of 2023 equals almost 250 billion dollars. This number is two times higher than the same investment figures for China and European countries combined [3].

With all the statistics mentioned, we can see that the artificial intelligence market is heavily oriented on the United States and Europe. That is why the language that is used in most AI products is English. Of course, the most popular ones like ChatGPT or Microsoft Copilot can both understand and answer in many languages. But as my experience shows, grammar mistakes in answers and misunderstandings are still common.

AI can process all the information that you give to it. But it is specifically focused on special keywords that are called prompts. These keywords represent a short way of telling some information to AI. If you want to get something certain as a result of your request, then you need to state the prompt clearly [4]. For example, it is much better to ask AI to build a histogram if you need one rather than just ask it to analyze the data. This is why to use artificial intelligence at full power you need to have a decent level of English. Moreover, it is

important to have an extensive vocabulary on the topic that you want to work on.

To sum up, I believe that artificial intelligence stands for our future. Every person needs to start learning how to work with it. Maybe, in the next decades, artificial intelligence will become much easier to use. But right now, to be more or less productive, it still requires an understanding of your actions and a good level of English.

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PROSPECTS FOR THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN THE CREATION OF A SYSTEM FOR DIAGNOSING OF TECHNICAL CONDITION OF MACHINES

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The idea of creating "intelligent" systems for diagnosing the technical condition of machines arose long before the technical possibilities to implement it appeared. Back at the beginning of the era of total computerization in the 80s and 90s of the last century, when personal computers were very rare, and large mainframe computers were only available at enterprises and some technical

universities, there were active discussions on this topic and attempts to build their own "expert systems".

The term "expert system" does not have a single interpretation, but in our case, this term will be identified with software that models the decisions made by experts in a particular field and uses these models to make expert decisions in this field without the involvement of a human expert. The main requirement for an expert system is that the system should not only provide a list of decisions made by it, but should also argue on the basis of which factors or parameters these decisions were made. At that time, everyone clearly understood how expert systems should work, many approaches and algorithms were formed, many simple programs were created in different programming languages, but unfortunately, technical capabilities and technical equipment did not allow creating a system that could at least partially replace a human expert. One of the main problems that enthusiasts of that time faced when building an expert system was the creation of a "knowledge base" about the main malfunctions of the selected types of machines and their diagnostic signs. When creating the "knowledge base", it was necessary to quickly process huge amounts of data for classification, indexing and searching, and this became, in fact, a problem that could not be solved at that time.

Let's go back to the present: every child has a device with power and speed hundreds of times greater than that of mainframe computers; shielded cables are no longer needed to transmit signals over a distance, and you do not need to go to the production site to get information from technical machines; many enterprises already have many IoT devices, and information is collected in large centralized data centers - Industry 4.0 is already working; every student has the opportunity to ask the artificial intelligence how to solve a particular problem and get a detailed answer; Big Data, Machine Learning and much more.

Considering all of the above, we can conclude that it is necessary to return to unresolved tasks and, finally, to realize the dreams of many enthusiasts - to build a diagnostic expert system using artificial intelligence technologies.

ADVANCES IN HIGH TECHNOLOGY AND HOW THEY IMPROVE LIFE IN MODERN WORLD

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The modern world is developing rapidly, and high technologies play an increasingly significant role in this process. They penetrate into all areas of a person's life, making it more comfortable, safe, effective and interesting. In this report, we will look at some of the most recent advances in this field and analyze their impact on various aspects of human life.

Artificial Intelligence (AI) is one of the most dynamically developing fields of high technology. Thanks to AI, new opportunities appear for automating routine tasks, decision-making, data analysis, pattern recognition, and many others. AI is already being used in medicine, finance, transportation, manufacturing, service, and many other industries, specifically in the following areas:

- Development of disease diagnosis systems based on artificial intelligence
- Creation of autonomous vehicles
- Using chatbots to provide customer support
- Development of personalized recommender systems

Internet of Things (IoT) is a concept that involves connecting physical devices equipped with sensors and microprocessors to the Internet. This allows you to collect data about the status and operation of these devices, as well as manage them remotely. IoT is used in smart homes, industrial systems, environmental monitoring, security systems, and many other areas, for example:

- smart homes, where lighting, heating, household appliances and other systems are controlled via the Internet
- equipment condition monitoring systems at industrial enterprises
- sensor networks for air and water quality monitoring
- security systems using motion sensors and cameras

Virtual and augmented reality (VR/AR) are technologies that create artificial virtual or augmented real environments. VR allows

you to fully immerse yourself in the virtual world, and AR allows you to superimpose virtual objects in the real world. These technologies are used in entertainment, education, medicine, industry, and other fields, some of which are listed below:

- VR games that allow players to feel like they are inside a virtual world
- AR applications for learning that allow you to visualize complex concepts
- Surgical simulators that allow surgeons to practice in a virtual environment
- AR systems for navigation and equipment maintenance

3D printing is a technology that allows you to create three-dimensional objects from digital models. This technology is used in prototyping, manufacturing, medicine, construction, and other fields, such as:

- production of prototypes of new products
- printing of parts for industrial devices
- creation of implants for surgical operations
- printing of houses made of concrete or plastic

To sum up, achievements in the field of high technology have a significant impact on human life. They make our lives more comfortable, safe, efficient, and interesting. In this report, we have considered only some of the most relevant areas of high technology development. In the future, we can expect even more impressive achievements that will change the world for the better.

APPLE VISION PRO: REVOLUTION IN EDUCATION

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Nowadays company Apple offers a wide range of innovative devices, which can be effectively used in education. These technologies are paving the way for more immersive, personalized, and digitized teaching and learning process. One of such latest technological inventions is the Vision Pro Goggles. This device, with its unique mix of virtual reality (VR) and augmented reality (AR),

promises to bridge the gap between real and virtual world. It can greatly change the education. [1]

Vision Pro is the first spatial computer by Apple, which is put on your head and projects images directly into your eyes. You can control it using eye movements and gestures tracking technology. VR and AR revolutionize students' interaction with the digital world around them in learning environment. Here is a brief description of the key issues of usage of these technology in education:

1. Individualized learning process. Educational modules, visual and audio elements of Apple Vision Pro Googles can be adapted to the individual needs of each student, his/her level of understanding and learning speed. Students can gain experience working in virtual environments that simulate real-life scenarios. For example, medical students can perform virtual surgeries, while engineers can create and test virtual prototypes.

2. Development of communication skills. VR and AR technologies create international communication environment, in which students from all over the world can interact in virtual projects.[2]

3. Development of research skills. Students can analyse and classify information during scientific research using image recognition technology. They could use Apple Vision Pro to explore ancient civilizations in history classes. Additionally, the technology can be used to create interactive presentations. This could make history come alive, making it both engaging and informative at the same time.[3]

4. Positive learning motivation. Students can play interactive games in Math or English classes. For example, to understand math better, shapes, graphs, and equations can be presented virtually. If students complete English grammar tasks, they receive rewards, which increase their interest to the education process and stimulate learning activity.

5. Recognition of emotions. Apple Vision Pro technology can help teachers track students' emotional responses. Thanks to this, educators will be able to adjust their teaching methods and

approaches, support students if it is needed, and create a more positive learning environment.

On the whole, Vision Pro is an innovative device, which makes a significant step forward in the modern evolution of education. The Ministry of Education and Science of Ukraine should realize the potential of this technology and create proper conditions for its successful implementation in teaching and learning process. I hope that in the nearest future Ukrainian students can get access to individualized, creative, positive learning environment; develop their communicative and research skills through active participation in virtual conferences using spatial computers. Therefore, Vision Pro Googles is not just a technological marvel, but it is a beacon for the future education.[4]

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SECTION 3 INTERCULTURAL COMMUNICATION AS A TOOL OF MUTUAL UNDERSTANDING IN THE NATIONAL DIVERSITY OF THE MODERN WORLD, JOURNALISM AND MULTIMEDIA TECHNOLOGIES

STUDENT TELEVISION AS A TOOL OF LEARNING A FOREIGN LANGUAGE

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This paper considers the importance of the television format as a means of improving foreign language learning skills. This aspect of language learning is becoming increasingly relevant due to the development of modern technologies and the growing popularity of visual learning. The experience of using student television shows that visual and audio content contributes to better learning of a new language. Interactivity and the ability to view content at any time convenient for the student ensure active participation in the learning process. Moreover, student television allows learners to clearly demonstrate language situations and cultural features, which makes them easier to understand and memorize language patterns.

Prospects for the use of student television include the search for new formats and interactive methods that would engage students more effectively in language learning. Some of the issues related to the role of the multimedia environment of student television in enriching the learners' linguistic experience are considered below.

1. *The role of student television in the formation of learners' language competence and cultural understanding.* By watching a variety of programs, videos and interviews, student television not only helps to improve language skills, but also provides access to knowledge about the cultural characteristics of the countries whose language is being studied. The use of student television promotes immersion in the language environment, providing an opportunity to learn the language in the context of real-life situations and experience cultural differences.

2. *Innovative methods of using student television to improve learners' language competence.* These are focused on creating a dynamic and effective learning environment. These methods include the use of interactive programs, multimedia resources, and video quizzes. Through the use of such innovations, students can actively interact with the content, perceive information in different formats, and get the opportunity to practice the language using real-life scenarios. This helps to deepen language understanding and develop students' language skills.

3. *Increasing motivation to learn a foreign language with the help of student television.* It involves creating a stimulating and interesting environment for students to actively engage in language learning through visual, audio and cinematic means. Student television opens wide opportunities for creating a variety of content that attracts attention and promotes involvement in the learning process.

In general, analysis of innovative approaches to the use of student television in teaching foreign languages has proved that this is one of the modern and promising technologies that contributes to the improvement of the language learning process. Regarding further investigation, this analysis should include research on this tool's various aspects, such as pedagogical and psychological foundation, technological innovations, as well as effective methods of using multimedia resources.

ANALYTICAL JOURNALISM GENRES: THEORETICAL FOUNDATIONS OF THE WORK OF A JOURNALIST

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Professional and high-quality practical activity cannot function stably without clearly expressed and formulated theoretical principles, which are thoroughly mastered by the specialist. They create the basis for a particular profession, describe the algorithm of actions, classify professional terms and concepts and form close relationships between them. In order to perform his work at a high

level, a specialist (a journalist in particular) must work on studying the theoretical components of his future activities to create a quality product that would meet all the norms generally accepted in the professional community.

Working with analytical genres of journalism, unlike informational ones, requires a special approach to work, in particular, the use of an analytical level of reflection of reality. The analytical level of reflection involves penetrating the essence of the phenomenon, revealing the hidden interrelationships of the subject matter. To do this, the author may need different methods of collecting information and working with it.

Traditionally, methods of collection of information (i.e., studies of the objective reality) are divided into three types: observation, work with documents, and interviews. In turn, they can be categorized as communicative (those that involve communication with someone) and non-communicative (when communication is not necessary). The first type includes interviews, conversations, various types of surveys, requests for information, and participation in media events. The second type includes personal experience, observation, action or experiment, work with documents or news agencies and other media, press services, measurements and scientific data.

To create an analytical report, the author needs to work with the actual analysis, decomposition and detailed study of information. Analysis in journalism is the identification of conditions, causes and trends in the development of events, situations and processes; study of the interests, motives, intentions and actions; assessment of the significance and forecast of their further development and possible consequences; determination the degree of validity of certain views, ideas, concepts. There are specific analytical methods: observation, historical method, analysis and synthesis, method of analogy, hypothesis, percentage method, comparison, generalization, pattern search method, classification method, system method and idealization method.

Commentary as an analytical genre explains and assesses the situation, gives forecasts of further developments and their consequences, conveys a certain idea to the reader, justifies a position or proposes a certain program of action. It can be either a

single piece or a part of a collection. In the process of expressing his opinion, the commentator answers the following questions: "What (who) really is?", "Under what circumstances?", "Why?", "Who benefits?", "What contradictions exist?", "How is the situation developing and will develop?", "What to do?", "What is the best?". To explain one fact, the expert may refer to other information sources or the background of the issue, past events or potential future.

The commentary may contain a conflict. In this case, a journalist should present the statements of controversy to maintain objectivity and impartiality. In addition, journalistic work involves the selection of a person who is competent in a particular issue, then a journalist has to contact this person and ask accurate and interesting questions and finally conduct a dialogue in the right direction. The adaptation of the respondent's language to the audience is also important. In the process of thinking, the author of a commentary can move from one fact to a generalization or a forecast.

An interview as one of the forms of journalistic genres is a dialogue material based on the question-and-answer principle. In the finished publication, the co-author journalist fully conveys the information received from the respondent. In order to get a successful interview, a media professional must be able to ask interesting, non-standard, clear and meaningful questions. This is especially important for an analytical interview, the evaluative component of which appears in the text only through the questions the interviewee receives. An informational interview carries only a message about a fact and answers the questions "Who?", "What?", "Where?" and "When?". An analytical interview also contains the analysis of facts, answering the questions "Why?", "How?", "What does it mean?", etc.

An analytical review is one of the genres of journalism that examines some homogeneous phenomena that have occurred over a certain period of time. Its main goal is to find out the main trends in the development of a phenomenon or process and to predict their future progress. The review provides a clear and detailed demonstration of the nature of phenomena and events, summarizing the development of a particular sphere of society.

Correspondence is an analytical genre based on the analysis of a local phenomenon and a series of facts related to each other. To get the information for the analysis is not a problem but phenomena need to be addressed immediately, and it is distinguished by the particular urgency and relevance of the topic presented. Correspondence is a genre which lies on the borderline between informational and analytical genres, with features of both but still more inclined to analytical genre. In addition to interpretation, it also provides readers with news.

The reason for writing a correspondence can be a certain news event, the circumstances of which will be explained in the text of the publication with the help of facts that are selected on the topic.

Correspondence is conventionally divided into four types namely informational, analytical, staged and reflective.

An article is an analytical genre that contains a conclusion or forecast as the main message, which the author formulates on the basis of a significant number of facts. Unlike correspondence, the topic of an article describes the existing problem, and the material is based not on a single fact but on a specific thesis that the author develops in the text and supports with arguments. An article is a thorough study that focuses on a single issue. It is interpreted by the author throughout the text. The purpose of the article is to determine the significance (social, political, cultural, etc.) of a certain event and to understand what should be done to support or eliminate its consequences. This genre is considered the most difficult.

Articles can be classified as advanced, propaganda, scientific or popular science, and problematic. Also such types of articles as general research, practical, analytical and polemical are relevant.

SOCIAL CAUSES OF LONELINESS IN ADOLESCENTS

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The psychology of communication in adolescence is built on the basis of a contradictory combination of two needs: separation and the need to belong, to be included in some group, community. Separation is most often manifested in the desire to be freed from the

control of elders. It is also inherent in relationships with peers. There is a growing need not only for social, but also for spatial autonomy, the inviolability of one's personal space. The process of communication does not always go smoothly, in the desired direction - because the interaction involves people who differ in many characteristics (goals, motives, needs, expectations, life experience, ways of interpreting what is happening, emotionality, interest in interaction, etc.).

Therefore, partial contradictions may arise. In any relationship, there are moments of crisis when you do not understand each other, when the relationship becomes so complicated that a conflict arises. The teenager understands that he has changed and his values are no longer the same as those of his friends. He has a different outlook, acquired new moral qualities. Of course, this is not the only reason for breaking social contacts with friends. There are many reasons. Misunderstandings can also arise due to a struggle for someone's attention or leadership. In addition, misunderstanding the actions and words of another person can cause conflict.

In conclusion, the emergence of loneliness among teenagers should be considered from different aspects. This problem is complex, therefore the approach to the study of its emergence must be appropriate. Certain individual features of the body and psyche, as well as events in the external and internal world, significantly affect the formation of loneliness in adolescents. The specificity of the organization and functioning of the body, low self-esteem, anxiety, computerization, lack or underdevelopment of communication skills - all these are determining factors of the feeling of isolation and loneliness in teenagers.

A FAMOUS AMERICAN FILM PRODUCER WALT DISNEY AND HIS MYSTERIES

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Walt Disney, the founder of the globally renowned Disney entertainment empire, faced early professional challenges due to lack

of art skills. Yet, despite initial setbacks, Disney showcased an ability to assemble creative teams and pursue ambitious visions. In 1920, he pioneered the first sound cartoon and later became the first filmmaker to produce color films. As time went on, in the 1950s his popularity increased even more once he secured a TV deal and launched Disneyland. However, beyond professional achievements and success, Disney's personal life and management style was full of controversial behavior and actions, including cooperation with the FBI, potentially driven by concerns over his unknown parentage. Evidence suggests that the mystery surrounding his birth remained unsolved even after investigations in Spain.

Walter Elias Disney Jr, officially born 1901 in Chicago (though possibly ten years earlier in the Spanish town of Mojacar) is arguably one of the greatest artists of all time. A legend in his lifetime, Disney shaped fairy tales into compelling new patterns, and while fighting off creditors, took immense financial risks as he innovated, experimented and went out on limbs, always refusing to cut corners for profit. The famous scrolled signature that became the company's logo had to be taught to him by an employee, and in 1920 he was laid off by a Kansas City advertising company with a comment on his 'singular lack of drawing ability'. But he had a gift for assembling creative teams and great ambition.

Despite not being a highly skilled graphic artist, Disney had a talent for assembling creative teams and had a vision for storytelling. He could act out entire movies in his head for his animators to see.

In 1920 he made the first sound cartoon (much influenced by his hero, Charlie Chaplin, who inspired Mickey Mouse). He was the first film-maker to see the appeal of Technicolor 16 and to move entirely into colour film. In 1934, at the height of the Depression, he increased his staff to 1,500 so he could embark on a seemingly foolhardy programme of feature-length cartoons. Disney achieved several milestones, including creating the first sound cartoon in 1920, being the first to use Technicolor and move into color film, and producing feature-length cartoons during the Depression, such as Snow White, Pinocchio, Fantasia, Dumbo, and Bambi.

In the mid-1950s, Disney struck a deal with the ABC television network, easing cash-flow problems with a weekly series. He also

conceived Disneyland, the world's first theme park, which opened to success despite a comically disastrous opening day. As other studios dithered, Disney struck a deal with the ABC television network for a weekly peak time series which for the first time eased his cash-flow problems. As its avuncular presenter, Disney's face became as famous as his name. At the same time he conceived Disneyland, and two years later, after a comically disastrous opening day, the turnstiles of the world's first theme park were happily clicking away.

Despite artistic and financial success, Disney's personal life was marked by dissatisfaction and sadness. He was described as a poor father and husband, a heavy smoker, and near alcoholic. His treatment of employees was criticized for low pay, stolen credits, and discriminatory practices.

Disney's association with the FBI, beginning in 1940, was linked to his fears about his parentage,
that began with his discovery that his birth had never been registered.

In return for Walt informing on his colleagues, J. Edgar Hoover reportedly helped trace Disney's origins to Isabella Zamora Ascensio in 19th-century Spain. The details of this discovery remain a mystery, with speculation that a 1967 visit aimed to destroy evidence rather than uncover information. J. Edgar Hoover apparently undertook to trace his origins. Three American teams visited her home town, Almeria, the first in 1940, the last in 1967 just after Walt's death. What they discovered is a mystery, though it seems likely that the 1967 party was bent on destroying evidence rather than finding anything out.

Walt Disney remains the greatest film producer of all times and his life mysteries continue to cause an insatiable curiosity in his admirors.

MEDICAL JUSTIFICATION WAYS OF INACTIVATION OF SANITARY POLUTANTS

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The search for effective ways to inactivate sanitary polutants is one of the most pressing medical problems, as it affects the quality of life and health of every person. Ukraine annually generates 380-400 thousand tons of waste from healthcare facilities, one third of which is hazardous. Since Ukraine's independence, about 30-40 billion tons of waste have been accumulated, which is disposed of at almost 7,000 landfills and dumpsites [4]. Sanitary polutants can be a source of infections. They contain residues of antibiotics, replication inhibitors and other 149 toxic drugs, as well as radioactive substances that have a very negative impact on public health and the environment. Sanitary polutants make up only 1-5% of the total waste, but they are generally considered the most dangerous. That is why this issue is relevant.

The management of extremely hazardous waste from healthcare facilities should consist of careful separation and disposal. Hazardous substances contained in the waste of health care facilities can cause some forms of cancer, AIDS, viral hepatitis, typhoid, meningitis, poisoning, injury and death. The World Health Organization classifies medical waste as hazardous and recommends the creation of special services for its processing [1].

Nowadays, there are quite a few ways to inactivate sanitary polutants in the world. But the most common methods are waste burning using incinerators, sterilization of waste with water vapor under high pressure and at temperatures above 100°C using special installations - autoclaves, chemical disinfection of medical waste, use of microwaves for waste disinfection, sterilization of waste by ionizing, radioactive or infrared irradiation.

Given the hazards of toxic emissions, incineration cannot be considered an absolutely environmentally safe method of hazardous medical waste disposal, and therefore should be used only as a

temporary method if there are no other possible options that are not related to incineration technologies. In addition, since health care facilities are usually located in densely populated areas of urbanized areas, the placement of incinerators on their territory is associated with certain difficulties. Thermal destruction of this category of sanitary polutants is advisable because they are made of a combined material: the elastic is one material, the mask itself is a very thin polymeric material, almost like non-woven fabric based on cellulose fibers, i.e. a heterogeneous material. Burning chlorine-containing materials produces dioxins and furans, which are human carcinogens. Therefore, chlorine-containing materials should not be incinerated in domestic or semi-domestic conditions. Only modern incinerators operating at temperatures of 850-1100°C meet international disposal standards for dioxin and furan emissions. There are few such incinerators in Ukraine. A fairly safe and cost-effective method is to treat sanitary polutants with steam under pressure (autoclaving). The chemical methods of neutralizing waste from healthcare facilities are dangerous for healthcare workers, costly, and have low disinfection efficiency. Pulse-vacuum technology is considered effective (a vacuum pump is used in an oxygen plant to create a difference in partial pressure; at low pressure, a small part of the water freezes, forming a water-ice mixture). But, unfortunately, pulse-vacuum technology is not yet used in Ukraine. In foreseeable future it will be implemented [2, 3].

To conclude everything up, healthcare facilities face a wide range of practical constraints in improving waste collection, treatment and storage. These include: a lack of a clear understanding of disposal standards; a lack of elevators for a safe movement of waste through the premises of a medical facility; a lack of specialized modern facilities for storing infectious waste; a lack of adequate ventilation in storage areas; a lack of low-temperature refrigerators for waste; and a limited budget for purchasing high-quality equipment for the disposal of residues. There are no specialized waste disposal services. Today in Ukraine, there are many difficulties in the field of rehabilitation treatment due to the lack of proper control, funding, and the resolution of many individual problems in practice. In fact, in most regions of Ukraine there are no specialized

facilities for handling such waste, so there is a risk that it will end up in conventional landfills and dumpsites with all the possible consequences. State budget expenditures for the purchase of containers and bags, vehicles for waste collection and temporary storage are insufficient. The very low fines for violating the rules of medical waste disposal do not solve the problem either, despite the fact that such facilities can be inspected by the authorized bodies every three years. Currently, the only way to overcome these problems is to implement the National Waste Management Strategy in Ukraine until 2030. The strategy defines the main directions of state regulation in the field of waste management in the coming decades, taking into account European approaches.

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THE EFFECTIVENESS OF MXene-BASED PHOTOTHERMAL THERAPIES FOR ANTIBACTERIAL APPLICATIONS

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Biomaterials technology has experienced notable advancements in recent years. The 2D nanostructures have been instrumental in driving this progress. These nanostructures,

characterized by their two-dimensional nature, offer unique properties that make them highly suitable for various biomedical applications. MXene has gained considerable attention and utility since its discovery in 2011 by Professor Yury Gogotsi and his team. MXene represents a family of 2D nanomaterials composed of transition metal carbides, nitrides, or carbonitrides. It is derived from the selective etching of aluminum from layered ternary carbides or nitrides, known as MAX phases. The growing attraction towards MXenes in the research community is indeed justified by their unique and advantageous properties. MXenes have better conduction, hydrophilicity, an elevated superficial area, better mechanical stability, and photothermal transformation effects for different applications. [1, 2]

In the last decade, numerous studies have focused on the application of the 2D materials for their antibacterial properties. Materials based on MXenes are considered reliable candidates for antibacterial applications due to their impressive photo-to-thermal conversion capacity and the potential for synergistic therapies derived from photothermal effects. 2D MXenes possess outstanding advantages in photo-to-thermal conversion due to their inherent large absorption surface, abundant distribution of free electrons, and strong absorption across a broad range of the solar spectrum. [3]

Therefore, it is crucial to provide a detailed description of the photothermal mechanisms of MXenes, as these mechanisms primarily account for their photo-induced antibacterial properties. Combined therapies employing lower light energy consumption demonstrate superior antibacterial potential and cost-effectiveness, achieving a desired synergistic effect. [4]

To understand the photothermal mechanisms of MXenes, numerous innovative studies have been conducted. The mechanism of photothermal therapy lies in materials like MXene absorbing light energy and converting it into thermal energy, which can affect bacteria or other microorganisms. The effectiveness of antimicrobial photothermal therapy is heavily influenced by various laser properties and the selection of photothermal agents (PTAs). Laser parameters such as intensity, frequency, and duration of irradiation

may be determined to achieve an optimal antimicrobial effect. Photothermal therapy, serving as a non-invasive anti-infection technique, offers advantages such as broad-spectrum antimicrobial properties, a brief treatment duration, and minimal systemic impact. [5]

The recent studies [6, 7] show that the high antibacterial efficiency of graphene oxide is due to damage to cell membranes due to the formation of reactive oxygen species and extremely sharp edges of graphene oxide. The heat generated by PTAs is affected by various laser light attributes, such as wavelength, power density (total energy per second delivered into a specific area), frequency of irradiation, laser range, and duration. Photothermal therapy in the near-infrared (NIR) spectral region has demonstrated considerably enhanced photothermal conversion efficiencies and increased target penetration, leading to improved antimicrobial effectiveness.

MXenes featuring sharp edges can readily attach to or infiltrate pathogenic cells. Simultaneously, the absorbed light irradiation energy significantly raises the temperature of MXenes nanosheets, inducing hyperthermia. This, in turn, promotes the ablation of bacterial structures, leading to the demise of pathogenic bacteria. Undoubtedly, photothermal therapy (PTT) has gained trust as an antibacterial treatment due to its independence from antibiotics and its capability for selective hyperthermal treatment. [8]

PTT denotes the process wherein a photothermic agent (PTA) transforms light into heat when exposed to a light source, resulting in the efficient eradication of pathogens thro PTT denotes the process wherein a photothermic agent (PTA) transforms light into heat when exposed to a light source, resulting in the efficient eradication of pathogens through thermal effects. These effects encompass the disruption of cell structures and the denaturation of macromolecules, including proteins and DNA. ugh thermal effects. These effects encompass the disruption of cell structures and the denaturation of macromolecules, including proteins and DNA. The typical light source for PTT is near-infrared light (NIR) due to the strong absorption of most biological chromophobe groups in the NIR region, allowing for heat generation through non-radiative

transition [9]. Additionally, compared to ultraviolet-visible light (UV-Vis), NIR light can penetrate tissues more deeply without causing damage [10]. The widely used wavelength for NIR light is 808 nm, chosen for its ability to penetrate to a depth of 10 mm [11].

Compared with traditional treatment methods, PTT is not prone to developing drug resistance and can treat microbial infections non-invasively and efficiently, which has made it an attractive therapy. The selection of PTAs is particularly important in PTT. Compared with inorganic PTAs with high biotoxicity, organic conjugated nanomaterials have high biocompatibility, easy modification, and good photothermal properties with great potential in PTT. However, for this potential to be fully harnessed, further studies are crucial to establish a clear protocol for antibacterial PTT.

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SYMPTOMS, TREATMENT AND PREVENTION OF GASTRITIS

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Gastritis is an inflammation of the protective lining of the stomach.

Acute gastritis involves sudden, severe inflammation. Chronic gastritis involves long-term inflammation that can last for years if it’s left untreated.

Erosive gastritis is a less common form of the condition. It typically doesn’t cause much inflammation, but it can lead to bleeding and ulcers in the lining of the stomach.

Symptoms

Gastritis doesn't cause noticeable symptoms in everyone. The most commonrusted source symptoms are: nausea, vomiting, a feeling of fullness in the upper abdomen, particularly after eating, indigestion.

If a patient has erosive gastritis, he might experience different symptoms, including black stools, vomiting blood or material that looks like coffee grounds.

Treatment

The treatment for gastritis depends on the cause of the condition.

If a patient has gastritis caused by nonsteroidal anti-inflammatory drugs (NSAIDs) or other medications, avoiding those drugs may be enough to relieve the symptoms. It is important to source the symptoms. If a patient thinks his prescription medication is causing gastritis, he has to talk to a prescriber before stopping or modifying the dosage.

Doctors routinely treat gastritis as a result of H. pylori with antibiotics in order to kill the bacteria.

In addition to antibiotics, several other types of medication are used to treat gastritis.

Medications called proton pump inhibitors work by blocking cells that create stomach acid. Common proton pump inhibitors include: omeprazole (Prilosec), lansoprazole (Prevacid), esomeprazole (Nexium).

However, long-term use of these medications, especially at high doses, can lead to an increased risk of spine, hip, and wrist fractures. It can also lead to increased risk of renal failure trusted source, dementia trusted source, and nutrient deficiencies.

Speak to a doctor before beginning one of these medications to create a treatment plan that is suitable for a certain patient.

Acid reducing medications and famotidine (Pepcid) as one example of suchmedication treduces the amount of acid a stomach produces.

By lowering the amount of acid that's released into the digestive tract, these medications relieve the pain of gastritis and allow a stomach lining to heal.

Antacids may be recommended to use for rapid relief of gastritis pain. These medications can neutralize the acid in the stomach. Some antacids may cause diarrhea or constipation, so a patient should talk to a doctor if he experiences any of these side effects.

Probiotics have been shown to help replenish digestive flora and heal gastric ulcers. However, there's no evidence that they have any impact on acid secretion.

There are currently no guidelines supporting the use of probiotics in ulcer management.

Causes

Weakness in your stomach lining allows digestive juices to damage and inflame it, causing gastritis. Having a thin or damaged stomach lining raises a risk for gastritis.

A gastrointestinal bacterial infection can also cause gastritis. The most common bacterial infection that causes it is H. pylori, a bacterium that infects the lining of the stomach. The infection is usually passed from person to person, but it can also be transmitted through contaminated food or water.

Certain conditions and activities may increase the risk for developing gastritis. Other risk factors include:

extreme alcohol consumption, routine use of NSAIDs like ibuprofen and aspirin, stress, cocaine use, age, because the stomach lining thins naturally with age, tobacco use.

Diagnosis

Doctors will perform a physical exam, ask about the symptoms, and a family history. They may also recommend a breath, blood, or stool test to check for H. pylori. In addition, a doctor may perform an upper GI endoscopy. This is important to check for inflammation in the esophagus, stomach, and duodenum. Also, a doctor may take a small sample, or biopsy, of the lining of the stomach. A pathologist will examine this sample for anything unusual under a microscope.

Performance an upper GI series is very informative. This involves taking X-rays of a digestive tract after a patient swallows a barium solution. This will help distinguish the areas of concern.

A blood test is necessary to check for other causes for the gastritis symptoms or signs of complications.

A stool sample may rule out an H. pylori infection or blood in a patient`s stool. Blood may indicate bleeding in the stomach.

An urea breath test also helps the investigation of the H. pylori infection by making a patient swallow a urea capsule and then seeing whether he breathes out carbon dioxide atoms. This would indicate the infection.

Complications

If a gastritis is left untreated, it can lead to a variety of complications. Certain forms of gastritis can increase the risk of developing stomach cancer, particularly in people with thinned stomach linings.

Complications may include anemia, deficiencies in vitamin B12, vitamin D, folic acid, vitamin C, zinc, calcium and magnesium, bleeding in the stomach, perforation inside the stomach, peptic ulcers, chronic atrophic gastritis, which causes the loss of cells in the gastric glands in addition to inflammation, gastric metaplasia and dysplasia, which are types of precancerous lesions in the stomach, achlorhydria, which prevents the stomach from producing the acid it needs to digest food properly, perforation of the stomach, cancers such as adenocarcinoma (gastric cancer), mucosa-associated lymphoid tissue (MALT) lymphoma, and neuroendocrine tumors (NET).

Because of these potential complications, it’s important to consult with a doctor if a patient experiences any symptoms of gastritis, especially if they’re chronic.

Prevention

Preventative strategies may depend on the health and any conditions increasing the risk for developing gastritis. But, since gastritis doesn’t always have a clear cause, it can be hard to prevent.

However, there are some things people can do:

Maintaining good hygiene habits. Habits like handwashing may help reduce the risk of having a H. pylori infection.

Taking good care of mental health. Self-care and de-stressing practices may reduce the risk of developing stress-induced gastritis.

Eating smaller meals more slowly and regularly. Also, avoiding or limiting fried, salty, sugary and spicy foods (these are things that research shows could trigger gastritis symptoms).

Quitting smoking. Avoiding or limiting alcohol and caffeine.

The outlook for gastritis depends on the underlying cause. Acute gastritis usually resolves quickly with treatment. H. pylori infections, for example, can often be treated with one or two rounds of antibiotics.

However, sometimes treatment fails and it can turn into chronic, or long-term forms of gastritis.

THE SIGNIFICANCE OF DNA UNLOCKS THE BLUEPRINT OF LIFE

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The discovery and understanding of DNA (deoxyribonucleic acid) has revolutionized the field of biology, providing invaluable insights into the intricate mechanisms of life, genetic diversity, and the potential for medical advancements, thus establishing it as a cornerstone in scientific research and technological innovation.

The discovery of DNA as the hereditary material has been a groundbreaking moment in the history of science. This thesis explores the multifaceted significance of DNA, delving into its role as the blueprint of life and its impact on diverse aspects of biology, medicine, and technology.

1. Genetic Blueprint and Inheritance:

DNA serves as the genetic blueprint that carries the instructions for the development, functioning, and reproduction of all living organisms. The process of inheritance, governed by DNA, determines the traits and characteristics passed from one generation to the next. DNA is called the blueprint of life because it contains the instructions needed for an organism to grow, develop, survive and reproduce. DNA does this by controlling protein synthesis. Proteins do most of the work in cells, and are the basic unit of structure and function in the cells of organisms.

2. Understanding Genetic Diversity:

DNA analysis allows scientists to unravel the complexity of genetic diversity, providing insights into the evolution of species and the adaptation of organisms to their environments. The study of DNA variation is crucial for understanding the genetic basis of diseases and population dynamics. Genetic diversity is the biological variation that occurs within species. It makes it possible for species to adapt when the environment changes. Genetic diversity is particularly important under rapid environmental change, such as in the Baltic Sea.

3. Medical Applications and Genetic Disorders:

DNA research has paved the way for medical breakthroughs, enabling the diagnosis, treatment, and prevention of genetic disorders. Advances in personalized medicine, driven by DNA analysis, hold promise for tailoring treatments to individual genetic profiles.

Examples of vaccines produced using recombinant DNA technology include the hepatitis B vaccine, human papillomavirus (HPV) vaccine, and the recombinant subunit vaccine for COVID-19, such as those based on the spike protein of the SARS-CoV-2 virus.

4. Forensic Science and DNA Profiling:

The advent of DNA profiling has revolutionized forensic science, providing a powerful tool for criminal investigations and accurate identification of individuals. DNA evidence has played a pivotal role in solving cold cases and ensuring justice. DNA profiling is the process where a specific DNA pattern, called a profile, is obtained from a person or sample of bodily tissue. Even though we are all unique, most of our DNA is actually identical to other people's DNA. However, specific regions vary highly between people. These regions are called polymorphic.

5. Biotechnological Innovations:

DNA manipulation techniques, such as genetic engineering and gene editing, have opened avenues for biotechnological innovations with applications in agriculture, medicine, and industry. The most notable innovations in biotech involve personalized medicine, drug research, artificial intelligence, big data, and synthetic biology. The ethical

considerations surrounding DNA technology necessitate responsible use and ongoing societal dialogue.

In conclusion, the discovery and understanding of DNA have had a profound impact on various scientific disciplines. From unraveling the secrets of inheritance to enabling medical breakthroughs and technological innovations, DNA stands as a cornerstone in our quest to comprehend and manipulate the fundamental processes of life. As our understanding of DNA continues to deepen, its potential applications are likely to expand, offering new avenues for advancements in science, m edicine, and technology.

BRONCHITIS, ITS TREATMENT AND PREVENTION

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Bronchitis is a disease that causes inflammation of the connecting part of the lungs and trachea - the bronchi. Bronchi become inflamed under the influence of various viruses. The cause of the disease can also be secondary infections, exposure to the respiratory system of toxins, dust, smoke and other foreign particles. As a result, tissues become inflamed, causing significant complications in the functioning of the respiratory tract. Bronchitis is most dangerous for older people, smokers and people with chronic pathologies of the heart and lungs. There are chronic and acute forms of bronchitis. They differ in symptoms, course and treatment. The main symptom of bronchitis is a cough sometimes attacks of coughing, especially in the morning with discharge of mucous-purulent sputum. The aggravation of the disease proceeds with an increase in cough and a rise in temperature. When auscultating the lungs, dry rales are more often detected. It can be dry or wet, a cough with a large amount of green sputum is characteristic of bacterial bronchitis, cough without mucus secretion is a sign of a viral and atypical form of the disease.

Acute bronchitis in the initial stages is easily confused with a cold. Most often, the disease is caused by a respiratory viral

infection, develops in the cold season and is accompanied by a cough, at first dry, then wet with sputum. Mucus can have a white, yellow or green tint. Acute bronchitis is often accompanied by high body temperature, runny nose. The average duration of the disease is 3 weeks, simple consequences of the disease can be observed for a long time up to 8 weeks.

The main symptoms of the acute form of the disease include a sharp increase in temperature, fatigue, apathy, increased sweating, chills, hard breathing, wheezing. chills, shortness of breath, wheezing, shortness of breath, and chest pain. shortness of breath and pain felt in the chest.

Chronic bronchitis involves a long course of the disease with periodic exacerbations and outbreaks in the acute form. Chronic bronchitis is also accompanied by a cough, the cause of which is a violation of the functions of the respiratory system and an increase in the release of viscous secretions. With an acute form of bronchitis, the cause of coughing is inflammation of the respiratory tract.

Another list of symptoms helps to determine the chronic form of bronchitis: wet cough with secretions; confused breathing during physical activity; temperature increase (optional).

With chronic bronchitis, the symptoms of the disease can change in different exacerbations.

Bronchitis, depending on violations in the work of the bronchi, causes non-obstructive breathing which does not become difficult and is disturbed only during the acute phase. Obstructive breathing becomes difficult due to spasm of the smooth muscles of the bronchial walls, in adults this disorder increases over time and is chronic, and in children it is characteristic only for the acute period.

Ways of infection with bronchitis

With infectious bronchitis, in most cases, infection occurs by airborne droplets. In case of non-observance of hygiene rules and lack of habit of washing hands, the causative agent that provokes inflammation can be transmitted by contact and household means.

The duration of the period during which a patient with infectious bronchitis is contagious depends on the type of pathogen.

Usually, the risk of infection remains during the entire period of the disease (including in the presence of a residual cough).

The most likely complications of bronchitis are development of obstruction, transformation into a chronic form, pneumonia, asthmatic component (suffocation attacks), heart failure, COPD (chronic obstructive pulmonary disease), deformation of bronchial walls, emphysema of the lungs, pulmonary failure, bronchial asthma, diffuse pneumosclerosis.

The complicated course of bronchiolitis is especially dangerous, with a possible fatal outcome.

A rapid or severe course, aggressive infection with reduced immunity, lack of proper therapy or concomitant pathologies are the most frequent causes of complications after bronchitis.

Laboratory and instrumental methods of diagnosing bronchitis are prescribed to clarify data on the form and type of inflammation of the bronchi, to carry out differential diagnosis.

Diagnosis of bronchitis may include listening and tapping the chest, x-ray, sputum, blood and urine tests in the laboratory. In complicated cases, spirography, bronchoscopy and CT may be prescribed

Bronchitis treatment tactics are determined by the clinical case and the stage of development of the pathology. In severe cases, hospitalization is recommended. The treatment plan for bronchitis may include various methods such as drug therapy namely antibiotics, antiviral drugs, antifungal agents, expectorants, bronchodilators, antitussives, antipyretics, antihistamines.

Bronchitis treatment continues until the symptoms completely disappear, so its duration is determined individually.

To speed up recovery and prevent complications, it is recommended to observe bed rest during the acute stage of bronchitis. In case of allergic and toxic damage to the bronchi, it is necessary to identify and eliminate the influence of irritants. The patient should spit out sputum, take large volumes of warm liquid, increase the humidity level in the room, ventilate the room often and prevent drafts.

Physiotherapy also helps to improve the results of treatment, and is effective especially for small patients because children's physiotherapy takes into account all the peculiarities of the child's body.

For physiotherapy of bronchitis, the following methods are recommended: taking medication from a nebulizer, inhalation, therapeutic massage, compresses, breathing exercises, physical therapy, etc.

Surgical treatment for bronchitis is usually not required. Sometimes, to eliminate foreign objects that cause bronchitis, or to treat severe forms of chronic bronchitis, such a remedial minimally invasive procedure as bronchoscopy is performed.

Adhering to a diet and the rules of proper nutrition for bronchitis is extremely important to eliminate protein starvation and lack of vitamins. The main principles of the diet for bronchial inflammation include the consumption of fresh fruits and vegetables, chicken broth, fatty types of fish, meat (not fried), cereals; consumption of products with a high level of proteins and vitamins; eating 4-5 times a day; elimination of allergens; abundant drinking (it is better to drink juices, fruit juices, herbal teas, whey, kefir).

It is recommended to follow the principles of rational nutrition both in chronic and acute forms of bronchitis.

As for the curability control it should be taken into consideration that with the right approach, in most cases, all uncomplicated forms of bronchitis can be successfully treated. To control the quality of treatment, such studies as X-ray, CT scan, bronchoscopy, sputum culture, etc. are carried out.

Prevention of bronchitis consists in observing the following rules:

exclusion of factors provoking the development of inflammation;

indoor air humidification;

fight against dustiness at home and at work;

hardening of the body;

compliance with the rules of rational nutrition;

timely treatment of any diseases (especially pathologies of the ENT organs);

regular walks in the fresh air;

sufficient motor activity;

avoiding visiting places with a large crowd of people (especially during flu and ARVI epidemics);

exclusion or minimization of exposure to factors that cause an allergic or toxic reaction (change of work, wearing of respirators, refusal of smoking, etc.);

compliance with hygiene rules.

When a patient follows all the safety rules of treatment and fulfills the recommendations of his therapist bronchitis will be overcome successfully without any complications

MODALITY OF THE AUTONOMIC NERVOUS SYSTEM IN MILITARY POPULATION

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The autonomic nervous system (ANS) is a part of the nervous system that is characterized by involuntary and is not controlled by consciousness. It performs a number of functions, such as coordinating the work of internal organs, regulating metabolic and trophic processes, and maintaining homeostasis. The objects of innervation of the ANS are smooth muscle tissue, cardiac muscle, and glands.

The largest changes in the activity of the ANS are provoked by non-specific adaptation of the body, called stress. Under the influence of stress, an adaptation syndrome occurs with the participation of the sympathoadrenal system. A complex reaction typically results in notable changes in behavior and disruptions to both the body's balance (homeostasis) and the mental and physical well-being. In the context of the military population, engagement in military operations and exposure to combat are significant stress-inducing factors that impact the immediate and prolonged stress responses in soldiers, influencing their overall performance and health.

A 2016 study have analysed the effects of chronic stress response were compared between experienced and novice

paratroopers. In the study, the psychophysiological response and specific motor skills of 17 novel and 23 expert war fighters before and after a tactical combat parachute jump were analysed [1]. Fine motor skills and muscle performance were equally affected in both groups, but in the novice group, heart rate, salivary cortisol, creatine kinase, and lactate significantly increased. A similar study in 2017 compared the reactivity of the sympathetic nervous system in elite and nonelite soldiers. In the experiment, 40 servicemen were considered (an equal number in each group) [2]. It was found that non-elite soldiers had a higher heart rate, and elite soldiers demonstrated higher muscle strength than nonelite soldiers before and after the combat simulation. At the same time, the lactate level in the blood of the elite division was 73.7% comparable to that of the nonelite.

In the next experiment, light infantry, more accustomed to asymmetric combat, were compared with heavy infantry soldiers during an urban combat simulation. [3] Heavy infantry demonstrated higher metabolic and cardiovascular responses compared to light infantry, but fine motor skills (time to load the gun magazine with ammunition) were similar in both groups. Therefore, the manifestation of sympathetic activation also depends on the specifics of the task.

Military personnel are a population group that is most exposed to acute and chronic stress, which affects the activity of the autonomic nervous system. Modulation of the ANS depends on many factors, such as the duration of the combat mission, the specifics of the battle, the experience and type of the unit, as well as specific stressors. On the basis of the above-described studies, it is possible to determine methods for stabilizing the vegetative balance.

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INNOVATIONS IN MEDICINE TRANSFORMING EVERYDAY LIFE

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Innovations in medicine have ushered in a new era of healthcare, significantly impacting modern life. Advancements in medical technology, treatment modalities, and healthcare systems have not only extended life expectancy but have also enhanced the quality of life for millions worldwide. From breakthroughs in personalized medicine to the integration of AI in diagnostics, these innovations continue to reshape the landscape of healthcare, bringing about remarkable changes in the way we perceive and experience health in our daily lives.

1. Personalized Medicine:

Genetic profiling and precision medicine have enabled tailored treatments based on an individual's genetic makeup, revolutionizing disease management. Targeted therapies and pharmacogenomics allow for more effective and personalized treatments, minimizing adverse effects and optimizing outcomes for patients.

2. Telemedicine and Remote Monitoring:

The advent of telehealth services has bridged geographical gaps, offering remote consultations, diagnosis, and monitoring.

Wearable devices equipped with sensors allow continuous health monitoring, empowering individuals to track their health metrics in real-time.

3. AI and Machine Learning in Healthcare:

AI-driven diagnostics assist in faster and more accurate disease detection through image analysis, aiding clinicians in decision-making processes. Predictive analytics help forecast disease outbreaks, streamline hospital operations, and optimize treatment plans.

4. Robotic Surgery and Minimally Invasive Procedures:

Robotic-assisted surgeries have elevated precision and dexterity, leading to smaller incisions, reduced recovery times, and improved surgical outcomes. Minimally invasive procedures have become more prevalent, minimizing patient discomfort and hospital stays.

5. Bioengineering and Regenerative Medicine:

Breakthroughs in tissue engineering and regenerative medicine offer hope for organ transplant alternatives through 3D bioprinting and stem cell therapies. Artificial organs and tissues are being developed, potentially addressing the shortage of donor organs.

6. Mental Health Innovations:

Digital mental health platforms and apps provide accessible resources for therapy, mindfulness, and mental health support.

AI-powered mental health chatbots offer immediate assistance and guidance, reducing barriers to seeking mental health care.

Impact on Everyday Life:

These innovations have transcended the boundaries of traditional healthcare, permeating into daily life in profound ways:

- Improved access to healthcare services, especially in remote or underserved areas.
- Empowerment of individuals to actively manage their health through personalized data and remote monitoring tools.
- Enhanced efficiency in healthcare delivery, reducing waiting times and improving patient outcomes.
- Greater emphasis on preventive care, promoting overall wellness and proactive health management.

So, innovations in medicine have become integral to our contemporary lives, reshaping how we perceive, access, and maintain our health. The continuous evolution of technology in healthcare not only promises a healthier future but also highlights the potential for further groundbreaking advancements that will continue to transform and enhance our everyday lives. Also, nowadays computer science unveiled the AI, modern helper that can be involved not only in our routine, but likewise in medical sphere, like we can see now how surgeons more often use robotic-assistants instead of humans. However, involving the AI in medicine is not a quick process, but on the other side we live in 21st century, so our technological progress develops faster and faster day after day.

INNOVATIVE PROSTHETICS: RESTORING LIVES AND HOPE FOR WOUNDED SOLDIERS IN UKRAINE

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Unfortunately, today's Ukraine is at war. In my opinion, innovations in medicine at the present time should be aimed at helping and returning our soldiers to normal life. The task of cosmetic replacement and restoration of the lost functions of the human musculoskeletal system can be solved with the help of new prosthetic methods. Prosthetics is the replacement of lost or damaged body parts. Prosthetics are an important part of the social rehabilitation process for patients with lost limbs.

There are two types of prostheses. The most common are mechanical prostheses. Their use is associated with a load on the spine and heavy steps. The emergence of the second type of prosthesis is due to innovative technologies that have made it possible to create bioelectric prostheses. Such prostheses can read muscle impulses. The built-in microprocessor can calculate the angle of inclination in the joints, maintain balance, and adjust the prosthesis while walking.

When designing prosthetics, it is important to know the mechanical properties and parameters of biological systems. The main material of the human musculoskeletal system is bone tissue.

From the point of view of biophysics, bone tissue is a composite material. It consists of organic and inorganic substances and hydroxyapatite. The main materials of bones, skin, muscles, and vascular tissue are collagen and elastin. The mechanical properties of these materials: the elastic modulus and tensile strength, respectively, are 10-100 MPa and 100 MPa for collagen, and 0.1-0.6 MPa and 5 MPa for elastin.

Now scientists around the world are facing the question of bringing the mechanisms of prostheses to the mechanism of muscles, which will help people with disabilities feel needed in society. I'd like to end with a quote from Oscar Pistorius: "Physical disabilities do not make us crippled, they open up new opportunities."

THE IMPACT OF MEDICAL INNOVATIONS ON MODERN LIFE

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Exploring the issue of innovations in medicine and their impact on modern life, we encounter a rapidly evolving field that profoundly affects each of us. Modern medical innovations not only change the methods of treatment and diagnosis; they redefine the very concepts of health and quality of life. From personalized medicine based on genetic analysis to revolutions in pharmacology and robotics, each innovation contributes to further extending life expectancy and improving its quality. However, along with the promises of these benefits come new challenges: ethical dilemmas, issues of access to advanced treatments, and the preservation of the human dimension in patient care. In this paper, we will examine how exactly innovations in medicine are shaping modern life, what benefits they bring, and the challenges we face.

This investigation is based on a comprehensive analysis of scientific literature, statistical data, and case studies to evaluate the impact of medical innovations on modern life. The research methodology includes the following stages:

1. Systematic Literature Review**:** A search and analysis of scientific articles published from 2010 to 2023 were conducted in

medical and scientific research databases such as PubMed, Scopus, and Google Scholar. Keywords for the search included "medical innovations," "digitalization in medicine," "personalized medicine," "robotics in surgery," and "impact of technology on health."

2. Analysis of Statistical Data: Examination of official statistics from health organizations and innovative medical companies to assess trends in the development of medical technologies and their adoption in clinical practice.

3. Case Studies: Selective investigation of several innovative medical projects and technologies aimed at a deeper analysis of their impact on improving patients' quality of life. This allowed for the identification of successful examples of innovation implementation and the challenges faced by medical institutions and patients.

Data from all sources were aggregated, systematized, and analyzed using quantitative and qualitative analysis, it enabled the identification of key trends, benefits, and challenges associated with innovations in medicine.

Ethical Considerations: All aspects of the research were conducted in accordance with ethical norms and standards of scientific integrity. Information obtained from published sources was used in compliance with citation rules and intellectual property rights [1].

The systematic literature review identified several key areas where medical innovations have significantly impacted modern life. These include advancements in personalized medicine, where genetic profiling enables more targeted and effective treatments; developments in medical devices, such as wearable technology that monitors health in real-time; and breakthroughs in digital health, including telemedicine and AI-driven diagnostic tools. Statistical analysis revealed a steady increase in the adoption of these technologies, with a notable acceleration in the past five years. Case studies highlighted specific examples of success, such as the use of AI in improving diagnostic accuracy for diseases like cancer and diabetes, and the implementation of telehealth services, which have dramatically increased access to healthcare, especially in remote areas [2]. The results underscore the profound impact of medical

innovations on enhancing healthcare delivery and patient outcomes. Personalized medicine represents a paradigm shift towards more customized care, potentially leading to better treatment outcomes and fewer side effects. Wearable technology and digital health tools offer promising avenues for preventive medicine, empowering individuals to take an active role in managing their health. However, the integration of these innovations also presents challenges. Issues of data privacy and security, the digital divide, and the need for regulatory frameworks are paramount. The adoption of telemedicine, while beneficial, raises questions about the patient-provider relationship and the potential for reduced human interaction. The acceleration in medical technology adoption due to the COVID-19 pandemic has further highlighted the need for robust digital infrastructure and equitable access to healthcare [3]. Innovations have the potential to bridge healthcare disparities, but this requires concerted efforts from governments, healthcare providers, and technology developers.

In conclusion, medical innovations are reshaping modern life by improving healthcare delivery and patient outcomes. While the future holds great promise, addressing the accompanying challenges is crucial to fully realizing the benefits of these advancements. Collaboration across sectors and disciplines, along with thoughtful consideration of ethical, legal, and social implications, will be key to harnessing the potential of medical innovations for the betterment of society. Based on the analysis of scientific literature, statistical data, and case studies, the following conclusion can be drawn regarding the impact of medical innovations on modern life:

1. Personalized medicine is becoming increasingly accessible, offering treatment approaches that are more precisely tailored to the individual needs of patients. This contributes to improved treatment outcomes and a reduction in side effects.

2. Wearable technologies and digital health tools play a key role in the transition from reactive to preventive medicine, providing individuals with tools for active monitoring and management of their own health.

3. Telemedicine and artificial intelligence-based diagnostics expand access to quality medical care, particularly in remote and underserved areas, while also enhancing the efficiency of diagnosis and treatment.

4. The COVID-19 pandemic has further highlighted the importance of medical innovations, accelerating their adoption and demonstrating their potential in responding to global health challenges.

5. Challenges associated with the integration of medical innovations include issues of privacy and data security, the need for regulatory adjustments, and the risk of a digital divide, which could limit access to innovative medical services for certain population groups.

6. Collaboration between governments, medical institutions, the scientific community,
and the private sector is key to overcoming these challenges and maximizing the potential of medical innovations for the benefit of society as a whole.

In thus, medical innovations are crucial for improving the quality of life and health of people worldwide. To achieve this goal, existing challenges must be addressed, and equitable access to innovative medical technologies and services must be ensured.

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INTERACTION OF COMPONENTS OF THE IMMUNE SYSTEM WITH NOVEL TWO-DIMENSIONAL MXENES MATERIALS

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Interaction of components of the immune system with novel two-dimensional MXenes materials has garnered an increasing

interest in the scientific community due to the potential applications of these materials in biomedical fields. MXenes are a group of nanomaterials composed of carbon, nitrogen, and other elements, possessing unique properties such as high conductivity, mechanical strength, and chemical stability. The recent studies [1] have shown that MXenes can interact with various cells of the immune system, including macrophages, lymphocytes, and dendritic cells. In this context, investigating the interaction of components of the immune system with novel two-dimensional (2D) MXenes materials is of strategic significance for understanding the biological properties of these materials and their potential impact on the human body. Based on this understanding, new diagnostic and treatment methods for various diseases can be developed, opening up new prospects in medical science and clinical practice.

It is hypothesized that contact with MXenes may activate the immune system and alter the phenotype of macrophages from M1 to M2. Additionally, we speculate that these changes may be accompanied by the production of specific cytokines that influence the immune response.

The research subject: the influence of MXenes on the functioning of the immune system.

The research object: MXenes molecules and their interaction with cells of the immune system.

The research goal: to study the interaction between the properties of MXenes and their impact on the immune response of the organism for further use in medicine or biotechnology.

The actuality of the research:

1. Activation of the immune system: there are studies confirming the ability of nanomaterials, such as MXenes, to activate the immune system. For example, their physicochemical properties may induce an immune response, prompting the production of cytokines and molecules that mobilize the immune cells.

2. Change in macrophage phenotype: macrophages are key cells of the immune system that can change their phenotype from M1 (anti-inflammatory) to M2 (pro-inflammatory) depending on the

microenvironment. This can be triggered by interaction with certain stimuli, including nanomaterials.

3. Production of cytokines: contact with MXenes can lead to the production of cytokines, such as interleukins and tumor necrosis factors, which may affect the immune response, including inflammation and modulation of the immune response.

High surface-to-volume ratio makes the 2D materials suitable for drug delivery systems, allowing them to load a large number of molecules (such as small molecule drugs, biomacromolecules, antigens, genes, and fluorescent probes) and demonstrate higher efficacy compared to controlled release at target sites [2]. The 2D materials have excellent advantages in the development of anti-tumor vaccines not only as delivery nanosystems. More importantly, they can elicit internal immune responses to induce immune-activating effects, which may lead to adjuvant-mediated immunotherapy. There is growing evidence that the 2D materials may play a crucial role in modulating the tumor microenvironment, including polarization of tumor-associated macrophages [3] and activation of dendritic cells, which activate the body's own defense to destroy the tumor [4]. Additionally, the 2D materials have great potential in regenerative medicine, as shown, for example, by promoting angiogenesis and neurogenesis using GBM and BP 3D scaffolds [5], as well as bone regeneration initiated by Nb2C 3D scaffolds. In this context, the inherent property of the 2D materials to suppress immunity may contribute to its application.

The research methods:

Using cellular models to study the response of the immune system cells to interaction with MXenes. Lymphocyte, macrophage, dendritic cell cultures, etc., can be utilized. Measurement of cytokine production, detection of changes in the cell cycle, analysis of MXenes' effects on the immune cell activation. To determine the impact of MXenes on living organisms and their cells. Investigation of biochemical indicators (enzyme activity, level of oxidative stress) to identify potential toxic effects of MXenes. Processing and analysis of cellular test results, measurement of biomarker production,

interpretation of experimental results using specialized programs and analytical tools.

We foresee that our research will help elucidate the mechanisms of interaction between MXenes and the immune system, as well as their potential impact on the immune response of the organism. As a result of our research, we anticipate that the influence of MXenes on the activity of the immune cells may lead to alterations in their phenotype and an increase in the production of cytokines and inflammatory mediators. These findings will underscore the importance of understanding the mechanisms of interaction between MXenes and the immune system for assessing their potential application in medicine. The data from our study could serve as a foundation for the development of new methods for treating diseases associated with changes in the immune system function or inflammatory processes.

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THE CORELATION OF THE PATIENTS' RESIDENCE PLACE AND THE RISK OF A CORONAVIRUS INFECTION

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Introduction. The mortality rate depends on many factors. One of those that increase the mortality of the population is the prevalence of infectious diseases among population. Infectious diseases have caused more than one epidemic. The most recent is the coronavirus, which was anounced by the WHO as a pandemic on March 11, 2022 due to the rapid spread and progressive severity of COVID-19. Which was occurred due to the emergence of variants of the SARS-CoV-2 virus due to the rapid mutation of the virus genome.

The main risk factors for coronavirus infection include modified (those that can be influenced and eliminated) and non-modified (those that cannot be eliminated).

In this work, we propose to investigate the residence place of the patient as risk factors for the development of the disease and the severity of the course of the corona virus infection.

Objective. To investigate the relationship between the place of patient's residence and the risk of contracting a coronavirus infection, as well as to determine possible ways to prevent infection and the severe course of the disease.

Materials and Methods. In the course of the study, 182 cases of deceased patients with severe coronavirus infection at the Sumy hospital were analyzed, in which, in addition to general clinical research methods, lung ultrasound and lung CT were used.

Among the patients, it was found that there are 52 (28.57%) rural residents and 130 (71.43%) urban residents. We suppose it is explained by the main factor.

Population density is an indicator that shows the populations ratio of a certain territory to its area (thousands of people/km2).

According to Main Department of Statistics in Sumy Region, as of March 1, 2020, the average population of Sumy Region was 1,067,165 people, including 573,000 urban residents and 493,082 rural residents. The area of the urban territory is 970.63 km2, the area of the rural territory is 22861.4 km2.

Thus, the density of the urban population is 0.59 thousand people/km2. The density of the rural population is 0.022 thousand people/km2.

It is possible to affirm a greater spread of CI due to the contact of an infected person with a larger number of people, which is possible due to the use of public transport more typical for the urban population, as well as the workimg in offices.

Conclusions. In the course of the work, a group of patients who died from the corona virus disease at the Clinical Hospital of Sumy was investigated. 182 stories were analyzed. Among which 130 - residents of cities, 52 - residents of villages. That is, it can be argued that there is a connection not between the patient's place of residence but between the density (density) of the residential area and the patient's risk of infection. There resident’s density is. the more risk of infection’s rapid spread is, also severity of infection caused by coronavirus.

The only way to prevent the infecting is following the prophylaxis methods for respiratory deseases. Using the bariers (masks, respirators) prevents the virus entering the organism. Vaccination (complete scheme) prevents the severity of coronavirus infection course among the infected. Also the certain persentage of vaccinated among population is the key to prophylaxing the infecting more individuals of the population. According to the foreign sourses is possibible to lower the risk of coronavirus infecting by globalizing the vaccination of the population. Which is possible due to wide range of vaccines.

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DIGITALIZATION AND TRANSFORMATION OF ECONOMY IN UKRAINE

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Faced with turbulent challenges (the pandemic caused by the COVID-19 coronavirus infection, Russia's war against Ukraine), most socio-economic systems need to find ways to function safely. From the beginning of the pandemic until today, information and communication technologies have provided an opportunity for safe activities. This is confirmed by the speed with which all organizations use information systems to support their activities and further development. If we assume that countries around the world gradually return to normal work after quarantine measures, then this also applies to Ukraine. In this situation, the war initiated by Russia has led to increased use and rapid transition to digital technologies to ensure stability of operations and functions. The successful development of the digital economy in other parts of the world requires Ukrainian companies to study and implement this experience.

To increase the competitiveness of industrial enterprises, it is necessary to take into account the specifics of the IV industrial revolution, the concept of which is characterized by a set of ideas related to the automation of production based on digital technologies, rapid automation of labor and robotization of all sectors of production. Thus, the transition from III to IV revolution, from simple digitization (III industrial revolution) to innovations based on a combination of technologies (IV industrial revolution), which will force domestic enterprises to review their business methods, is inevitable [3]. Therefore, in addition to ensuring their competitiveness, Ukrainian enterprises must ensure their functioning in the conditions of the IV industrial revolution based on the automation of business processes using information technologies and digitization.

The transition to a digital environment requires the digitization of production processes, performance management and product quality, communication with teams and customers, logistics and delivery, as well as all other procedures. Digitalization of business processes aims to simplify and increase the flexibility of processes. Achieving the digitization of business processes requires a long time, as well as the skills and abilities of management to make appropriate changes with the participation of employees and taking into account their needs.

In general, Ukrainian companies are interested and invest in the development of the digital economy. When investing, first of all, it is necessary to ensure that the needs of customers are met, so that it is possible to foresee the further development of the digital economy. In modern conditions, digital technologies transform and adapt various areas of business processes. An important tool of digitization is the development of accounting for the creation of integrated information systems with control elements in enterprise management systems. The modern trend of the digital economy is the introduction of information technologies into the business processes of enterprises to ensure their competitiveness and effective functioning on the market [1].

The development of digital tools in the modern economy guarantees the functioning of e-commerce in both domestic and foreign markets, providing speed and space in turbulent situations. It has been found that the development of digital tools in the economy is limited by the lack of research on their use, and therefore the knowledge and skills related to their application are very important. Digitization is one of the most important factors in the development of enterprises and involves not only the use of innovative technologies, but also changes in management.

Digital transformation requires significant changes in the business and economic environment and should be aimed at monitoring global digital trends, opportunities for implementing innovative digital technologies, as well as monitoring and evaluating the stability of company management [2]. Therefore, the governments of the partner countries should create conditions for

supporting the post-war economic development of Ukraine. And the research and analysis of the current state of the military economy and proposals for measures regarding the post-war economic development of Ukraine are extremely relevant and timely. In general, for the successful adaptation of the digital economy in Ukraine, it is important to study the global trends in the development of the digital economy.

New digital trends such as cloud computing, mobile web services, intelligent networks and social media are fundamentally changing the world of business, transforming the way organizations work, their boundaries and responsibilities. A model of interaction between the state, business and society should be proposed, which will lead to economic growth, increased labor productivity and competitiveness through the development of a digital economy based on skills and knowledge. The study of national peculiarities of business process management in the conditions of the development of the digital economy indicates a positive trend of adaptation of Ukrainian enterprises. Analysis of the use of digital technologies by Ukrainian companies shows that the largest investments are made in the areas of interaction with customers, data analysis, management of employees and business processes, automation and closure of supply chains, cyber security, and robotics.

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HUMAN RESOURCES MANAGEMENT IN THE TIMES OF CRISIS: ADAPTED ROLES AND NEW RESPONSIBILITIES

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Human resources management (HRM), often referred to simply as human resources (HR), is the practice of recruiting, hiring, deploying and managing an organization's employees. HRM is employee management emphasizing employees as assets of the business. The purpose of HRM practices is to manage the people within a workplace to achieve the organization's mission and reinforce the corporate culture [4].

Over the past ten years, we have been living in volatile times: the outbreak of military aggression in 2014, the COVID-19 pandemic, and the full-scale war since the beginning of 2022 have seriously affected our lives in general, as well as the field of HR management in particular.

The HR Department traditionally plays a critical role in any company, but in times of crisis, it faces significant new challenges [2]. With the outbreak of a full-scale war, in addition to the essential functions of HR management, the responsibilities listed below have been added.

- Addressing the basic needs of employees. All problems and difficulties encountered by employees must be resolved as quickly as possible. Also, for example, timely salary payment will give confidence in the future [3].
- Emotional support and psychological assistance. Organizing training and seminars to relieve emotional stress and access to psychological aid is an essential aspect of maintaining the psychological well-being of the team.
- Adapting the team to the current circumstances. Creating and conducting briefings in the event of any critical situations, including air raids and first aid training - all this will help employees not to get confused and to quickly orientate themselves at a critical

moment. For some employees, it may be important to revise productivity and KPIs, as not everyone can work at 100% during a crisis [1].

- Systematic communication. Implementation of a communication system that allows for quick and efficient dissemination of information to all employees. In times of crisis, it is important for employees to know up-to-date and reliable information about events and decisions in the company.
- Work schedule and format. It is always important to be flexible, especially during a crisis. This should apply to both the work schedule and, for example, the ability to work remotely.
- Ensuring a continuous workflow. Despite various difficulties, such as blackouts or prolonged air alerts, employees should have access to comfortable and more or less safe work places.
- Corporate values. The opportunity to improve the team's life in a difficult time should not be neglected. With entertainment being out of the question at the moment, joint team-building activities such as board and sports games, master classes, etc., will positively impact team spirit [1].
- Employee retention. A crisis period can create instability in the labor market, such as an outflow of personnel abroad. The HR department should consider this so the business can operate fully [2].

At the same time, the HR manager's activities are not limited to interacting with employees but also affect business performance. In times of crisis, businesses especially need new solutions, so the functions of an HR manager are also added:

- Identification of key risks related to the company's business area, namely spotting the negative scenarios for business development.
- Review of short-term and long-term planning. Determining the necessary set of actions and adapting the company's tactics and strategy to the crisis. Ensuring effective responses to current challenges and identifying ways to develop for the future.
- Optimization of existing processes and resources. For example, minimizing managers' time for operational activities, and abandoning suboptimal or inefficient processes.

- Reducing the financial burden. Minimizing financial costs and implementing programs for effective financial resource management and cost control.
- Assistance in finding alternative business development opportunities. Reviewing the direction of activities following the current needs of society, opening new areas of activity.

In times of crisis, businesses expect HR managers not only to provide advice but also to actively participate in decision-making. The ability to make unpopular decisions and defend them is an important aspect of successful crisis management.

In general, HR today has learned to adapt to unforeseen circumstances and develop strategies that ensure the staff's safety, productivity, and well-being [2]. Thus, the role of HR management in the company's personnel management is significant. The better HR management can adapt to extreme conditions the faster it can make prompt and relevant decisions, and the better the company will be able to align with the current crisis conditions.

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ARTIFICIAL INTELLIGENCE IN CRISIS MANAGEMENT: NAVIGATING THE FUTURE

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One of the most important issues in crisis management is the ability to respond effectively to unfavorable factors and ensure sustainable development. As noted by Nunamaker, Weber, and Chen [2], the decision-making part of crisis management is split into two categories: planning for and handling crises when they occur. Crisis management in the classical sense relies on arranging for preparation measures, as well as human judgment to travel through crises. However, in the era of artificial intelligence (AI), there is a paradigm shift at hand that promises increased efficiency, speed, and adaptability in dealing with crises.

According to Starbuck, Greve, and Hedberg [5], crises are events that interrupt normal operations of an organization, a community, or individual growth. They come in two main forms: sudden and preventable. Sudden crises include occurrences like natural disasters, terrorist acts, and accidents. These external crises are unrelated to any particular organization; therefore, anticipation is crucial. Still, due to potential impacts, swift reaction measures and efficient planning.may be employed.

Preventable crises develop gradually, and management failures or internal issues are attributable to them. Management failures, which lack visible warning signs, lead to numerous warning signals. Since they start with the accumulation phase, it's possible to prevent or lessen the severity of the aftermath. These crises bring along intense impairment across domains, involving physical, financial, environmental, social, and psychological realms.

Historically, crisis management was focused on reacting to events as they unfolded, with reactivity and recovery being placed over prevention and preparedness [4]. Such traditional systems are the formal, hierarchical structures that spell out an explicit, top-down

approach to emergency steps and procedures. In modern times, reactive, short-term systems, which are a part of conventional processes, work properly when it comes to certain crises.

However, with the increasing complexity and unpredictability of the new challenges, they still fail to meet all needed goals. One of the obvious deficiencies of traditional crisis management is that it remains focused on a reactive, short-term approach. It most often considers immediate actions, leaving the underlying factors almost neglected. With the changing environment of the threats, relying on such an approach is scarecely credible. The development of an AI-based system thus offers a flexible answer to the emerging crises of our times.

AI's capability to rapidly process datasets, predict outcomes, and learn from patterns is just the important element that has an insatiable thirst to foretell and respond to crises. Insofar as historical data are being processed alongside current trends, AI offers predictive insights that make it possible to forecast crises before they happen. The learning and adaptation features of the AI systems turn into more accurate predictive precision and operational efficiency. Thereafter, AI's analysis of intricate datasets accelerates the decision-making process, improving the quality of decisions made. Predictive analytics, fueled by the AI system, enables organizations and governments to run the show in detecting threats well ahead. These AI systems support a dynamic approach to crisis management and reduce the time taken for decision-making.

In general, the crisis management landscape is changing with the advent of AI. AI gives crisis managers the ability to avoid, address, and recover from a crisis using various tools and technologies. Regarding C.-C. Lee et al. [3], the benefits and challenges of using AI in crisis management are numerous. The summary of these is presented in Table 1 below.

As can be seen from the Table, AI-driven analytics and data processing allow crisis managers to have a comprehensive view of what the unfolding crisis entails. For example, geospatial and social media monitoring tools enable the manager to understand the reach of the disaster, the public's sentiment, and the nature of the threats.

By processing data, AI models identify patterns that predict certain crises, eradicate the cause, and prevent various situations, such as natural disasters, devastating epidemics, or social upheaval. Also, AI systems help crisis managers make informed decisions by providing recommendations from the above following the data-driven analysis. Finally, the data-centric AI makes sure that actions taken are based on the most recent and comprehensive information.

Table 1

Advantages and challenges of using AI in crisis management

Advantages of AI in crisis management	Challenges of AI in crisis management
Comprehensive crisis insights: AI-driven analytics and data processing offer a detailed view of crises.	Technical limitations: data quality, availability, model accuracy.
Predictive capabilities: AI identifies patterns to predict and prevent crises.	Ethical and societal concerns: issues around privacy and data protection.
Informed decision-making: AI provides data-driven recommendations.	Mitigation strategies needed: increasing transparency, and involving stakeholders.
Enhanced communication: AI facilitates improved knowledge sharing and communication within the realm of crisis management.	

However, the application of AI in this field encounters numerous problematic issues and challenges, both of technical and ethical character. On a technical level, these embody limitations concerning data quality and availability, model accuracy and reliability, generalization for pathologies that have never occurred before, etc. Ethical and societal issues involve privacy and data protection, fairness and biases in decision-making, as well as citizen states. The best way to overcome these challenges would be to ensure data privacy and security, mitigate biases, grant more transparency and explainability, and involve stakeholders actively.

Organizations need to stick to a complete set of business practices to effectively use AI in crisis management. Protecting the integrity and confidentiality of data is critical if AI is to produce accurate results. According to Cox [1], organizations should set up strict procedures for such things as data collection and processing. Not only do they need to insure the quality and privacy of information but also guarantee that personal information is anonymous and consent has been properly drawn up. Therefore, participation of a wide range of experts in the development and application of AI for managing crises is requited: AI specialists, crisis management professionals, ethical advisors, community representatives etc. This multidisciplinary approach ensures a well-rounded strategy.

It is important for organizations to develop AI systems that are understandable, give the public access to data on how decisions are made, and build confidence in AI crisis management. Given that AI models are based on past and present data, keeping AI systems up-to-date is important for their effectiveness. Organizations should make sure their AI solutions conform to long-accepted ethical principles, promote fair dealing with others, and help avoid discrimination. By observing these operating techniques, organizations can take full advantage of what AI can do in the age of modern crisis management.

To sum up, across a range of dimensions from prediction to response and recovery, AI offers great potential for improving crisis management. As we march ahead, thoughtful embedment of AI technologies rooted in ethical principles and best practices will be essential for constructing societies that are more resilient when faced with tomorrow's catastrophes.

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FINANCIAL AND ECONOMIC CHANGES OF TODAY

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In today's dynamic global world, financial and economic systems are undergoing profound changes caused by many factors, including technological advances, geopolitical shifts, demographic changes, and environmental challenges.

The purpose of this paper is to explore and analyze the current financial and economic changes shaping our world, identifying key trends, challenges, and their implications in a broader context. Through a comprehensive literature review, empirical analysis, and case studies, the paper explores the complex interrelationships between the various drivers of change and their impact on financial markets, economic policy, and the dynamics of social development. By examining both macroeconomic indicators and micro-level phenomena, this study aims to provide valuable insights for policymakers, businesses, investors, and individuals navigating today's complex financial and economic landscape.

The 21st century has witnessed unprecedented changes in the global economic system, marked by technological breakthroughs, geopolitical changes, and social transformations. These developments have not only changed financial markets and economic systems, but also created new challenges and opportunities. In this context, it becomes necessary to comprehensively examine the nature and implications of these changes.

- ***Objectives of the study***

The main objective of this paper is to analyze in detail the current financial and economic changes, focusing on their main factors, development trends, and long-term consequences. The study aims, in particular, at the following objectives:

1. Identify and analyze the main factors of financial and economic changes in the modern world.
2. To study new trends and patterns in the financial market and the global economy.
3. Evaluate the challenges associated with these changes and their implications for various stakeholders.
4. To offer ideas and advice to help effectively navigate the complex and changing environment.

- ***Literature Review***

1. Theoretical Frameworks

The literature review delves into the theoretical underpinnings of financial and economic change, drawing on established concepts such as neoclassical economics, institutional economics, and behavioral economics.

It discusses key concepts and models relevant to understanding the dynamics of financial markets, economic systems, and the interactions between economic actors. It also explores interdisciplinary perspectives that provide insights into the social, political, and environmental dimensions of financial and economic change.

2. Technological Innovations and Financial Markets:

This section discusses how technological innovations such as AI, blockchain, and big data are transforming financial markets and institutions, posing challenges like cybersecurity and data privacy.

3. Globalization and Economic Interconnectedness:

Globalization has changed the world economy by increasing trade, capital flow, and international ties. This part reviews its literature, covering drivers, impacts, and controversies regarding economic development, inequality, and sovereignty. It also examines recent trends like protectionism and their effects on global economic governance.

4. Environmental Sustainability and Economic Development

The literature review explores the relationship between environmental sustainability and economic development, highlighting the challenges posed by climate change, resource depletion, and pollution. It discusses the concept of sustainable development and the role of businesses, governments, and civil society in promoting environmentally responsible economic practices.

- ***Methodology***

1. Research Design

The methodology section describes a mixed-methods approach, blending qualitative and quantitative techniques to study financial and economic changes. It highlights the rationale for this choice and outlines the research questions, hypotheses, variables, and data analysis framework.

2. Data Collection:

Data collection involves gathering diverse information from academic literature, international reports, government publications, industry reports, and media. This section discusses source selection criteria, data retrieval methods, validity checks, and ethical considerations, addressing challenges like data availability, quality, and representativeness.

- ***Financial Changes of Today***

1. Digital Transformation in Banking and Finance:

This section explores how digital advancements are revolutionizing banking and finance, covering trends like online banking, mobile payments, and regulatory responses.

2. Rise of Cryptocurrencies and Blockchain Technology:

Examines the rise of cryptocurrencies like Bitcoin and their impact on traditional financial systems, alongside discussions on blockchain technology and regulatory responses.

3. Fintech Disruption and Financial Inclusion:

Explores how fintech startups are disrupting traditional financial services and promoting financial inclusion, addressing challenges and policy initiatives.

4. Regulatory Challenges and Responses:

Discusses regulatory challenges posed by financial technology innovations and responses to ensure market integrity and consumer protection.

- ***Economic Changes of Today***

1. Trade Wars and Protectionism:

Analyses the resurgence of protectionism and its impact on global trade, exploring strategies for mitigating adverse effects.

2. Emerging Markets and Global Economic Shifts:

Examines the role of emerging markets in the global economy, discussing challenges and policy responses for sustainable growth.

3. Income Inequality and Social Unrest:

Explores rising income inequality and its socioeconomic implications, discussing policy options for promoting inclusive growth.

4. Climate Change and Economic Resilience:

Discusses the economic implications of climate change and strategies for building resilience and promoting sustainable development.

- ***Challenges and Implications***

1. Financial Stability Risks:

Addresses systemic risks in the financial system and policy measures to enhance stability and crisis management.

2. Economic Policy Dilemmas:

Discusses trade-offs in economic policy-making and unconventional policy measures adopted during crises.

3. Socioeconomic Disparities and Inclusion:

Examines socioeconomic disparities and policy interventions for promoting inclusion and reducing inequality.

4. Sustainable Development Goals and Agenda 2030:

Discusses the UN Sustainable Development Goals and strategies for achieving them, highlighting the role of stakeholders.

- ***Case Studies***

1. Impact of COVID-19 Pandemic on Global Economy:

Analyzes the economic impact of the COVID-19 pandemic and policy responses to mitigate its effects.

2. China's Belt and Road Initiative: Economic Prospects and Challenges:

Examines the economic prospects and challenges of China's Belt and Road Initiative, assessing its implications for global economic governance.

3. European Union's Green Deal: Economic Transformation and Environmental Sustainability:

Explores the economic implications of the EU's Green Deal and its role in promoting sustainability and innovation.

- ***Future Perspectives and Recommendations***

1. Anticipating Future Trends:

Reflects on future trends shaping the financial and economic landscape and strategies for navigating uncertainty.

2. Policy Recommendations for Mitigating Risks:

Offers policy recommendations for enhancing resilience and addressing emerging challenges in the financial and economic domain.

3. Opportunities for Businesses and Investors:

Highlights opportunities for businesses and investors in emerging markets, sustainable finance, and digital innovation.

4. Importance of Financial Literacy and Education:

Emphasizes the importance of financial literacy and education in empowering individuals to make informed financial decisions.

- ***Conclusion***

1. Recapitulation of Key Findings:

Summarizes key findings and insights generated through the analysis of financial and economic changes.

2. Contributions to the Field:

Discusses the contributions of the thesis to financial and economic research, highlighting new insights and recommendations.

3. Limitations and Suggestions for Future Research:

Finally, the thesis acknowledges its limitations and suggests avenues for future research, including the need for longitudinal studies, cross-country comparisons, and interdisciplinary collaborations to address complex and evolving issues in the field. It discusses methodological limitations, data constraints, and

theoretical gaps that could be addressed in future research endeavors, as well as opportunities for expanding the scope and depth of analysis to provide a more comprehensive understanding of financial and economic changes and their implications for society and the environment.

BUILDING AN EFFECTIVE MANAGEMENT SYSTEM IN SMALL AND MEDIUM-SIZED ENTERPRISES: PROBLEMS AND WAYS TO SOLVE THEM

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The urgency of researching the problems of building an effective management system in small and medium-sized enterprises (SMEs) is extremely high in modern conditions. Small and medium-sized enterprises in most economies are the main engines of development that create a significant part of jobs and contribute to the gross domestic product. However, they often experience difficulties in building effective management systems, which limits their ability to achieve success and maintain sustainable development.

However, despite their crucial role in today's economic environment, SMEs often face many problems related to building an effective management system. These challenges may include limited access to resources, insufficient skills of personnel, unstable economic environment, and competition in the market [1].

One of the main problems is the lack of a clear strategic vision and planning in SMEs. Many business owners in this market segment are focused on current tasks and underestimate the importance of strategic analysis. This can lead to a loss of competitiveness and failure to achieve long-term goals.

A serious problem is insufficient automation and the use of information technologies in management processes. Many SMEs do not have sufficient resources to implement modern management systems, which can lead to delays in production, errors in decision-making, and general inefficiency.

Another equally important problem is the lack of adequate control over financial activities and resource management. Many SMEs do not have adequate monitoring mechanisms, which can lead to financial losses, damages, and a negative impact on the company's reputation [2].

To overcome these problems, it is necessary to take several measures listed below.

First, SME owners should pay due attention to strategic planning and development, i.e. market analysis, vision of competitive advantages, and development of a clear development strategy.

Secondly, it is important to invest in the introduction of information technologies and the automation of management processes. This will help increase work efficiency, reduce costs, and improve the quality of products or services.

Thirdly, SMEs must improve the system of control over finances and resources. This may include the implementation of accounting, internal control and auditing systems to ensure effective management of financial resources.

In general, building an effective management system in SMEs requires a comprehensive approach and improvements in areas such as strategic planning, technology use, and financial management. Solving these problems will help SMEs to increase their competitiveness and achieve sustainable development.

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THE FUTURE OF ECONOMIC ANALYSIS: INNOVATIONS IN UNDERSTANDING ECONOMIC DYNAMICS

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Like having a good map when you're on a road trip, having the right tools matters a lot in every research. Without these tools you can get lost or miss your turn. This is especially true in economic research, where the accuracy and reliability of analytical tools play a critical role in understanding complex processes and dynamics within a volatile economic environment. Every year technologies go ahead bringing us even better tools for analyzing and predicting economic processes. This paper considers the latest innovations and methodologies that are shaping the toolbox for modern economic analysis.

Today we witness formation of a huge bunch of tools based on artificial intelligence (AI). This global trend inevitably involves the economic field. The work "AI and Macroeconomic Modeling: Deep Reinforcement Learning in an RBC Model" by Tohida Atashbar and Rui (Aruhan) Shi [1] represents significant progress in this direction, focusing on the use of AI in deep reinforcement learning (DRL). The authors explore how AI can learn on its own to make sense of economic ups and downs. This approach helps to get models smarter and adjust them to the economy changes, which is crucial for grasping complex macroeconomic dynamics.

In macroeconomic modeling, actions refer to decisions made by the model or economic agents within it: e.g., adjusting interest rates or figuring out how much to invest are super important. Traditional models can only choose from a set menu of options, but with AI, they can order anything they want from the economic menu, offering more flexibility and precision in economic decision-making. Similarly, when AI-based models try to understand the state of the economy, they look at everything from unemployment rates to inflation, being good at juggling these many factors at once.

The research focuses on two main learning environments: predictable and unpredictable, which gives ground to analyze how well the model adapts to various economic climates. The findings are

encouraging enough. The model's choices are often matched up with optimal solutions, demonstrating AI potential in macroeconomic modeling.

Another method worth considering is systemic dynamic analysis [3]. This approach is used to study complex systems with dynamic interrelationships and time delays. Developed by Jay Forrester in the 1950s at the Massachusetts Institute of Technology, this method is not new, but it`s still considered appropriate to find out why things in the economy change the way they do.

System dynamics focuses on four main parts: stocks, flows, feedback loops, and limits. Stocks are like storage containers that gather or lose resources over time. Negative feedback loops help stabilize a system. They work by spotting when there`s a difference between what is happening and what should happen, and then making changes to fix it. Positive feedback loops do the opposite by making things grow faster or decrease quicker. They act like dominoes, where one change leads to more changes, making the first change even bigger. For example, a successful company might attract more investment, making it grow even faster. Or, when people earn more, they spend more, which can make the economy grow faster.

In system dynamics, positive and negative feedback loops are always interacting and can change the direction of a system. Which loop is in charge can switch over time as the system grows or shrinks. When modeling these systems, it is important to remember that stocks typically have limits. They cannot exceed or fall below certain maximum or minimum levels. If a model produces unrealistically large or negative values, it does not accurately reflect real economic processes and is considered flawed.

Big data is another modern buzzword. It's transforming finance by making it easier to predict trends, understand market movements, and manage risks. A study titled "Current landscape and influence of big data on finance" dives into how the flood of data we`re now able to collect and analyze is revolutionizing the financial world [2]. Big data offers deeper insights into market trends, consumer preferences, and behavioral patterns, leading to more

accurate forecasts, effective investment strategies, development of new financial products and services.

Lastly, there's a lot of discussion on cognitive modeling in economics, which blends insights from psychology with economic theory. It suggests that markets can behave a bit like human brains, organizing themselves and reacting to new information. This way of thinking, known as the Market Mind Hypothesis, suggests that the economy isn't just a machine with levers and gears but a living entity that can learn and evolve [4].

Using cognitive modeling in Economics helps better understand economic processes, as it accounts for human emotions, beliefs, and behaviors often overlooked by traditional economic models. This approach uncovers indirect and complex relationships between different economic factors, such as consumer sentiments, investment strategies, and market trends. By understanding how human thoughts and emotions influence economic decisions, researchers can predict and respond to economic changes more effectively.

The relentless progress of technology continuously transforms approaches to economic research, providing scientists and analysts with powerful tools for analyzing and understanding complex economic processes. Moving away from old-school charts and graphs, we're stepping into a world where our tools can learn, adapt, and reveal deeper truths about how money moves and grows.

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MECHANISM OF ENTREPRENEURSHIP DEVELOPMENT IN THE CONTEXT OF THE UKRAINIAN ECONOMY CRISIS

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The basis for the development of a strong and economically independent country is its ability to conduct free business within the country with transparent and clear legislation. Given effective and balanced support from the state, small and micro enterprises can develop steadily, increasing the country's GDP and creating jobs for the population, thereby stimulating economic growth. However, in the current economic environment in Ukraine, small, medium and even large enterprises have suffered significant financial losses, first due to the pandemic (COVID-19) and then due to the full-scale military invasion of Ukraine by the Russian Federation, which suspended the operation of thousands of businesses. A significant number of enterprises were evacuated to the territory of western Ukraine. Thus, as of 02.03.2023, 800 enterprises were relocated to safer regions of the country under the government's relocation programme, 623 of which have already resumed operations at the new location. Most of the companies were relocated to Lviv (24%), Zakarpattia (14.5%), Chernivtsi (9.8%), Ivano-Frankivsk (8.3%), Khmelnytskyi (7.3%), and Ternopil (6.3%) regions. In 2023 the number of relocated enterprises reached the point of 800.

Under such conditions, it is extremely difficult to run a business and develop your own business, and even more difficult to set up a new business. For this reason, the government has developed a significant number of incentive mechanisms and programmes to support and launch small and medium-sized businesses. In order to attract foreign investment in the development of Ukrainian business, the so-called "Invest Nanny" programme was developed, which was

widely expected to attract foreign capital. However, no investments were actually attracted to Ukraine under this programme during the two years of the law on "investment nannies" [2]. And out of the 1196 applications submitted during the 10th wave in 2023 for a microgrant to start a business, only 306 winners who could theoretically prove the viability of their business will receive funds [3], which is an extremely low figure for the country's economy in a time of war.

Given these statistics and the critical need to create new businesses to maintain stability in the economy, it is advisable to create state-owned "Invest Nanny" offices in regions and regional centres for Ukrainian citizens who are ready to invest in starting their own businesses or set up their own business at the expense of the state. These centres should specialise in training and assistance in starting a business for new entrepreneurs.

The work of such centres should be based on providing maximum assistance to young entrepreneurs. Specifically, by visiting such a centre, every citizen who wants to start their own business can receive full and comprehensive information about the programmes provided by the state to launch their own business, and receive legal support and assistance in starting and running a business. If necessary, they can also take a full-fledged free business training course. In such a centre, the future entrepreneur should also receive free assistance in developing a business plan, both for starting a business at their own expense and for attracting government programmes, conducting market analysis, identifying the most profitable and currently needed sectors of the economy in which there is a shortage of businesses. In such centres, a future entrepreneur should also have the opportunity to use office equipment, telephony, computers, and Internet access free of charge for a certain period to create favourable conditions for starting and developing his or her own business.

Due to creation of such state centres for the support and development of small and medium-sized businesses it will be possible to significantly improve the level of qualification of future entrepreneurs, reduce the number of unsuccessful attempts to start their own business by new entrepreneurs, and increase the number of

tax-paying entrepreneurs and businesses in Ukraine, thereby maintaining stability and stimulating economic growth in the context of martial law in Ukraine.

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LEGAL ASPECTS OF VIRTUAL ASSETS

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In the current phase, information technology advancements are swiftly integrating, giving rise to the growth of the digital economy. Progress in fintech compelling the development of mechanisms to regulate new social relations and terms like "Virtual Asset Market", "Virtual Asset Wallet" and "Virtual Asset Key" are slowly but steadily taking their place.

Numerous publications focus on legally defining virtual assets (Kud, Kucheryavenko, Smychok, Danich), and there are also works discussing the classification of virtual assets (Kud, Ovcharenko).

Establishing international consensus on what should be called virtual assets is crucial for government regulators. A clear and legally defined status for virtual assets provides users and market participants with legal protection. Furthermore, having a legislatively

defined status and corresponding regulatory mechanisms provides the state budget with the opportunity to acquire new sources of revenues from operations with virtual assets.

Over a decade ago, in 2012, the European Central Bank initially characterized virtual currency as a form of unregulated digital money issued and controlled by developers, utilized and accepted within specific virtual communities. Later, the FATF provided its own definition, describing virtual currency as a digital representation of value capable of serving as a unit of account, traded or used as a medium of exchange, and/or a means of storing value. However, it lacks the legal tender status, meaning it is not officially recognized as valid for settlements with creditors in any jurisdiction. It wasn't until 2018 that the FATF, for the first time, defined the term "virtual asset" as a digital representation of value traded or utilized digitally for payment or investment purposes (Danich, Lutsenko, 2023).

According to the Law of Ukraine № 2074-IX (The law of Ukraine «About virtual activities») virtual asset is an intangible good that is the subject of civil rights, has value, and is expressed through a set of data in electronic form. The existence and tradability of a virtual asset are ensured by a system that supports the circulation of virtual assets. A virtual asset may certify property rights, including claims to other objects of civil rights.

Virtual assets can be secured or unsecured. Secured assets grant their owner the right to make claims regarding objects of civil rights other than the virtual asset, whereas unsecured assets do not grant any such rights to their owner concerning other objects of civil rights.

O. Kud's article (Kud, 2021) offers an extensive categorization of virtual assets. The author delineates various types of virtual assets, proposing a classification that considers their multifaceted nature, including technological, economic, legal, informational, and applied aspects.

It categorizes virtual assets into three levels:

The first level of classification, based on its technological nature, divides virtual assets into virtual assets of the distributed ledger and virtual assets of the non-distributed ledger.

The second level of classification, focusing on economic and legal attributes, further subdivides distributed ledger virtual assets into tokenized assets and crypto-assets.

The third level of classification, centered on informational and applied aspects, categorizes tokenized assets into digital assets, polyassets, and monoassets.

In summary, the discourse on virtual assets reflects the evolving landscape of the digital economy and the need for regulatory frameworks to accommodate these advancements. Notably, there's a growing body of literature dedicated to defining and classifying virtual assets, reflecting the complexity and interdisciplinary nature of this field.

The legal status of virtual assets, as exemplified by the Law of Ukraine № 2074-IX, acknowledges their significance as intangible goods with value expressed through electronic data. This legal recognition lays the groundwork for implementing regulatory mechanisms and ensuring the tradability and legitimacy of virtual assets.

Furthermore, the classification proposed by O. Kud offers a comprehensive framework for understanding the diverse nature of virtual assets, considering technological, economic, legal, informational, and practical aspects. This classification system delineates virtual assets into distinct categories based on their characteristics, providing valuable insights for policymakers, researchers, and market participants alike.

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INVESTMENT CLIMATE AND FOREIGN ECONOMIC RELATIONS IN THE CONTEXT OF THE WAR IN UKRAINE

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Ukraine is always trying to make its economy better and have more friends with other countries because of the war. Even though the war is tough, the country is working hard to make friends with other countries and groups, and to help each other out.

Ukraine is trying to get help from other countries to deal with the money problems caused by the war. Working together, like sharing money and help, is really important for fixing things, making businesses better, and being strong against problems. Ukraine wants to get help from other countries to deal with the bad things that the war is doing to its money and future.

Also, the Ukrainian government is making big changes to make it easier for businesses to operate and bring in more money from other countries. These changes cover different areas, like laws, rules, and how things are done, with the goal of making things more open, effective, and trustworthy for investors. Ukraine wants to make it easier for businesses to operate by simplifying paperwork and making sure they are protected by the law.

So, not only are they trying to fix the economy, but theyre also working on making friends with other countries and getting them to like Ukraine more. Ukraine is trying to get more help from other countries by talking to them, making deals, and showing them how good it is for business. Ukraine wants to make friends with different countries so it can have more options for doing business and not be affected too much by whats going on in the world.

In this ever-changing world, we need to stay alert and flexible. Ukraine needs to be flexible and quick in dealing with changing political and economic situations, and also take advantage of new chances for development and partnership. Ukraine can get through the tough times of war by being tough and taking action, and come out better, with a stronger economy and more friends in the world.

SECTION 6 PRESERVATION OF A HEALTHY ECOLOGICAL ENVIRONMENT FOR FUTURE GENERATIONS

BIOMETHANE AS AN ALTERNATIVE TO NATURAL GAS CONSUMPTION WITHIN UKRAINE

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The current state of the Ukrainian electric power industry appears to have fallen into a dramatically hard period. A while ago, due to commonplace shellings and missile attacks a lot of Its critical infrastructure objects were heavily damaged or even destroyed completely. The war tends to lead it to economical and power crisis, It threatens both, the future of Ukraine and the goals of the sustainable development. The Russian invasion has also provoked another challenge to the European Union due to imminent embargo on its fossil fuels. It is no secret that the European Union was dependent on the Russian gas, coal and oil before February, 2022. The following numbers represent the actual situation for the reviewed period of time: 47% of coal imports, 41% of natural gas imports and 27% of oil imports. The total consumption is imposing at this point.

In order to reduce the indicators to any noticeable level, the European commission submitted a new approach, which would be implemented till 2030. Starting with the natural gas, every item of the list would be excluded eventually. Ukraine on the other hand is obligated to purchase about 40% of Its electrical energy abroad. That makes It heavily dependent on the supplies from beyond. Therefore the sphere demands reliable and eco-friendly energy sources which are to be utilized on regular basis.

In the process of biogas extraction biofertilizer (digestate) is meant to be produced. It is a crucial nutrient source which provides methane generating bacteria with chemical compounds required for the whole procedure. That demands development in the RES field since there can barely be found another country in Europe with equal potential of producing renewable energy sources (RES) as Ukraine.

As the Institute of renewable energy claims, It has a huge potential that could cover up to 50 percent of the total energy consumption by the use of RES. That does not seem to be able to suffice, compared to some other European countries, but something that would definitely rectify the situation.

The Ukrainian energy marker reform played vital role at this point. According to the new concept the country is supposed to focus on diversifying Its energy sphere and encouraging local production of RES including biogas. However It's being a big challenge to Ukraine as about 17% of its biogas plants were ruined. Still as an agricultural country It would never face a lack of substrate for the process. It also has to be considered that the distance from substrate supplier to the facility has to be within 50 km for dry raw material and 20 km for liquid raw material, which means there has to be at least a couple of farms nearby to make use of biogas production. Otherwise there is a risk of lacking substrates for the facilities which may result in unprofitability.

Biogas production is meant to handle rapidly increasing amount of the organic waste and deal with the imperative of reducing global greenhouse gas emissions. The resource afterwards can be converted into another purified substance called biomethane. There are many benefits from the usage of biogas. Not only does it provide local solutions for waste operation but also prevents the greenhouse gas emission and ensures the flexibility of power grid which is also important for the often occuring power-cut-resistance. The problem of the mineral fertilizer substitution and digestate usage is also topical for food security as well as It fits perfectly to the circular economy scenario.

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PROTECTION OF ENVIRONMENTAL HUMAN RIGHTS IN THE LAW OF THE COUNCIL OF EUROPE

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The Council of Europe, as the leading international human rights organization on the European continent, defines human rights and the environment as one of its priorities. The documents of the Council of Europe provide the following definition of the concept of "environment": natural resources, both abiotic and biotic, such as air, water, soil, fauna, flora and the interaction between the same factors; property that is part of cultural heritage; and characteristic aspects of the landscape. It is not in vain that this concept is mentioned, because such a category of rights as "the right to the environment" gradually appeared.

There is no provision in the ECHR and in its additional protocols that would directly indicate the right to a healthy environment. However, the European Court of Human Rights has recognized in its practice and the European Commission that certain types of environmental degradation with serious consequences for individuals or even the inability of public authorities to provide information on environmental risks to which individuals are exposed may constitute a violation of certain rights protected by provisions Conventions.

From the point of view of human rights, the right to a healthy and quality environment is a fundamental right, the characteristics of which do not change with the passage of time or as a result of changing circumstances. Fundamental human rights are inalienable, and this inalienability also applies to the right to a healthy environment.

Along with the right to life enshrined in Article 2 (1) of the Convention, the right to private and family life is provided for. since it is Article 8 (1) that has been most frequently used in cases involving damage to the environment as a result of pollution. The Court's evolutionary interpretation of these concepts made it possible to compensate for these damages caused environment, and accordingly, the content of human environmental rights in a certain

way falls under the concepts of "right to life", "private life" and "family life".

Speaking about the protection of environmental human rights, one should definitely pay attention to the practice of the ECtHR. In general, it is possible to identify the following important areas of decisions adopted by the ECtHR in the context of protection of environmental rights: in which the right of a person to the environment is mentioned; in which the principle of preventive maintenance is mentioned; in the motivation of which they refer to the Aarhus Convention on access to information, public participation in decision-making and access to justice on environmental issues.

Appeals to the Court in environmental cases are made on the grounds that adverse environmental factors have caused a violation of one of their human rights protected by the European Convention on Human Rights. The Court's practice includes interference with the right to life, the right to respect for private and family life, as well as to housing, the right to a fair trial and access to a court, the right to receive and impart information and ideas, the right to an effective remedy and the right to peaceful possession of one's property.

In its activities, the Council of Europe pays great attention to international cooperation with other organizations, including issues of protection of human environmental rights and the environment. As an example, we can take the cooperation of the Council of Europe and the European Union within the framework of the EEA - European Environment Agency. Also, cooperation with the UN within the framework of UNEP - the UN Environment Program. And a key achievement of the recognition of the right to a clean, healthy and sustainable environment by the UN General Assembly and the Council of Europe is the creation of conditions for other parts of the UN system, regional human rights systems and individual states (even those that were previously skeptical of this right) to implement and develop it's a right The ability to induce, even if not obligate (General Assembly and Council of Europe resolutions are not legally binding), other parts of the international system to change course or take significant steps forward is an important and often underestimated strength of the United Nations and the Council of Europe.

THE IMPACT OF GREEN ENERGY ON PUBLIC HEALTH AND ENVIRONMENTAL WELL-BEING

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All energy sources have some impact on our environment. Fossil fuels such as coal, oil, and natural gas cause significantly more damage than renewable energy sources in most terms, including air and water pollution, public health, loss of wildlife and habitat, water use, land use, and global warming emissions.

However, renewable sources such as wind, solar, geothermal, biomass, and hydropower also have environmental impacts, some of which are quite significant. This transition from traditional, polluting fossil fuels to clean, sustainable energy sources is a key step in addressing some of the most pressing health issues nowadays. The urgency of combating climate change and achieving sustainable development is strengthening the global momentum for the transition to renewable energy in an era of global environmental degradation.

The transition to green energy contributes to a substantial reduction in air emissions of harmful substances such as carbon dioxide, nitrogen, and sulfur oxides. This helps to reduce air pollution and protect public health from respiratory diseases, cardiovascular diseases, and other air pollution-related problems. According to the International Energy Agency's (IEA) analysis for 2023, the amount of carbon generated by the energy sector remains virtually unchanged at 37.4 billion tonnes [1]. However, due to the growth of renewables, energy-related emissions in the US decreased by 4.1% and in the EU by 9% last year. A report by the IEA showed that the share of renewable energy in global electricity production could exceed coal generation by 2025, rising to 37 % of global electricity production [op. cit.].

Almost 80% of the world's population lives in countries that are net importers of fossil fuels [2]. Due to their dependence on foreign fossil fuels, approximately six billion people are vulnerable to geopolitical shocks and crises [3]. In contrast, renewable energy sources are available in all countries, but their potential has not yet been fully realized. The International Renewable Energy Agency

(IRENA) estimates that by 2050, 90% of the world's energy could and should come from renewable sources [2].

The role of renewable energy sources in reducing water pollution is another considerable public health benefit. Conventional energy production, particularly from coal and oil, often leads to water pollution through runoff, leakage, and the washing away of toxic materials. However, most forms of renewable energy, such as wind and solar, have minimal impact on water resources. This reduction in water pollution ensures drinking water supplies, protects water ecosystems, and prevents waterborne diseases, thus providing a crucial element of public health.

Renewable energy also contributes to food security, which is strongly linked to public health. Innovative methods, such as using solar energy to power agricultural equipment, the new technology of agrovoltaics (dual use of land), or using wind energy to irrigate water, are leading to more sustainable food production. This not only ensures a more stable food supply but also promotes healthier farming practices that are less reliant on pesticides, contributing to a healthier diet.

Employment is an integral element in achieving economic and social development in any country and therefore remains a key priority for governments. Currently, the global unemployment rate, which reflects the number of jobs lost since the start of the economic crisis, is 5.2% [4]. This is an increase from 5.1% in 2023, and the International Labour Organization predicts that the number of unemployed will increase by 2 million. It is noted that the main reason for the increase in unemployment is the slowdown in economic growth around the world.

According to IRENA, in 2023, the renewable energy sector employed more than 12 million people [4]. It includes various industries such as bioenergy, solar energy, hydropower, and wind energy. According to forecasts, the number of jobs in this sector could grow to 38.2 million by 2030. This indicates a high potential for economic growth and job creation in the future.

Thus, the use of green energy produces a positive impact on health and environmental well-being by reducing CO2 emissions,

mitigating harmful environmental impacts, and developing an environmentally sustainable society.

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BUFFER CAPACITY OF NATURAL WATERS

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The buffer capacity of natural waters indicates the environment's ability to compensate for changes in the content of various substances, such as acids or alkalis, without significantly altering its chemical nature or properties [1]. This indicator is crucial for preserving the ecological balance and quality of water resources. The higher the buffer capacity index, the more effectively the environment can maintain the stability of its chemical composition when external conditions change [2].

The buffer capacity may vary among different types of natural waters, depending on their composition, geographical location, and other factors. Each type of water has unique characteristics that affect its buffering capacity.

The buffer capacity of natural waters demonstrates their ability to self-regulate and maintain a stable chemical composition despite changes in internal or external factors, such as pollution, pH level fluctuations, atmospheric emissions, and other anthropogenic influences.

A high buffer capacity in the aquatic environment indicates its resistance to changes and its ability to sustain ecological

balance [3]. There are several methods for determining the buffer capacity of natural waters [4]:

1.pH titration: This method involves adding an acid or base to a water sample and measuring the change in pH [5]. The change in pH when adding acid and alkali allows you to determine the buffer capacity.

Advantages:

- Easy to use and understand.
- Ability to determine the buffer capacity directly.

Disadvantages:

- The need for accurate and potentially expensive instruments for measuring pH.
- May be insensitive to some important water components.

2. Amperometric methods: These methods are based on measuring the change in potential or current in an aqueous solution when an acid or base is added. A change in current or potential for the determination of the buffer capacity [6].

Advantages:

- High sensitivity and speed of measurement.
- Ability to use in real time.

Disadvantages:

- The requirement for sensitive sensors and devices.
- Complexity of device calibration and stabilization.

3. Methods Using Standard pH Buffer Solutions: These methods involve adding aqueous solutions of known pH to a water sample and measuring the change in pH. The buffer capacity can be determined from these data.

Advantages:

- Relatively easy to use.
- Ability to determine the buffer capacity based on known standards.

Disadvantages:

- The need to prepare standard solutions.
- Sensitivity to external influences on the solution.

4. Spectrophotometry methods: They are based on measuring the change in light absorption in an aqueous solution when acid or alkali is added. The change in light absorption makes it possible to determine the buffer capacity [7].

Advantages:

- High accuracy and sensitivity.
- Ability to measure changes over a wide concentration range.

Disadvantages:

- Requires expensive and potentially challenging-to-use devices.
- Requires special preparation of water samples.

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ON THE ISSUE OF LEGAL REGULATION OF ECOCIDE AT THE INTERNATIONAL LEVEL

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The struggle to recognize ecocide as a crime at the international level and to bring the perpetrators to justice has been going on for decades. Actions that lead to the destruction of entire

ecosystems remain unpunished, which gives rise to lawlessness and new crimes. Wars, industrial pollution, and other negative environmental impacts cause irreparable damage that has no borders and is devastating for the entire planet.

Creating a system to counteract ecocide is one of the key tasks facing humanity, the relevance of which is obvious in the context of current environmental challenges and climate change. Russia's full-scale invasion of Ukraine has actualized the problem of determining the responsibility of states for ecocide as a crime against human security. Despite certain steps in this direction, the issue of ecocide remains unresolved at the international level.

The term "ecocide" comes from the Greek *"olikos"* meaning *"house"* and the Latin *"caedo"* meaning *"to demolish"* or *"to kill"*. According to the Merriam-Webster International Dictionary, the word "ecocide" means the destruction of large areas of the natural environment as a result of human activity in peacetime or wartime [1].

The term "ecocide" was first coined in 1970 by Professor Arthur W. Galston from Yale University who first used the term "ecocide" at a conference in Washington. This happened against the background of the large-scale use of herbicides and defoliants by the United States during the Vietnam War, which caused irreparable damage to the Vietnamese environment, and Prof. Galston called for the criminalization of actions aimed at the mass destruction of ecosystems [2]. Following this claim, in 1972, Swedish Prime Minister Olof Palme called the Vietnam War an ecocide at the UN Stockholm Conference. In 1973, Princeton University Professor Richard Falk published an article calling for the adoption of an international convention on ecocide [3].

In 1985, the Whitaker Report, presented to the UN Commission on Human Rights, recommended that ecocide should be recognized as a separate international crime, along with genocide, ethnocide and cultural genocide. Between 1991 and 1996, under the influence of the UN International Law Commission, efforts were focused on solving the problem of criminalizing ecocide. Thus, in 1991, Article 26 of the Code of Crimes against the Peace and

Security of Mankind stipulated that "a person who intentionally causes or orders damage to the environment, if found guilty, shall be punished." This wording, although indirect, still pointed to the criminal nature of ecocide. However, already in 1995, after many legal discussions, this article was excluded, which in turn made it impossible to bring certain subjects to international legal responsibility under the article of ecocide [4, p. 323].

Meanwhile, efforts to include ecocide in the jurisdiction of the ICC do not stop. The Rome Statute of the International Criminal Court mentions the environment only once in the context of war crimes and in situations legally qualified as armed conflicts. However, in addition to war crimes, crimes against humanity are another mechanism for environmental protection under the jurisdiction of the ICC, but this category is purely anthropocentric and consists of the destruction of the environment by "committing a massive or systematic attack" against civilians [5].

In 2017, Stop Ecocide International Ltd (SEI) was founded, a company whose main goal is to promote the recognition of ecocide as an international crime. In June 2021, the Independent Expert Panel (IEP), which was established at the initiative of Stop Ecocide International, presented a definition of ecocide for an amendment to the Rome Statute: "unlawful and unjustified acts committed with the knowledge that they may cause serious widespread or long-term damage to the environment" [6]. In this respect, it should be noted that the recognition of ecocide as a crime by amending the Rome Statute will allow for the criminalization of the people responsible for actions or decisions that have led to serious environmental damage.

The process of introducing such amendments to the Rome Statute is complicated and lengthy. A member state must formally propose an amendment, which must then be approved by a two-thirds majority of all member states. However, constant public pressure and public discourse should influence the consciousness and push member states to adopt such changes. For example, in February 2024, the Belgian Federal Parliament voted in favor of a new version of the Criminal Code, which for the first time in Europe includes the

recognition of the crime of ecocide at both the national and international levels, applying the definition proposed in 2021 by the Independent Expert Panel (IEP) [7].

The day before, on March 29, 2023, the European Parliament officially proposed to include "ecocide" in the EU Directive on Environmental Crimes. On November 17, 2023, the EU reached an agreement on the final text of the new document, which includes acts that "cause destruction, irreversible, widespread and significant damage, or long-term, significant and widespread damage to the ecosystem." Although the wording of this provision does not explicitly mention "ecocide," the definition proposed in 2021 by the Independent Expert Panel (IEP) is applied. This is the first time such a definition has been included in EU legislation. On February 27, 2024, the EU Parliament voted in favor of the new directive on environmental crimes, and the European Council is scheduled to vote in March 2024. After both governing bodies vote, EU member states will have 24 months to align their national legislation with the directive. Since the EU represents almost a quarter of the states in the International Criminal Court, this would be a big step towards international recognition of "ecocide" as a crime [8].

Considering the recent events in Ukraine, the following fact should be highlighted: on March 14, 2024, the Supreme Court of Ukraine found Russia guilty of war crimes and crimes against the environment committed during the invasion of Ukraine. This was the first precedent for recognizing ecocide as a crime at the national level. Further, on April 21, 2024, the International Criminal Court launched an investigation into possible crimes of ecocide committed by Russia in Ukraine.

As for public initiatives, in 2024, the international coalition of non-governmental organizations *Stop Ecocide* launched a campaign to collect 1 million signatures under a petition to recognize ecocide as a crime. At the same time, protests were held in 20 countries around the world to demand that ecocide be recognized as a crime.

In terms of scientific research, in 2023, a study published in *Nature* magazine showed that human activity had led to the death of the 6th mass extinction of species on Earth. This emphasizes the

urgent need to recognize ecocide as a crime. In turn, in 2024, a group of scientists from Oxford University developed a new methodology for assessing environmental damage. This methodology can be used to collect evidence in cases of ecocide. Such changes at the level of the European Union indicate the eco-centric development of EU law and, in particular, the movement of legal regulation towards the recognition of ecocide as a crime at the EU level [9].

Undoubtedly, the inclusion of ecocide, along with crimes against humanity, in the Rome Statute is an extremely important step, but it is only part of the process of realizing the place of humans in the environment, their inextricable link and interdependence. Humanity still faces many challenges related to this issue. Changes in legislation concerning ecocide at the national level are urgent, as countries must adopt laws criminalizing ecocide and other crimes against the environment. Law enforcement agencies need to be strengthened, namely, resources are needed to investigate and prosecute crimes against the environment. Also, a change in consciousness is crucial, i.e., awareness of the importance of environmental protection and environmental responsibility needs to be raised. All available tools, including legal, political, economic, and other instruments, are important to achieve a change in consciousness and environmental protection.

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PEDAGOGICAL APPROACH TO TACKLING STREET TRASH PROBLEM

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Addressing the issue of street trash requires a multifaceted approach that not only involves community initiatives and policy interventions but also emphasizes pedagogical strategies to instill a sense of environmental responsibility from a young age.

Educators play a pivotal role in shaping the attitudes and behaviors of future generations towards the environment, street trash problem in particular. Incorporating environmental studies into school and university curricula enables students to develop a deep understanding of the consequences of littering and the importance of waste management.

Interactive learning experiences, such as field trips to recycling centers or participation in community clean-up activities, can provide students with firsthand exposure to the impact of street trash on their surroundings. These experiences foster a sense of ownership and responsibility for the environment, encouraging students to take proactive measures to reduce littering and promote cleanliness in their communities.

Furthermore, integrating environmental themes into various subjects, including science, social studies, and language arts, facilitates a holistic approach to environmental education. Through interdisciplinary projects, students can explore the interconnectedness of environmental issues and develop critical thinking skills to devise innovative solutions to address street trash.

An example of this is a student project, which was presented at Sumy State University (Ukraine) in 2024 at the lesson of English. Here is an abstract from it:

«Street trash problem is very important, even during the war. Because if we ignore this problem, the city will collapse into one big landfill. Our native city Sumy also has this problem. We have many polluted places outside the city center: abandoned "Hirosima", near the water, in parks, on bus stops.

But we still have opportunities to change it. How can we make Sumy cleaner without spending millions of hryvnias? The answer is very simple: trash cans. The biggest part of garbage is cast because of human laziness. If we put more trash cans, less garbage will be on the streets. So, if we become a little bit more patient to not throwing garbage before trash cans and always remember that it is our holy Ukrainian soil, motherland for many generations of Ukrainians, which we are to love and look after, we'll be able to solve this problem.»

In addition to formal education, informal learning opportunities, such as environmental clubs, societies, associations, as well as extracurricular activities, offer venues for students to engage actively in environmental issues. These platforms provide a space for students to collaborate, exchange ideas, and implement initiatives to

combat street trash, fostering a sense of cooperation and collective responsibility.

Moreover, incorporating technology can enhance the effectiveness of pedagogical interventions. Interactive simulations and virtual reality experiences can simulate real-life scenarios related to waste management, allowing students to explore the consequences of their actions in a safe and controlled environment.

Beyond the classroom, partnerships with local municipalities, NGOs, and businesses can provide students with opportunities for hands-on engagement in environmental conservation efforts. By actively participating in community initiatives, students not only contribute to tangible solutions, but also develop a sense of civic duty and social responsibility.

Ultimately, addressing the issue of street trash requires a comprehensive and sustained effort that begins with education. By incorporating pedagogical approaches that promote environmental consciousness and active citizenship, we can empower future generations to become ambassadors of a cleaner, healthier world.

STRUCTURAL AND PHYSICAL PROPERTIES OF MULTI-ELEMENT ALLOYS BASED ON TiZrCu AND NbCuSi

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Multi-element alloys like TiZrCu and NbCuSi are highly intriguing for scientists due to their unique blend of structural complexities, including both amorphous and crystalline phases. Understanding these structural intricacies is pivotal for enhancing mechanical and thermal properties [3]. Research on these alloys is crucial for their broader adoption in advanced sectors such as aviation, space, and thermal energy, where materials with exceptional strength, heat resistance, and controlled microstructure are indispensable. These alloys exhibit complex crystalline structures with microregions of amorphousness, which develop during the order restoration process in the melt, highlighting their unique structural characteristics.

The structure of these alloys comprises both crystalline and amorphous phases, with variations depending on composition and synthesis conditions [2]. The size and distribution of these phases significantly impact material properties, such as strength and ductility. Studies highlight the importance of particle size, where smaller sizes tend to increase strength. Understanding these structural aspects is vital for optimizing alloy properties and developing efficient synthesis methods for diverse applications [3]. The mechanical properties of coatings based on TiZrCu and NbCuSi alloys are influenced by dispersion strengthening, grain boundary strengthening, and volume deformation [3].

One of the key mechanisms influencing mechanical properties is dispersion strengthening, which occurs due to the presence of fine amorphous particles in the material [2]. This effect contributes to increased material strength and its ability to resist deformation. Additionally, grain boundary strengthening plays an important role in enhancing the strength of the alloy. Grain

boundaries in the material act as obstacles to the movement of deformation dislocations, leading to increased strength and ductility. Particle size also matters for the mechanical properties of the material [3]. Studies show that reducing particle size contributes to increased material strength since smaller particles create more interphase barriers to the movement of deformation dislocations. Thus, understanding the mechanical properties of multi-element coatings based on TiZrCu and NbCuSi is crucial for their successful application in various industries, including aviation, aerospace, and energy [1].

Multi-element coatings based on TiZrCu and NbCuSi alloys are characterized by high thermal stability [3], making them particularly valuable for applications in high-temperature environments. This property is explained by the structure and phase composition of the material. The amorphous and crystalline phases in TiZrCu and NbCuSi alloys can provide structural stability at high temperatures, allowing them to retain their mechanical properties during operation in high-temperature environments [4]. Moreover, high resistance to thermal mechanical degradation is an important characteristic for the application of these materials in conditions where high temperatures and mechanical loads are present. Research shows that TiZrCu and NbCuSi multi-element coatings have stability against crystallization at high temperatures, allowing them to maintain their structure and properties during operation, where other materials may degrade.

Multi-element coatings based on TiZrCu and NbCuSi alloys have a wide range of potential applications in high-tech industries [4]. One of the main directions for the application of these materials is the aviation industry. Their high strength, thermal stability, and excellent corrosion resistance make them ideal candidates for manufacturing structural components of aircraft and spacecraft [2]. Specifically, multi-element coatings can be used to produce lightweight and strong wings, fuselages, and engines, improving the performance and fuel efficiency of aircraft. Additionally, these materials can be applied in thermal energy production, particularly in the manufacturing of turbine blades for gas turbines [2]. Their high thermal stability and strength allow them to operate in high-

temperature and pressure conditions, making them essential components for the energy industry. Furthermore, potential applications of multi-element coatings include the production of equipment for protection against high temperatures, such as manufacturing heat-resistant protective suits for rescuers and workers in hazardous conditions [1].

Considering the TiZrCu and NbCuSi alloys, several key aspects can be highlighted. Firstly, they have complex crystalline structures, including both amorphous and crystalline phases, which allows for a better understanding of their properties and optimization for various applications. Secondly, in terms of mechanical properties, dispersion strengthening and grain boundary strengthening play a crucial role in enhancing the strength and ductility of the material. Thermal stability is also important, especially for applications in high-temperature conditions such as in aircraft, spacecraft, and power plants. Regarding potential applications, these alloys have a wide range of uses in aviation, space, energy, and other high-tech industries. Finally, to fully realize the potential of these materials, further research is needed on their structure, properties, and synthesis methods [4].

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INTENSIFICATION OF MECHANICAL PROCESSING OF GUIDING DEVICES ON MULTI-COORDINATE CNC MACHINES

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Guiding devices are an integral part of the design of centrifugal pumps, which play a key role in various sectors around the world providing efficient and reliable pumping of liquids in industrial, municipal, agricultural, and domestic conditions. In industry, centrifugal pumps are the most commonly used, especially in the chemical, oil refining, water and energy sectors.

Centrifugal pumps are the most widespread and versatile types of pumps, having the same principle of operation and design elements that contain several key components which together ensure their efficient functioning: casing, impeller, shaft, guiding device, bearings, shaft seals, etc. The design of a centrifugal pump can vary depending on its type and purpose, but the above-mentioned elements are basic for most models.

The guiding device deserves special attention, as it has a complex geometric shape of the channels. The characteristic profile of the channels of these devices ensures their functional purpose, but it is the geometric element that poses the greatest difficulties in the processing. It requires additional devices or re-fixing of the workpiece, as it is impossible to process all the channels in one setup without any obstacles.

In recent decades, this problem has been solved by machining on CNC milling machines, which do not require the use of additional devices. However, re-fixing cannot be avoided due to the lack of tool accessibility. It takes a lot of time and can lead to fixation errors. Due to the rather large range of devices, it is difficult to fix them in standard devices, so they are usually mounted in special or universal fixtures.

From the point of view of reducing auxiliary time and costs for special devices, it is proposed to develop a universal automated reconfigurable device for machining guide devices in one setup, ensuring maximum tool accessibility.

The study of the issue has shown that the experience of automated flexible machine devices has already been applied to such parts as levers, connecting rods, forks and successfully implemented in production.

Therefore, the topic of future research is promising and should be developed in the context of changes in the approaches to the processing of devices, cutting modes, tool selection, and control.

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NUMERICAL ANALYSIS OF THE INFLUENCE OF SEAL RINGS DEFORMATIONS ON THE FLOW AND ROTORDYNAMIC CHARACTERISTICS OF LABYRINTH-HOLE SEALS

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Labyrinth seals are a standard type of non-contact seals used in turbomachinery such as compressors, turbines and pumps. They provide the necessary level of sealing, although certain leaks are allowed. In jet engines, non-contact gas seals are mainly used to minimize leakage between components with different pressures, and to prevent direct contact between the rotor and stator. Importantly, any contact between the rotor and stator at high speeds can cause damage to the seal, poor performance, and ultimately engine failure.

Recent research on labyrinth seals has focused on leakage analysis, heat transfer, rotor dynamics, seal configurations, and energy losses through the seals, including both experimental and numerical studies. Analytical studies of these issues are also being

worked on. The calculation of rotordynamic coefficients is usually performed using numerical methods. To calculate fluid forces, three-dimensional computational fluid dynamics (CFD) modeling is used, which allows researchers to better understand the flow in complex seal configurations, and numerical studies of heat transfer have shown good agreement with experimental data.

Most existing studies make certain assumptions to simplify the complex fluid-structure interaction (FSI) problems. However, based on the fact that in real conditions, the liquid and the structure have a significant influence on each other, it is necessary to develop a methodology for the numerical calculation of flow in damper labyrinth-hole seals, taking into account the deformations of labyrinth rings made of flexible materials. Such a method will allow to achieve greater accuracy in studying fluid dynamics and its influence on the structure, taking into account all key aspects of the fluid-structure interaction.

The development of a methodology for numerical calculation of static and dynamic characteristics of labyrinth-hole seals for turbopump units of liquid rocket engines is of great practical value. One of the possible areas of its application is the possibility of evaluating promising designs of labyrinth-hole seals at the stage of their development without conducting experimental studies. This will make it possible to optimize the geometry of the seal to achieve the required optimal leakage values, dynamic stiffness and damping coefficients without conducting expensive field experiments.

THE PROBLEM OF INCREASING THE ROTATION SPEED OF THE CENTRIFUGAL PUMP ROTOR AND ITS INFLUENCE ON THE WORKING PROCESS

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Pumps are hydraulic machines designed to move liquids under pressure. By converting the mechanical energy of the drive motor into the mechanical energy of fluid motion, pumps raise the fluid to a certain height, deliver it to the required distance in the horizontal plane, or force it to circulate in any closed system [1].

Centrifugal pumps are the most common pumps designed for supplying cold or hot water, viscous or aggressive liquids (acids and alkalis), wastewater, mixtures of water with soil, ash and slag, peat, and crushed coal. The high efficiency of modern pumping equipment, combined with energy efficiency and the possibility of using in a wide range of pump capacities and pressure pumps characteristics, make it indispensable in any production and water supply systems. Centrifugal pumps are one of the most common types of pumps, used in various industries to pump large volumes of liquids with high efficiency.

The main advantages of a centrifugal pump are as follows: 1) uniformity of flow; 2) high speed (possibility of direct connection to the engine); 3) compactness; 4) simplicity of construction; 5) the possibility of pumping contaminated liquids, since centrifugal pumps have large gaps between the casing and the pump and no valves; 6) massive foundations are not required to installation centrifugal pumps.

The most significant disadvantages of centrifugal pumps are: 1) slightly lower efficiency than piston pumps (10–15% lower); 2) the need to fill the pump and suction pipe with liquid before starting it; 3) a decrease in productivity with an increase in pressure; 4) a sharp decrease in efficiency at low productivity. A general mathematical model for increasing the rotor speed of a centrifugal pump is the description of the continuous viscous liquid motion by the Navier-Stokes equation.

Increasing the rotor rotation speed of a centrifugal pump can be achieved by reducing the overall, mass characteristics and the convex shape of the rotor blades. In the case of a simplified calculation of the centrifugal pump rotor speed, the direct stiffness of the seal-support was determined from the dependence for a short gap seal.

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HYDRO-SUSPENSION LAYER SIMULATION IN CYLINDROCANE APPARATUS

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Fractionation of granular material in hydroclassifiers with an upward flow is relevant for such branches of the economy as ferrous metallurgy, mechanical engineering, electric power, chemical and food industries. The main purposes pursued in this case are: increasing production efficiency, minimizing material and energy losses, improving product quality, promoting sustainability of production and compliance with environmental and safety standards.

Currently, hydroclassifiers of various designs are used in the industry for the separation of crystalline suspensions: vertical and horizontal, hydromechanical and hydraulic, cylindrical and cylindroconical. In all these devices, the classification process takes place under the conditions of interaction between the floating solid phase and the liquefying agent. In a vertical cylindroconical apparatus with a cone that expands upwards, the formation of a hydrosuspended layer is carried out by means of the impact on dispersed solid particles by the ascending liquid flow of the transient flow regime.

During the modeling of the hydrosuspended layer, it was assumed that the liquid and particles do not change their physical properties in the process of interaction, the movement of particles is vortex-free, the particles have a rounded shape and do not aggregate into blocks. In the flow of liquid, various forces act on the particle - viscous, gravitational and inertial. They form a certain hydrodynamic environment around the particle, during which it hovers and moves in a certain direction. The parameters describing the hydrodynamic situation are the equivalent diameter of the grains, the flow regime, and the local difference of the suspended layer.

At the initial stage, the layer is stationary and occupies a certain volume in the apparatus. In the process of interaction of the layer with the flow of liquid coming from the bottom up, and under

the action of viscous, gravitational and inertial forces, a homogeneous hydrosuspended layer of suspension is formed. The local parameters of the suspended layer are formed and set along the height of the apparatus in accordance with the local hydrodynamic situation. They depend on the physical and chemical properties of the interacting phases, as well as on the local geometric characteristics of the conical section (input diameter and height, cone opening angle). Suspended layers of a classified suspension are formed in a stable mode of phase hydrodynamic interaction in the apparatus at a certain height. Monofractions of products with a certain mass fraction, volume concentration and a certain size range (or the average size of the monofraction grains) can be selected from these layers.

Thus, all of the above modeling parameters can be used to develop an engineering method for calculating vertical cylindrical-conical hydroclassifiers for their industrial use.

FEATURES OF COATINGS BASED ON MULTICOMPONENT TITANIUM NITRIDES

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Recently, researchers are increasingly interested in the features of coatings based on multicomponent titanium nitrides. Therefore, the development of functional multicomponent nanostructured coatings with excellent performance properties, such as high hardness with good plasticity and good anti-corrosion properties is an area of constant interest in many industries.

Despite the importance of various solid materials, however, little research has been conducted to study the problem of the chemical composition and structure of multilayer coatings, as they allow understanding the interactions between components and optimizing them to achieve optimal properties.

In this article, I claim that multilayer coatings are a versatile tool for improving the properties of various materials and structures. The use of multilayer coatings leads to achieving certain functional and characteristic properties of the material or the object they cover.

Depending on the specific application, the purpose of this article may include the following aspects: protection against corrosion and oxidation; increasing stability and strength; improvement of thermal conductivity; aesthetic appearance; friction and wear reduction properties.

The obtained results show that multilayer coatings are coatings with multifunctional characteristics, lower residual stresses, good adhesion to metal substrates, improved hardness-to-viscosity ratios, and low friction coefficients. The study provides implications for further research and application in various fields of science and technology.

The paper contains a number of practical recommendations for further scientific research and improvement of materials. They are the further research of the material properties; study of the environmental impact of the production and use of multilayer coatings; involvement of industrial partners for the implementation of multilayer coatings in practice and expansion of their use in industrial processes.

THE USE OF EJECTORS IN TRANSCRITICAL REFRIGERATION SYSTEMS ON CARBON DIOXIDE

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Modeling and optimization of a jet working process in carbon dioxide (CO2) heat-using installations is an urgent task in the context of finding effective solutions to increase the efficiency of refrigeration and heat pump systems.

In transcritical refrigeration systems, ejectors are used as additional devices to improve the efficiency of the medium-temperature compressor system. Ejectors are placed on the line connected from the gas cooler to the receiver. The use of ejectors has shown its effectiveness in installations located in warm climates.

In transcritical refrigeration systems, the ejector uses high-pressure and high-temperature CO2 from the gas cooler in a transcritical liquid state as the active medium. By increasing the

velocity in the nozzle, the kinetic energy of the CO2 expansion is converted into potential pressure energy. A part of the flow coming from the liquid separator installed after the evaporator is sent to the line connected to the ejector, ejected, and increases its pressure from the boiling pressure in the evaporator to the pressure in the receiver.

Various mathematical models are used to simulate the operation of the jet ejector. One of the key models describes the flow using Navier-Stokes equations and the equations of bounding surfaces. This model allows to take into account all physical parameters and boundary conditions, which is important for an accurate mathematical representation of the processes.

However, there is not enough experimental research on the processes occurring in the ejector using carbon dioxide. In addition, the known designs of the ejectors using CO2 as a working medium have disadvantages, that lead to a loss of ejector efficiency.

Further work will focus on refining the flow model along the jet ejector, taking into account the results already obtained for other working media, and developing new approaches to improve the efficiency of ejectors using carbon dioxide as a working medium in heat-using installations. Considering the recommendations and research results, it is also necessary to choose the design of the jet ejector using carbon dioxide, key elements such as supplied working nozzles and mixing chamber to ensure flow symmetry and efficient operation, to perform mathematical modeling of the the jet ejector operation in the nozzle outlet, to experimentally confirm the correctness of the chosen mathematical model, calculate and visualize the flow in the Ansys CFX software package.

INNOVATIVE HOLE MACHINING METHODS FOR ENSURING HIGH ACCURACY OF PIN TAPERED JOINTS IN PUMPING EQUIPMENT

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In modern industry, pumping equipment plays an important role in ensuring production processes for pumping of liquids and gases. Modern production is constantly looking for innovative

solutions to improve the quality and efficiency, to extend the service life, and ensure uninterrupted operation. Pin tapered connections are an important element in pumping equipment. They provide a secure connection between different elements, such as pump covers and casings, make possible easy replacement of bearing supports and maintenance.

The use of conventional tapered pin hole machining techniques is outdated and require too many resources: machining time and cost. Currently, there are a number of problems in the machining of holes for tapered pin connections: insufficient accuracy of the relative position of the surfaces and the geometry of the holes, insufficient strength.

Ensuring high accuracy and geometry of holes is important for the reliability and durability of structures, for minimising the likelihood of defects and breakdowns during operation. Innovative methods and technologies help achieve high-quality machining in a shorter time and reduce production costs. To solve the problem of machining accuracy is to use high-precision CNC machines with automatic measurement and correction systems to ensure the required accuracy and relative positioning of surfaces. Additionally, the use of such machines will reduce machining time compared to universal machines. Computer modelling techniques can also improve the quality of machining. This method enables the calculation of optimal machining parameters in advance to obtain the required accuracy and hole geometry. To solve complex problems, it is appropriate to use robotic systems. Automating the machining process with robotic systems will ensure high accuracy and repeatability of operations. These methods can help solve existing problems with the processing holes for pin-tapered connections in pumping equipment.

The constant search for and implementation of innovative methods and technologies in the production of pumping equipment is becoming a central task for the industry.

HYDRODYNAMIC CONDITIONS OF SEPARATION OF THREE-PHASE SYSTEMS IN VORTEX APPARATUS

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Apparatuses for separation of gas-liquid mixtures with solid inclusions include hydro-cyclones and centrifugal separators. The principle of operation of such apparatuses is to separate liquids and solid particles based on their size and density under the influence of centrifugal forces with simultaneous degassing of the system. In most of these apparatuses, the suspension is fed into the apparatus through a tangentially mounted nozzle, which results in a rotation motion inside the shell of the apparatus. In the formed field of centrifugal forces, solid particles with a higher density move to the inner surface of the apparatus shell, where they move along the wall to the bottom under the action of gravity and are subsequently removed from the apparatus. The light liquid fraction is formed in the central part of the casing and discharged from the upper part of the apparatus.

The disadvantages of such apparatuses are low separation efficiency, which limits the possibility of separating inclusions of different sizes and difficulty in separating systems with more than two phases. This makes it necessary to use additional equipment to achieve a certain level of product purity. The proposed method and design have some features that positively affect the operation of such an apparatus. First of all, grooves for phase drainage are formed by the variable cross-sectional area of the cylindrical-conical body between the double walls, which makes separation process of three-phase systems more accurate. It should also be noted that the gas-liquid mixture is fed from the lower part of the apparatus, after which, under the influence of centrifugal forces, it rotates towards the upper part of the apparatus, where the low-pressure zone is located. Thus, in the area of funnel, which is formed due to the vortex flow in the cylindrical-conical body of the apparatus, as well as on the surface of the gas-liquid phase separation, degassing

occurs, and the purified gas mixture is discharged from the top of the apparatus body. The study of hydrodynamics, in particular, velocity and pressure fields, as well as trajectories of motion of the continuous medium and dispersed particles, confirms the presence of clearly defined three zones (high, medium, and low pressure). This phenomenon is proposed to be used to separate three-phase flows into the required number of fractions. Thus, the design of the three-phase vortex separator has unique operating features that under normally require multi-stage separation in traditional two-phase separators.

So, it can be concluded that theoretical and experimental studies of hydrodynamic processes during the separation of two- and three-phase systems will allow to establish hydrodynamic conditions and parameters to achieve a high degree of separation and the most efficient separation during the operation of the vortex apparatus.

DIFFUSION COATINGS IN MACHINE INDUSTRY

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Improving operational characteristics of steel products can be achieved with chemical heat treatment (CHT), which changes the phase and chemical composition, structure and properties of surface zones. The choice of CHT method, saturating element or group of saturating elements determines the properties of coated steel. Currently, the methods of single- and multi-component saturation of ferritic, austenitic, martensitic stainless steels with non-metals and metals are well-known.

Recently, the tasks of CHT have become more complicated. Diffusion coatings are required to provide not one, but several properties under extreme operating conditions.

A positive effect from the use of protective coatings can be achieved with an individual approach to the selection of not only their composition, but also to the method and manner of application to specific products and tools. Furthermore, when selecting a

composition, it is necessary to meet the requirements that satisfy the intended coating depending on the operating conditions (e.g. high strength, wear-resistance, corrosion resistance, etc.). Moreover, the compatibility of the coating material with the treated alloy in terms of its strength profile should be taken into account. When choosing a method or application technique, it is essential not only to obtain the required composition, structure and properties of the coatings, but also their qualitative characteristics (porosity, fragility, uniformity in the diffusion layer thickness, absence of defects, etc.). When selecting specific coating compositions and methods of their production, it is also necessary to take into account economic factors (capital investment cost, depreciation charges, cost and consumption of the initial reagents). It should be noted that today there are no universal compositions of carbide coatings and methods of applying them to the surface of steels and hard alloys that for all operating conditions.

The operational properties of carbide coatings depend not only on the phase composition, but also on their carbon and alloying element content. The data on the distribution of elements across the coating thickness allow us to evaluate the diffusion processes of elements in the coating, and are of some scientific interest.

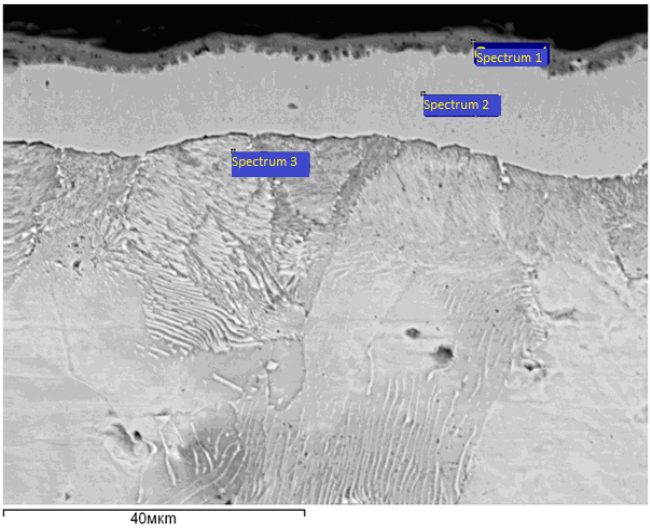

Figure 1 – Microstructure (in reflected electrons) of the surface layer of steel 45 after **chrome-titanizing**; T=1050°C, τ= 3 hours.

In the process of chrome-titanizing of steel 45, a two-layer structure is formed on the surface (Fig. 1). According to the micro-X-ray spectral analysis, the upper layer (spectrum 1) consists of titanium 79.42% (wt.) and carbon 18.5% (wt.), which corresponds to TiC carbide. About 2.08% (wt.) of chromium is dissolved in it.

The central zone contains chromium and carbon. The carbon concentration of 5.4% (wt.) corresponds to Cr23C6 carbide. According to micro-X-ray spectral analysis, a significant amount of iron (up to 19.8% (wt.)) is also observed in this zone. This is typical for diffusion carbide-chromium coatings.

Under the coating, there is a zone enriched with 9.4% (wt.) chromium, i.e., not only the carbide layer is alloyed with iron, but the base is also alloyed with chromium, which leads to the improvement in mechanical properties.

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FACTORS AFFECTING SUSTAINABLE DEVELOPMENT GOALS IN ZIMBABWE

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Sustainable development goals (SDGs) have become a focal point for policymakers and researchers worldwide, aiming to address pressing global challenges while ensuring the well-being of present and future generations. Zimbabwe, like many other developing

countries, faces significant challenges in achieving sustainable development due to various economic, social, and environmental factors. This abstract outlines the research field by acknowledging the importance of sustainable development and the critical role of Zimbabwe in contributing to global efforts.

Zimbabwe's journey towards sustainable development is marked by a complex interplay of factors that influence its progress towards achieving the SDGs. Economic instability, political unrest, and inadequate infrastructure pose significant challenges to sustainable development efforts in the country. Additionally, socio-cultural factors, including gender inequality and limited access to education and healthcare, further exacerbate the challenges faced by Zimbabwe in achieving its sustainable development goals.

This study aims to explore the multifaceted factors affecting sustainable development goals in Zimbabwe and proposes strategies for addressing these challenges. Through an interdisciplinary approach, incorporating insights from economics, political science, sociology, and environmental studies, the paper will analyze the root causes of Zimbabwe's sustainability challenges and identify potential solutions. By highlighting the importance of addressing these factors, the paper seeks to contribute to the ongoing discourse on sustainable development in Zimbabwe and provide valuable insights for policymakers, researchers, and practitioners.

The study draws on existing literature, empirical data, and case studies to provide a comprehensive overview of the factors influencing sustainable development in Zimbabwe. The implications of these factors on Zimbabwe's progress toward achieving the SDGs and exploring potential pathways for overcoming barriers to sustainable development are essential. By synthesizing existing knowledge and proposing innovative solutions, we aim to contribute to the advancement of sustainable development efforts in Zimbabwe and beyond.

In summary, this paper will explore the various factors affecting sustainable development goals in Zimbabwe, analyze their implications, and propose strategies for addressing these challenges. Through a multidisciplinary approach, the study aims to provide

valuable insights and recommendations for policymakers and stakeholders to advance sustainable development in Zimbabwe and contribute to global efforts towards achieving the SDGs.

THE INFLUENCE OF GEOMETRIC PARAMETERS OF THE FLOW SECTION ON THE CHARACTERISTICS OF REGENERATIVE COMPRESSORS

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Regenerative compressors are a class of turbomachinery whose operating principle is similar to dynamic action machines, but they have some features of volumetric machines, namely, a high pressure increase at low flow velocity and a linear change in head relative to flow rate. These compressors are characterized by relative simplicity of design, absence of surge phenomenon, low cost of manufacture, and stable operating characteristics.

The application range of these machines covers many industrial sectors and agriculture where stable operating conditions, small dimensions, weight, and high reliability are required. For example, regenerative compressors can be used in air boost systems for combustion chambers in thermal power plants, aeration of wastewater, air supply as a barrier gas in dry gas seals (DGS), and purging magnetic bearings in centrifugal compressors. Additionally, regenerative compressors can be also used as booster compressors to supply buffer gas to DGS during start-up and shutdown periods of centrifugal compressors.

Understanding the principle of any device operation can help to reduce losses and increase productivity. Moreover, optimization can be made depending on whether we want to increase efficiency, boost pressure, or improve flow structure. The operating principle of centrifugal compressors is well studied, and therefore these devices have been standardized to date. However, although regenerative compressors are machines of dynamic action principle, their flow structure is more complex and corresponds to the regenerative hypothesis. According to this hypothesis, gas particles in the flow

section move in spiral trajectories from the inlet to the outlet of the machine, repeatedly interacting with the impeller blades and gradually receiving energy from it, which provides a significantly higher pressure rise compared to centrifugal stages.

The amount of energy transfer strongly depends on the geometry and design parameters of the impeller and the casing, where pressure rise occurs. Geometric and design parameters include the impeller size, the blade shape, their location and number, the location of inlet and outlet openings, the shape of the annular channel, number of stages, etc. Most of the research work conducted to improve the performance of turbomachinery with regenerative flow has focused on geometric and design parameters.

There has been considerable amount of research devoted to studies on the structural elements of regenerative compressors. Various blade shapes ranging from straight to curved, aerodynamic, chevron, or even S-shaped have been investigated. Although blades of complex shape are usually more efficient, but considering one of the main advantages of compressors with regenerative flow, namely, their simplicity, complex blade shapes may negate this advantage. Therefore, straight radial blades have become the most widespread. Regarding the type of impeller and channel, impellers with peripheral and peripheral-side blades in combination with a circular profile of the meridional section of the channel are most commonly used in regenerative compressors.

In addition to the study of structural elements that ensure energy transfer of the gas flow, special attention is paid to the study of compressor elements that cause losses. Knowing the loss types and their causes can help minimize them and increase compressor efficiency. Compressors with regenerative flow are very sensitive to axial and radial clearances between the impeller and casing. For efficient operation, these clearances need to be minimized, taking into account thermal and pressure deformations.

One of the most interesting elements of a regenerative compressor to study is a stripper. It is an integral part of the flow section of the regenerative compressor and prevents the gas under pressure from entering the suction area. However, some gas is

transferred to the suction area through the clearance and interblade channels of the impeller. The amount of leakage decreases as the clearance decreases and the angle of a stripper increases, but on the other hand, an increase in the stripper angle leads to a decrease in the working area of the channel. A stripper design involves determining its angle and clearance between it and the rotor. Most researchers have used empirical values of parameters and use 2 to 3-blade pitches as a stripper angle measure.

Due to these and other losses, regenerative machines have relatively low efficiency. It has been established that leakage losses through the stripper are higher compared to other elements of the flow section. Therefore, systematic research should be conducted in the stripper area.

Computational fluid dynamics (CFD) can provide insight into gas flow that is impossible to obtain analytically or experimentally and improve performance by reducing losses. Moreover, expensive prototype manufacturing can be done after establishing convincing characteristics using CFD models. The results of such studies will be useful for visualizing the flow scheme and identifying any deficiencies in it. With the advent of high-speed computing, the use of CFD has become very popular in engineering design and analysis.

It is proposed to create a parametric model of the flow section of the regenerative compressor, select significant geometric and thermodynamic parameters and ratios, and study the gas flow in the compressor flow section, and optimize geometric parameters to achieve maximum efficiency.

APPLICATION OF 3D-PRINTED PLASTIC SAMPLES IN PUMP CONSTRUCTION

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The use of 3D printing in mechanical engineering provides a wide range of opportunities to create complex parts and prototypes promptly and with high accuracy. This technological process makes it possible to produce components and parts for cars, airplanes, ships,

turbines, engines, and other types of machinery using a variety of materials, including plastic, metal, ceramics, and even composite materials.

This process enables the rapid and efficient engineering and prototyping of new parts and components. It reduces the required time for designing and testing new models, which results in faster time-to-market for new products. In addition, 3D printing can be used to produce unique, customized items that meet specific customer needs.

To select a plastic, it is proposed to produce samples that will be evaluated according to the following criteria:

1. **Tensile strength:** This parameter will be determined with a dynamometer to measure the material's resistance to fracture under tensile force.
2. **Compressive strength**: The value of this indicator will also be determined with a dynamometer, which will help measure the force that the sample can withstand under the compressive force.
3. **Hardness**: The hardness of the material will be determined with a hardness tester, which will measure the level of resistance of the material to penetration by a solid.
4. **Modulus of elasticity:** This indicator will be measured with a dynamometer, which enables to evaluate the ability of the material to return to its original state after applying a tensile force.
5. **Melting point:** This parameter will be determined with a thermometer which will allow measuring the temperature when the material becomes liquid.

These criteria will enable an objective assessment of the structural properties of various plastics and, on this basis, the appropriate type of plastic for a particular application will be selected.

It is suggested to create test samples for each type of plastic. These samples will be tested for tensile and compressive strength, as well as hardness and melting point.

The study will also analyze how different 3D printing parameters affect the characteristics of manufactured items. The research will cover changes in filling style, filling density, and printing speed.

RESEARCH ON THE STRUCTURAL AND PHASE STATE OF DIELECTRIC FILMS OF SiO2, MgO

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Dielectric films of materials such as SiO2 and MgO can be used in various technological applications, ranging from microelectronics to optics. Understanding their structural and phase state is essential for optimizing their properties and performance.

Scanning electron microscopy (SEM) was used to study the surface morphology of the films. The X-ray diffraction (XRD) analysis revealed that the SiO2 films show an amorphous structure, consistent with its known properties. MgO films typically shows a crystalline structure, with prominent diffraction peaks corresponding to the cubic phase of MgO. The SiO2 films shows a higher hardness compared to the MgO films, which can be attributed to their amorphous nature. The optical properties of the films were studied using spectroscopic ellipsometry, revealing high transparency and a refractive index suitable for optical applications [2]. SiO2 films have a high dielectric constant, making them suitable for use in capacitors and insulating layers in microelectronics. MgO films have a lower dielectric constant but offer excellent electrical insulation properties. Dielectric strength is another critical property of dielectric films, as it determines their ability to withstand high electric fields without breaking down. SiO2 films have a high dielectric strength, making them suitable for use in high-voltage applications. MgO films also exhibit high dielectric strength, making them ideal for insulation in electronic devices. The mechanical properties of dielectric films are essential, especially in applications where the films are subjected to mechanical stress [3]. SiO2 films are known for their high hardness and mechanical strength, making them resistant to scratching and wear. MgO films also shows good mechanical properties, making them suitable for use in harsh environments. SiO2 films are highly stable chemically, making them resistant to corrosion and degradation [4]. MgO films also exhibit good chemical stability, making them suitable for use in corrosive environments. The optical properties of dielectric films are crucial in applications such as

optical coatings and photovoltaic devices. SiO2 films are transparent in the visible spectrum, making them suitable for use in optical applications [1]. MgO films also shows good optical properties, with high transparency and low absorption coefficients.

In conclusion, SiO2 and MgO dielectric films show us unique properties that make them essential in various technological applications. Their images showed that both of them had smooth and uniform surfaces when manufacturing quality is high, but also they had different types of structures and hardness levels. Understanding these properties is important for optimizing their performance and developing new applications in areas such as microelectronics, optics, and energy storage.

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VIBRATION DIAGNOSTICS AS THE MOST EFFECTIVE METHOD FOR ASSESSING THE TECHNICAL CONDITION OF ROTOR MACHINES

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Scientific and technological progress requires the use of machines of various purposes and designs. During operation, a machine interacts with the environment, the person operating the machine, and the object for which it is intended, and this leads to a gradual degradation of its quality indicators. The machine, which is supposed to be a human assistant, eventually becomes a burden for human, needs his or her help, and the person is forced to provide this help by regularly monitoring the technical condition of the machine and promptly responding to undesirable changes. The main causes of machine failure are: breakage of parts due to fatigue phenomena caused by load; changes in the size of parts in moving joints as a result of wear; jamming of moving joints; breakdowns of parts under peak loads; failure of individual parts and mechanisms due to breakdowns caused by combined effects of external conditions, wear and fatigue. Experience has shown that among the various methods of diagnosing the current technical condition of a machine, the most effective and efficient one is vibration diagnostics, which allows to assess the condition of the machine based on the results of monitoring vibrations that accompany the operation of the machine and most fully reflect the physical processes that occur in it. Only an ideal machine would not generate vibrations at all, because all the energy in it would be converted into useful work. In practice, during the operation of any mechanism, elastic vibrations with the frequencies ranging from several hertz to hundreds of kilohertz occur and propagate as side effects of the normal transmission of dynamic influences.

The main value of the vibroacoustic signal lies in its versatility, since changes in its parameters are correlated with changes in many parameters of the technical condition of the mechanism caused by the degradation of its components, changes in the size of parts, deviations in adjustment parameters, etc. The wide

frequency and dynamic ranges, low inertia, and high propagation speed determine the rapid response of the vibroacoustic signal to changes in the state of the object. The simplicity and accessibility of converting a vibroacoustic signal into an electrical one and the possibility of its further processing using modern electronic and microprocessor technology are also important.

Vibration is a process that cannot be directly measured. The parameters of this process must be measured. In this case, it is necessary to select parameters that are in a certain way correlated with the parameters characterizing the degradation of the technical condition of the machine. The parameters that describe the vibration process constitute diagnostic features, and their selection is a significant problem that requires studying the characteristics of vibration generation by each type of machine.

JUSTIFICATION OF THE FEASIBILITY OF USING A SHELF PNEUMOCLASSIFIER FOR THE SEPARATION OF POLYDISPERSE MIXTURES IN THE PRODUCTION OF MINERAL FERTILIZERS

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One of the important areas of the chemical industry is the production of granular phosphate fertilizers. Among phosphate fertilizers, various types of granular superphosphates, ammophos, and other complex fertilizers are in high demand by consumers.

Technological operations of obtaining granular fertilizers lead to the formation of a product of polydisperse granulometric composition. At the same time, the consumer requirements for this indicator are quite stringent: the commercial fraction with a granule size of 1–4 mm should be at least 85–90 %, and fractions less than 1 mm – no more than 5 %.

Recent granulation methods do not guarantee the production of a product with a specified range of granule sizes. Therefore, any technological line must be equipped with equipment that would limit the granulometric composition. Such equipment includes classifiers and crushers. They should enable the return of large fractions of

more than 4 mm for crushing and extraction of small fractions less than 1 mm.

To separate granules by size in modern technologies, mechanical classification on screens is used. The most common is mechanical separation. The polydisperse mixture is divided on vibrating screens, thus separating the fraction of more than 4 mm on the upper sieve, and less than 1 mm on the lower one. However, superphosphate granules have a sufficiently high temperature at the outlet of the granulator (about 90 °C), they are prone to agglomeration and adhesion. Therefore, the fine fraction clogs the cells of the lower sieve while reducing the passage section of the holes. This leads to a deterioration in the sifting capacity of the lower sieve. As a result, the fraction content of less than 1 mm in the material is overestimated, which does not meet the requirements for the quality indicators of the finished product. The operational reliability of the screen is also degraded as it must stop to clean the surface of the lower sieve. To partially solve this problem, additional mechanical screens are installed after the fluidized bed coolers. However, this approach complicates the technological scheme and leads to an increase in energy costs for production.

A rational way to solve this problem is to use pneumatic classification in order to remove small fractions from granular material using a shelf-type pneumatic classifier. The pneumatic classifier is installed after the granulator, which makes it possible to eliminate the need for mechanical screen in the lower sieve and at the same time to cool down the granulated product. At the same time, the need to use a separate fluidized bed cooler in the technological line is eliminated, which avoids the above-mentioned disadvantages.

RESEARCH AND DEVELOPMENT OF ENERGY-EFFICIENT HIGH-SPEED CENTRIFUGAL AGGREGATES

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Hydrodynamic pumps and aggregates based on them are used in many industries and the national economy. Pumps of various designs accounts for 25-50% of the total energy consumption in

different countries and industries. Rising energy costs and environmental protection have led to the need to reduce the consumption of electricity (or other types of energy) by pumping aggregates both during operation and at the production stage.

One of the ways to solve these problems is to use pumps with increased rotor speed. In general, the topic of such pumps is not new, but they have not been widely used in industry and other sectors of the economy. The use of such a pump aggregate design allows reducing the weight and initial cost of the pumps, as well as improving energy performance, for example, increasing the efficiency. One of the factors in the slow transition to the use of high-speed pumps is the lack of existing pump designs and design methods. Classical design methods are used for pumps with rotor speed up to 3000 rpm, which cannot be fully applied in the design of high-speed pumps.

In this research, the main criteria for improving the energy efficiency of pumps are presented, and the analysis of existing structures and pump design methods is carried out. A new methodology for designing working parts of pumps under new operating conditions is also proposed, the main parameters of the pump are determined, and mathematical calculations are presented. The design of a 6000 rpm pump for water supply with the required parameters was designed and presented. At this stage, this pump is being tested and its technical parameters are being determined.

It can be concluded that the development and introduction of high-speed pumps will increase the efficiency of pumps and contribute to environmental protection.

HOW TO AVOID ERRORS WHEN REPORTING TO THE ARBITRATOR IN THE BANKRUPTCY LIQUIDATION PROCEDURE

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Following Clause 2 of Section I of the Procedure for Controlling the Activities of Arbitration Administrators, approved by the Order of the Ministry of Justice of Ukraine dated December 6,

2019 No. 3928/5, control over the activities of arbitration administrators under this Procedure is carried out by the Ministry of Justice as a state body on bankruptcy issues and interregional departments of the Ministry of Justice (further - territorial bodies of the Ministry of Justice) with the consent of the Ministry of Justice. According to Clause 1 of Section II of this Procedure. The control over the activities of arbitration managers is carried out by conducting scheduled and unscheduled inspections.

When conducting an unscheduled inspection, the inspection commission mainly deals with issues that are raised in the complaint of the subject of the appeal, the inspection commission is not empowered to go beyond the limits of the complaint, since Clause 6 of Section II of this Procedure contains an exhaustive list of grounds for conducting an unscheduled on-site inspection checks.

Recently, there has been an increase in interest in the reporting of the arbitration manager to the creditors' committee.

That is why, it is necessary to focus attention on this issue.

In accordance with Part 4 of Art. 61 of the Code of Ukraine on Bankruptcy Procedures, the liquidator shall submit to the creditors' committee at least once a month a report on his activities, information on the debtor's financial condition and property on the day of the opening of the liquidation procedure and during the liquidation procedure, on the use of the debtor's funds, as well as other information at the request of the creditors' committee.

At the same time, the shortcoming of the Code itself is that there are no requirements for the volume of the specified information, as well as the frequency of the description of the actions taken.

However little is known about the situation in practice. Arbitration administrators quite often take advantage of the specified loophole in the legislation and send reports to the members of the creditors' committee that are duplicated every month and do not cover the progress of the arbitration administrator's work. Sometimes arbitration administrators in their reports indicate the work performed in several sentences since the requirements for the scope

of the report by the Code of Ukraine on bankruptcy procedures are absent.

From the analysis of this norm, it follows that the Code of Ukraine on Bankruptcy Procedures did not regulate the specific form of reporting of the arbitration manager to the creditors' committee, from which it can be concluded that the selection of the specified form is within the competence of the creditors' committee (and not the court or an individual creditor). That is, in the arbitration the manager independently, (in agreement with the creditors' committee) determines the form of the reporting, such as: 1) sending letters to each member of the creditors' committee; 2) delivery of information at meetings of the creditors' committee, subject to compliance with the monthly deadline and the presence of all members of the creditors; 3) sending the report to the chairman of the creditors' committee, provided that this is directly indicated in the Minutes of the meetings of the creditors' committee if this decision was adopted by the creditors' committee; 4) the use of electronic means (by sending messages only by e-mail or by reporting via video conference).

At the same time, it is worth noting that the legislator focuses firstly on the time period - the arbitration manager is obliged to report every month, if we approach formally - then on any date, every month there must be a report; secondly, the composition of the subject, the arbitration manager is obliged to report to the entire composition of the creditors' committee, for example, the creditors' committee consists of four people, the arbitration manager reported to three creditors and did not send a message to the fourth, or the fourth creditor was absent at the meeting of the creditors' committee and the arbitration manager did not send him the minutes of the creditors' committee meetings. As a result, the creditor was properly informed about the meeting, thus in this situation the arbitration manager committed a violation, because in fact he did not report to the entire composition of the creditors' committee for a specific month.

Finally, the Code of Ukraine on Bankruptcy Procedures stipulates what information is provided - about the debtor's financial

condition and property on the day of the opening of the liquidation procedure and during the liquidation procedure, about the use of the debtor's funds.

In conclusion, the selection of the specified form of reporting is within the competence of the creditors' committee (and not the court or an individual creditor). At the same time, the creditors' committee does not consist of one person, and its decisions are made in the form of minutes. The Code clearly stipulates the deadline for submission - at least one month and the composition of the subject - the committee of creditors, and explains what information is to be provided (there are no requirements for the volume of the specified information, as well as the form of its provision). At the same time, the Code of Ukraine on Bankruptcy Procedures which does not include the liquidator's obligation to convene monthly meetings of the creditors' committee, must be offered.

THE IMPACT OF LEADERSHIP ON ORGANIZATIONAL PERFORMANCE AND SUPPLY CHAIN EFFICIENCY IN CHINESE IMPORT CROSS-BORDER E-COMMERCE

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Chinese import cross-border e-commerce (ICBEC) has attracted wide attention from the retail industry, scholars, and the public. In the wave of economic globalization and supply chain integration, research on supply chain leadership can help enterprises make strategic supply chain decisions.

This study is trying to discuss whether supply chain leadership has a positive impact on organizational performance and supply chain efficiency in the context of ICBEC in China.

There are few studies on the role of leadership in the integrated supply chain of ICBEC in China. Studying the influence of supply chain leadership has a significant impact on organizational performance and supply chain efficiency, which can enhance the competitiveness of the booming ICBEC supply chain.

This study facilitates a research framework with three concepts, including supply chain leadership, organizational performance, and supply chain efficiency. The study employs web questionnaires to collect data from 107 ICBEC employees. Structural equation modeling is adopted to test the hypothesis.

Supply chain leadership has a positive impact on organizational performance and supply chain efficiency. The results show that transactional leadership has a stronger effect on organizational performance, while transformational leadership has a stronger impact on supply chain performance. Suggestions are given based on the different influences of transactional leadership and transformational leadership.

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МАТЕРІАЛИ XVIII ВСЕУКРАЇНСЬКОЇ НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ
Лінгвістичного навчально-методичного центру
кафедри іноземних мов та лінгводидактики

(Суми, 25-26 квітня 2024 року)

«TO MAKE THE WORLD SMARTER AND SAFER»

Materials of the eighteenth all Ukrainian scientific practical students', postgraduates' and instructors' conference of Foreign Language Teaching Centre of the Department of Foreign Languages and Linguodidactics

(Sumy, April 25-26, 2024)

Відповідальний за випуск Н. В. Таценко
Комп`ютерне верстання О. А. Литвиненко