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У збірнику представлені матеріали VIII Всеукраїнської науково-практичної студентської конференції з міжнародною участю, що висвітлюють питання філології, психології, педагогіки, методики викладання іноземних мов, історії, політології, екології, інформатики, менеджменту та економіки.

Для студентів вищих навчальних закладів, аспірантів, наукових та педагогічних працівників.

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SPECIAL MECHANISMS OF SYNTHESIS OF NEW ORGANIC-INORGANIC COMPOSITES

Modern scientific research is aimed at obtaining composite materials with improved sorption properties by modifying the surface layer with various organic reagents, in particular nitrogen-containing polymers, which can be used as effective complexing sorbents for metal cations due to their complexation with nitrogen atoms of the immobilized polymer.

The physical fixation of the polymer on the surface of the inorganic carrier is carried out by precipitation of pre-synthesized polymer macromolecules from solution and subsequent decantation of the synthesized composite onto the filter by slow drying with spontaneous evaporation of the solvent or its forced removal from the composite phase. The main advantage of this method is its simplicity, but the hydrogen bonds formed are so weak that the polymer can easily move from the surface of the carrier to the solution.

The method of chemical fixation of the polymer on the surface (chemical surface modification) is based on the formation of covalent bonds between the polymer and the inorganic carrier. This method makes it possible to obtain materials with high concentrations of polymer bound by strong chemical bonds to the functional groups of the inorganic matrix.

Sol-gel synthesis of organic-mineral composites consists in the formation of the inorganic component of sol-gel composites around polymer particles. As a result, areas of different phases of nanoscale are formed. Almost all products formed after this process have the properties of nanomaterials. The great advantage of this method is the ability to vary the structure, the amount of inorganic carrier, its packing density, etc.

One of the promising ways to create organo-mineral composite materials with valuable adsorption properties, but at the same time the least method of immobilizing polymers on solid surfaces is *in situ immobilization*, which consists in the direct formation of an immobilized polymer layer in the presence of inorganic carrier particles. This method irreversibly fixes the supramolecular structure of polymer-based composite materials, as well as its supramolecular packaging. The density, permeability, surface properties, and level of electrical conductivity are determined by the packaging of macromolecules, so it is impossible to rebuild the assembled chain.

There are known studies on the synthesis of various organic-inorganic composites using the methods described above. The properties of dispersed oxide matrices with physically fixed chitosan [1], by crosslinking it with diglycidyl ether of ethylene glycol [2], and by sol-gel synthesis [3] have been studied.

A silicagel-poly[8-methacryloxyquinoline] composite was prepared by *in situ immobilization* [4]. Scientists at Taras Shevchenko National University of Kyiv have obtained new organo-mineral composites with *in situ mobilized* derivatives of 8-oxyquinoline (oxine) with nitrogen-chlorine-containing groups.

To study the surface parameters of the synthesized composites, infrared and mass spectroscopy, thermogravimetric analysis were used to confirm the formation of polymers and to determine the structures of the immobilized polymers.

So, most of the new organic-inorganic composites exhibit higher adsorption capacity for Cu^{2+}, Pb^{2+}, Mn^{2+}, Fe^{3+}, and Cd^{2+} ions due to the increase in active centers on the surface.

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THE EVOLUTION OF YOUTH VOCABULARY AND SLANG: A LINGUISTIC ADVENTURE

Language is a dynamic entity, constantly evolving and adapting to the needs and preferences of its speakers. Nowhere is this more evident than in the realm of youth vocabulary and slang. From generation to generation, young people develop their own lexicon, replete with slang terms and expressions that serve as markers of identity, solidarity, and cultural belonging. In this thesis, we will explore the world of youth vocabulary, examining its origins, functions, and impact on communication and social dynamics.

The origins of youth vocabulary and slang can be traced back to various sources, including popular culture, music, social media, and regional dialects. Young people often draw inspiration from their surroundings, incorporating elements of their environment into their linguistic repertoire. For example, the rise of hip-hop music in the 1980s and 1990s gave birth to a plethora of slang terms and expressions that became widely adopted by youth culture.

Youth vocabulary serves multiple functions, beyond merely conveying meaning. One of its primary functions is identity formation. By adopting and using slang terms specific to their social group or subculture, young people signal their membership and affiliation. Slang can also serve as a form of resistance or rebellion against mainstream language norms, allowing youth to assert their independence and autonomy [1].

Moreover, youth vocabulary often functions as a form of code-switching, enabling young people to communicate with peers in a manner that is distinct from formal language usage. This code-switching facilitates bonding and solidarity within peer groups, creating a sense of belonging and camaraderie.

The adoption of youth vocabulary and slang has a profound impact on communication and social dynamics, both within peer groups and in broader society. On the one hand, it fosters a sense of camaraderie and belonging among young people, strengthening social bonds and facilitating communication within peer networks.

On the other hand, youth vocabulary can also be a source of misunderstanding and miscommunication, particularly across generational or cultural divides. Older generations may struggle to understand or interpret the slang used by young people, leading to friction or conflict in intergenerational communication. Similarly, the rapid evolution of youth vocabulary can make it difficult for adults to keep pace with the latest trends and expressions, further exacerbating the communication gap [2].

In conclusion, youth vocabulary and slang represent a vibrant and dynamic aspect of language evolution. From its diverse origins to its multifaceted functions, youth vocabulary plays a central role in identity formation, communication, and social dynamics among young people. While it can be a source of solidarity and connection, it also presents challenges in intergenerational communication and understanding. Nevertheless, the ever-changing nature of youth vocabulary ensures that language remains a dynamic and evolving phenomenon, reflecting the creativity and ingenuity of its speakers.

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INNOVATIVE APPROACHES TO IMPROVING THE ORGANIZATION OF EXTRACURRICULAR PHYSICAL EDUCATION CLASSES

The state target program for the development of physical culture and sports until 2024 indicates the huge role of physical culture and sports in the all-round harmonious development of a person, the formation of his physical and spiritual perfection. At the current stage of the development of physical culture and sports in Ukraine, the problem of improving the system of physical education of schoolchildren is becoming particularly relevant.

Physical activity and health have become important aspects of modern life, especially in the conditions of a sedentary lifestyle and technological progress. In the school environment, extracurricular activities in physical culture are a key element of raising a healthy generation. In order to meet the needs of students in the modern world, it is necessary to constantly improve the organization of extracurricular activities, introducing innovative approaches. In today's technology-driven world, the use of innovative solutions in various industries is becoming a key factor in development. Physical culture is no exception, and the use of technology in this area opens up new opportunities for health and physical development. Let's consider how the use of technology in physical education contributes to the improvement of the quality of classes and the motivation of students.

One of the main innovations can be the use of modern technologies to improve the quality of extracurricular physical education. Mobile applications, virtual simulators and gaming technologies can be an important tool to engage students in physical activity and promote their interest in a healthy lifestyle. The introduction of mobile applications and interactive platforms makes physical activity accessible and exciting. Workout apps that provide personalized workouts, track progress, and provide health recommendations can become an integral part of physical education. Wearable electronic devices such as fitness trackers can be effective means of tracking physical activity and keeping statistics. It promotes self-control, motivates to achieve goals and provides additional information for pedagogical work.

To improve extracurricular activities in physical education, it is important to take into account the diversity of individual capabilities and interests of students. The use of various types of physical exercises, which take into account different types of activity, allows each student to find his own way to health.

An innovative approach can also be to involve professionals in the field of physical culture and sports to organize extracurricular activities. Coaching staff with extensive experience in individual and group work can become an important motivation factor for students. Diversity in physical education plays a key role in creating a stimulating and effective environment for student development. The variety of approaches to physical exercises contributes not only to the physical, but also to the mental development of students. Let's take a look at how a variety of approaches to exercise can contribute to health and learning about different aspects of physical activity.

Creating communities and interactive online platforms can make extracurricular activities more accessible and interesting for students. Joint participation in virtual training, sharing experiences and competitions can increase students' interest in physical exercises. Taking into account the different needs of students involve the use of both group and individual approaches to physical exercises. Group classes encourage social interaction and collaboration, while individual training allows you to personalize the program to meet specific goals. The development of communities on the Internet is becoming an important means of uniting enthusiasts of physical activity. The creation of communities on platforms such as forums, social networks or specialized applications facilitates the exchange of ideas, training plans and the support of a common goal. Interactive platforms allow trainers and students to conduct training online. With the use of video communication, coaches can provide instructions and correct technique in real time, and students can track their progress and receive feedback. The creation of virtual sports events and competitions on interactive platforms is becoming an important aspect of the development of physical culture. This may include online competitions, challenges and other activities that motivate activity and a healthy lifestyle.

Innovative approaches to improving the organization of extracurricular physical education classes play a key role in the formation of a healthy and active generation. Through the introduction of technologies, various approaches and the involvement of professionals, it is possible to create favorable conditions for the development of the physical and mental health of students, contributing to their full physical development and the formation of a healthy lifestyle. The development of communities and interactive platforms in physical culture is changing the paradigm of extracurricular activities, making them more exciting and effective. Interaction, exchange of experiences and the use of the latest technologies contribute to the development of physical education and increase motivation for a healthy lifestyle.

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CHANGE DETECTION IN SATELLITE IMAGES USING MACHINE LEARNING

With the rapid development of technologies, there exists an ongoing necessity to enhance and automate a variety of processes. An essential and highly relevant area of study today involves researching the recognition, tracking, and monitoring of changes in objects. In this paper, we explore the task of change detection, covering its concepts, approaches, deep learning workflow and an overview of results.

Remote sensing (RS) is the process of gathering information about the Earth's surface from a distance, often using satellites or airplanes. It produces special types of images like multispectral and radar images, capturing data across multiple bands of the electromagnetic spectrum or using radar waves to penetrate through clouds and vegetation. They help scientists study things like land usage, vegetation health, and geological characteristics.

Change detection (CD)[1] is a task in remote sensing that aims to identify changes within a scene by comparing two images taken in the same geographic area but at different times. This task finds wide-ranging applications in urban development, disaster management, land cover monitoring, and defence capability enhancement, which is critically important for Ukraine at the moment.

To solve this issue, numerous approaches have been proposed, which are broadly classified into two categories: traditional and AI-based [2]. They can be generally summarized into the following groups:

- Pixel-Level - compares pixel values directly between images to identify differences;
- Feature-Level - extracts and compares features such as keypoints or edges to detect changes;
- Object-Level - segments images into objects or regions, comparing them between images;
- 3D Object-Level - integrates three-dimensional scene data to analyze changes in object structure or geometry over time.

AI-based techniques, especially machine learning methods, are currently the most effective tools. Machine learning (ML)[3] is a branch of AI that focuses on using algorithms to enable machines to imitate the way human brains learn, gradually improving their accuracy. It is effective due to its ability to analyze vast amounts of data and identify patterns or anomalies.

The standard workflow of the change detection architecture involves several steps [4]:

1. Dataset selection. Choosing a dataset containing relevant data for the task is

crucial for both training and evaluating the model. In the field of RS, datasets include different kinds of images: SAR (Synthetic Aperture Radar), multispectral, VHR (Very High Resolution), hyper-spectral, and heterogeneous.

2. Pre-processing. This step involves preparing the images or data before feeding them into the CD model. This includes tasks such as normalization (correcting consistent radiometric and geometric properties), image registration (aligning images from different times), denoising (removing unwanted noise artifacts or speckle noise), image filtering (improving image quality).
3. Deep learning network for change detection. Deep Learning (DL) is the subset of ML methods based on neural networks. Neural networks operate by processing input data through interconnected layers of nodes to produce output predictions. Convolutional layers are commonly used in image-processing tasks. They are employed to process, detect and extract features from data. In the context of CD, a distinctive feature involves the fusion of input images. By adjusting various model parameters and the sequence of operations, it is possible to create a model that is sufficiently accurate in predictions.
4. Evaluation techniques. Evaluation metrics are necessary to assess the performance of the model. The most commonly used metrics are Accuracy, Precision and Recall, F1-score, percentage of correct classification (PCC), PRE (represents that of expected agreements), IoU, and Kappa. Some examples are given below.

$$\text{Precision } (P) = \frac{\text{TP}}{\text{TP} + \text{FP}} \qquad \text{Recall } (R) = \frac{\text{TP}}{\text{TP+FN}}$$

$$\text{F1-score} = \frac{2 \cdot P \cdot R}{\text{P+R}} \qquad \text{Kappa} = \frac{\text{PCC -PRE}}{\text{1 -PRE}}$$

Here TP - pixels identified as change, TN - pixels identified as unchanged, FP - unchanged pixels are incorrectly identified as change by the algorithm, FN - changed pixels that are incorrectly classified as unchanged.

5. Change detection. The final output is a change map, which highlights the areas where significant changes have occurred. This map can be binary or encode

different types of changes. Using visualization techniques, we can easily show the changes by overlaying them on the original images.

To provide an overview of the outcomes of several models, the results obtained from an investigation [5] conducted in August 2023 on Onera Satellite Change Detection are given below (Table 1).

Change detection using ML techniques has shown significant success in remote sensing applications. However, it faces several challenges such as dealing with high-dimensional datasets, solving nonlinear optimization problems caused by different sensors, getting enough training data for ML methods, which is a time-consuming process, and selecting the most suitable models among new ones, requiring the assurance of reliability in practical usage.

In conclusion, it is necessary to admit that the task of change detection has been significantly strengthened by the integration of ML algorithms with remote sensing data, leading to increase accuracy and efficiency. The continued evolution of machine learning approaches holds great promise for advancing change detection capabilities.

Method	Precision	Recall	F1
ResNet50 (ImageNet-1k)	70.42	25.12	36.20
SeCo	65.47	38.06	46.94
MATTER	61.80	57.13	59.37
ViT (ImageNet-22k)	48.34	22.52	30.73
SatMAE	48.19	42.24	45.02
Swin (random)	51.80	47.69	49.66
Swin (ImageNet-22k)	46.88	59.28	52.35
GFM	58.07	61.67	59.82

Table 1. Onera Satellite Change Detection Results

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TOURIST ATTRACTIONS OF ZHYTOMYR REGION

In Zhytomyr region, the tourism potential is not fully unlocked, so some sites need to be promoted and popularised for different target groups of tourists.

In our opinion, it is worth paying attention to Drevlyansky Park in Korosten, which is the most prominent attraction in the region. It is located in the heart of the city, on the banks of the Uzh River. There is a magnificent bridge over the river, a huge statue of Prince Mal and Princess Olga, a large network of walking paths and many other interesting things. Drevlyansky Park is one of the TOP-12 best parks in Ukraine. The park is home to the 3rd Drevlianske settlement, which is classified as an archaeological site. The natural landscape has been preserved — picturesque flora and rock outcrops. The military history museum Skelia is located in Drevlyansky Park, which you can visit to listen to a detailed and professional story about the recent past of this region. The Skelia complex is located above the river, on the site of a Drevlyansky settlement. The caves in the granite rock were discovered in the 6th-10th centuries, and in our era they became the basis for the construction of a powerful fortification [1].

It is worth noting that Staryi Solotvyn is also a place of interest: an amazing place on the island of love. This wonderful house is located on the Island of Love, created in 1970. The building was erected 14 years after the creation of this island. The name of the island makes it clear that the visitor will not be indifferent to this beautiful location. No wonder the Hunting Lodge looks quite romantic, as it is surrounded by a lake, and several slender birches and fir trees grow near the hut itself. Locals say that this mysterious building is haunted by the spirit of a fisherman who committed suicide for love. There is also a legend that nymphs live in the river that washes the islet. It is said that they are waiting to lure someone to the moths. The house is built of wood, which is carved and painted with wonderful patterns. A wooden bridge leads from the house to the islet, which, unfortunately, is not in very good condition. The doors of the house are closed, so you are not able to get inside, but the view from the outside makes up for it. The island used to be a favourite place for fishermen and hunters. They stayed there for rest and shelter during the rain, until the islet became a tourist destination and gained popularity. The best time of year to visit is autumn, but it is beautiful at any time of the year [2].

The top tourist magnet is Radomysl Castle, a private museum complex located in the city of Radomyshl (Zhytomyr region). Opened by Ukrainian activist and doctor Olga Bogomolets, Radomysl Castle is a story shrouded in romantic legends that inspire achievements and bring good luck. It is the only museum of Ukrainian domestic icons in Europe, based on the personal collection of icons that Olga Bogomolets has been collecting since 1995. The complex exposition includes various collections of objects of both sacred art and church utensils. This beautiful complex unites the Via Regia boutique hotel, the Soul of Ukraine museum of Ukrainian home icons and antiquities, as well as a landscaped park, a room for ceremonies, a refectory, a conference and a concert hall [3].

Another attraction of the Zhytomyr region is the castle located in the city of Berdychiv. This castle was founded in the 16th century. At that time it belonged to the Tyshkevich family. But in 1630, Jan Tyshkevych was released from captivity, and after that he gave the castle to the Catholic Order of the Barefoot Carmelites. At that time, the construction of the castle was still ongoing. A Roman Catholic church and a monastery were later built on the territory of the fortifications. In the 18th century, the castle was reconstructed by Jan de Witt, who built the Church of the Holy Trinity. During the Second World War, Berdychiv Castle was heavily damaged, but in the postwar years it was restored [4].

Perhaps, the most popular place in the Zhytomyr region, which, unfortunately, is to its detriment, is Korostyshiv Canyon. On weekends, there are a lot of people here, and some of the holidaymakers do not consider it necessary to clean up the consequences of their picnics. But, if we put aside these nuances, we can safely say that Korostyshiv Canyon is one of the most beautiful places not only in the Zhytomyr region, but also in the whole of Ukraine. The canyon will envelop you in the scent of pine needles and impress you with breathtaking views. Here you can go rock climbing, swim on sap boards, have a picnic, swim in the water and relax your soul. The place that has become famous among travellers was created by a skilful human hand, and, ultimately, nature made its contribution, giving the canyon the look it has now. In the 19th century, the Korostyshiv granite quarry was born. This is the name it was given at the time, and this is how the locals call it. In 1850, the small town of Korostyshiv became an important centre for the extraction of gabbro (a stone used to make crushed stone and monuments). By the way, if you go to Korostyshiv itself, you will see that there are a lot of buildings with inscriptions on them: "production of gravestones". This is the application of gabbro stone nowadays), labradorite (a stone that is actively used for decorative purposes, especially for the manufacture of chairs, window sills, columns and cornices) and granite (a stone used for construction purposes) [5].

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THE DYSTOPIAN WARNINGS OF GEORGE ORWELL'S NOVEL «1984»

War is just one of the ways to govern a state. Having realised the inadmissibility of a full-fledged nuclear conflict due to the high losses, the authorities decided to use war as a way to control consciousness, by uniting society and through fear of a constant threat because fear is all that remains when God is dead. But as we remember, nothing can tolerate emptiness, something has to take the place of God. And this is not a father, but an older brother. And I am not talking about the present time, but about George Orwell's novel «1984», which has become especially relevant for us.

In a world where war is becoming the norm, the novel «1984» is perceived differently for us. The theme of totalitarianism and control emphasises the importance of freedom, which becomes especially important in times of war. Through the prism of this novel, we can understand not only the tragedy of war, but also its impact on society and psychology. A lot of people may draw a parallel between the people in the novel and the people of our enemy.

SYMBOLISM

An ulcer... an ulcer on the protagonist's leg is what best describes the world in which Winston lives. This ulcer is constantly itching, does not give him peace, the hero feels not even old, but decrepit. The whole world around Winston is also old, everything in it is falling apart, deteriorating and stinking. The author of the novel is very attentive to smells. For example, one of the descriptions in the novel: "There are red flags of the Youth Union and spies on the walls, a full-size poster of my older brother. The whole building smells like boiled cabbage, but a pungent smell of sweat breaks through this more familiar stench".

It's clear where this image came from: while George was working on the work, he was dying of tuberculosis on a remote island. He had to reprint the book himself, despite his exhaustion, because the typist refused to come. The protagonist is also a writer, and his brainwashed mind begins to malfunction after Winston starts a diary. He wonders who he is writing this for. For the future? For the unborn? Is it really 1984? Suddenly, Winston stumbles over a newly used word: doublethink. He realised that he had started something big.

ORWELL'S WORLD

Winston feels as if the face on his older brother's posters is constantly looking into his soul. What is more interesting is how we are shown the use of the anger of the masses because the negative needs to be released somewhere. For example, on fictional enemies. It is interesting how Orwell describes this feeling of enlightenment when Winston realised that he was shouting with the crowd. The worst thing about a moment of hatred is not that you have to play a role, but that it is impossible not to join in. After 30 seconds, pretence is no longer necessary. The sickening ecstasy based on fear, the thirst for revenge, the desire to kill and torture seem to keep the participants on edge, unwillingly turning them into screaming madmen. The anger they feel is abstract and not directed at anything. It can be redirected from one object to another.

THE IMPORTANCE OF MEMORY

Memory is the fuel of literature and Winston, when he focuses on memory, awakens his own personality, it is important for him to cling to the past. That's why he surrounds himself with a huge amount of cute stuff and thinks that in this environment he can build happiness with his beloved Julia. They even dream of starting a family, although they are frankly aware that they are actually suicide bombers. Julia's character is also really damn interesting, because unlike Winston, she didn't have a childhood as such. She's from a new generation of children, but she likes to stand up to the system. Why? Because she is a child in her mind. She sees that the system is deceiving her, so she wants to deceive it in return. However, she has no memory - this anchor in the past around which her personality will begin to form. She enjoys the protest itself, the rejection of the system. At the same time, Winston is also an image of a writer who decided to oppose the soulless state machine with such ephemeral, seemingly insignificant things as words and memory. But the most interesting thing is that for Orwell, the goal of power is primarily power itself, nothing more. This is, in fact, the apogee of the perversion of the idea of what the power of God can symbolise. The government no longer has any purpose other than to rule people. And in order to control people better, they try to undermine all possible guidelines that form a personality. That's because the old God had just as much trouble with people. Just look at the story of Adam and Eve, who learnt about good and evil. That is, they received the same bricks to form a personality, after which they were immediately expelled from Paradise. Therefore, the new God has to do what first of all? Destroy the very personality of man. And in order to destroy this personality, it is necessary to break any connection with the past. Yes, these details of the past are really what is so important to Winston's consciousness. It is no coincidence that at some point all his ideas, all his dreams, everything that somehow tells us about his "I" will be formed from specific details of the past. But, even before this moment, we understand perfectly well what Winston is actually capable of in order to achieve his goal. He is, in fact, condemning himself to death when at a certain point he agrees to do anything to undermine the party's power. He agrees to poison people, kill children, and commit almost any crime, just to get back his memories of the past. However, as mentioned above, notice how the same details of the old world are described. Getting here is difficult and dangerous, but the room itself is a safe haven.

Winston once stared into a glass dome with the feeling that he could get inside and stop time. The memory makes him feel, grieve, and dream, which is why he wants so badly to build family happiness with Julia, even though he understands that this is an absolute illusion. It's no coincidence that at one point, the protagonist says that it's important not to betray each other, even though it doesn't change anything at all. And then he positions his main principle of struggle: if you see the point of remaining human, even if it doesn't matter, you have already won. At the same time, Winston is still a child, he still has aggression in him, and this aggression is directed towards the party. In this case, the party's task is not to destroy this aggression, but to redirect it. As we have said before, the new government has difficulty with people and difficulty with personalities, so the aggression directed at the party must be redirected to the person himself, because in this way the personality will be destroyed. After all, those who do not respect themselves cannot protest in any way.

HOW TO DESTROY A PERSONALITY?

Love can only be killed through betrayal because the moment you betray your feelings, you cease to respect yourself. As already mentioned, love does not tolerate emptiness. God is love, but in the place of "nothing" there must be "something". When Winston betrays his feelings, a new form of love is born, love for Big Brother. Look how Orwell is attentive to language. Winston's self-awareness begins when he writes his first honest phrases in his diary and shows himself to be a great writer. He chooses his words and describes his feelings precisely. At the same time, there is also a new language. It wants to limit freedom of thought at the level of language. Hence the hero's rejection of the new language. He deliberately speaks only the old language. The party removes the internal dispute by introducing doublethink. In other words, it actually legitimises hypocrisy, when logic ceases to be the only way to understand the world. People no longer see contradictions. It is this doublethink that appears in Winston's realisation at the end. All the messages about a false victory in a false war, which the protagonist used to read so easily, now make no sense to him. Because in the place of this abyss, of self-dislike, of betrayal of his feelings, an unhealthy love for Big Brother is born. Now he is a cattle, a cattle that is ready to be slaughtered. The most interesting thing about the novel is that Orwell writes it at his death, the last word he would say to the world if he wanted to shout out. The main thing is not to betray each other, even though it doesn't change anything...

This is the main meaning of the novel. Because at the moment when a person does not betray himself, preserves his personality, he retains the desire to fight. This is the only panacea. However, in Orwell's novel itself, the individual lost. Winston adopted new laws, adopted a new form of love. He got the family he had never dreamed of and which will live with him only according to the laws of violence.

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URBANISATION WITHIN THE CITY OF ZHYTOMYR

Zhytomyr is the largest city in the Zhytomyr region and the administrative centre of the Zhytomyr region and Zhytomyr district of Ukraine. The lands of the modern city of Zhytomyr have been inhabited by people since the 9th century BC. The historical core of the city is the area where the ancient (medieval) Zhytomyr is located. These are Castle Hill, Okhrimova Hill, Petrovska Hill and Podil. But the city area was constantly growing, and the old city was surrounded by new neighbourhoods - Khmilnyky, Kroshnya, Vydumka, Dovzhyk, Smokivka, Korbutivka, Smolyanka, Levkivka, Porub, Malyovanka, Muzykalka and others. Today, the area of the city is 65 km². The increase in the city's area was due to population growth and industrial development.

Currently, the city's population is 261.6 thousand people (01.01.2022), with a population density of 4.387 thousand people per 1 km2 [35]. As of 1 January 2022, the population of Zhytomyr was 261,624 people, with 22.2 %

of the population of Zhytomyr region living here. The dynamics of the population of Zhytomyr in 2010-2022 is shown in Table 2.2.

Table 2.2

Dynamics of the population of Zhytomyr in 2010-2022

Year	Population	Deviation	
		Absolute, +, -	Relative, %
1	2	3	4
2011	271755	-	-
2012	271895	140	0.05
2013	271303	-592	-0.22
2014	270922	-381	-0.14
2015	269942	-980	-0.36
2016	267610	-2332	-0.86
2017	267363	-247	-0.09
2018	266936	-427	-0.16
2019	265240	-1696	-0.64
2020	264318	-922	-0.35
2021	263507	-811	-0.31
2022	261624	-1883	-0.71

In 2012, the population of Zhytomyr city amounted to 271895 persons, which is 140 persons less than in 2011. Since 2013, the population has been declining. The relative deviation in 2014 was -0.14%, and in 2015 and 2016 -0.36% and -0.38% respectively. The population in 2018 was 266936 people, which is 427 people less than in 2017. A significant decrease in the population was also observed in 2019 and 2022, with an absolute deviation of 1696 people and 1883 people, respectively.

Fig. 2.9 shows the population of Zhytomyr.

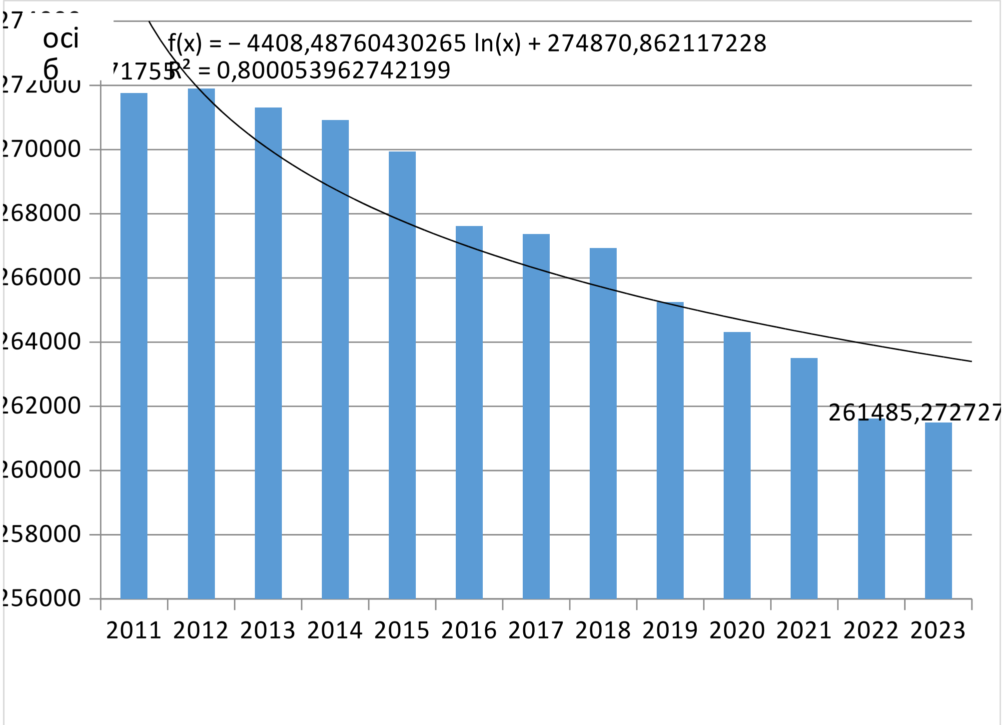

Figure 2.9. Population dynamics of Zhytomyr in 2010-2023 (own development based on data from source [9])

Thus, as can be seen from Fig. 2.9, the population of Zhytomyr has a steady downward trend. The key factors of this phenomenon include population ageing, natural population decline, decreasing birth rate, increasing mortality rate, migration, and the impact of military operations. For example, in the last decade in Zhytomyr, birth rates have remained quite low and cover mortality rates by only 68%, each subsequent generation of mothers is smaller than the previous one, which ensures natural reproduction processes of the population by only 3/4.

The population of the city is gradually ageing, which is caused by a steady decline in the number of people aged 45-50 and an increase in the population aged 46-49. If this trend continues in the future, it may lead to a decrease in the number of working-age people and a shortage of highly skilled workers.

The most acute problems include high and premature mortality of the working-age population, especially among men. In the city of Zhytomyr, male mortality reflects the trend that exists in Ukraine today. It should be noted that mortality rates for men in Ukraine are 3-4 times higher than for women. This is due to the physiological characteristics of the male body and certain differences in lifestyle.

The city of Zhytomyr, as well as other regions of Ukraine, is characterised by population migration, which makes a negative contribution to the mechanical reduction of the population. There were no significant changes in the structure of the population by ethnicity during the period under analysis, so we will analyse the ethnic composition of the population only in 2022.

The ethnic composition of the population of Zhytomyr is shown in Figure 2.11.

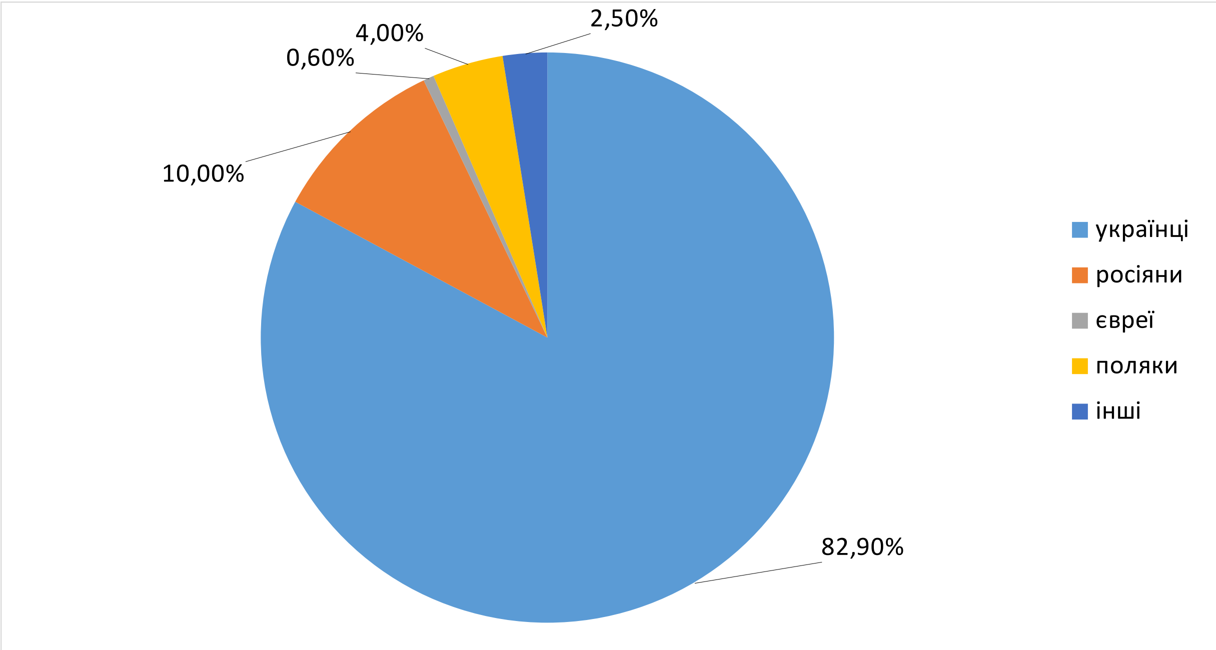

Fig. 2.11. Ethnic composition of the population of Zhytomyr in 2022

The national composition of the population is dominated by Ukrainians, whose share in 2022 was 82.9%, which will not have a significant impact on demographic processes in the future.

The impact of the hostilities has also led to a decrease in the population of Zhytomyr. At the beginning of the full-scale invasion, approximately 40-45% of the city's residents left the city. As of 1 January 2023, approximately 15-20% (i.e. half of those who left) have not returned.

Thus, Zhytomyr is the largest city in the region by area and population. However, the city's demographic situation is generally unfavourable. There is a rapid decline in the population, with the key factors behind this phenomenon being the ageing of the population, natural population decline, declining birth rates, increasing mortality rates, migration, and the impact of military operations.

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STUDYING ENGLISH BY ECONOMIC STUDENTS IN TERMS OF WAR – CHALLENGES AND REQUIREMENTS OF TODAY

English serves as a global medium for communication among nations worldwide, making it imperative for students specializing in economics to acquire proficiency in this language. Mastery of English holds significant importance in our lives, particularly during times of war conflict. Despite numerous challenges in achieving fluency, every economic student endeavours to enhance English proficiency as they represent the future of Ukraine, especially on the international stage.

In the current landscape marked by war in Ukraine and global instability, personalized approaches to foreign language education emerge as pivotal elements in safeguarding national security and fostering fruitful international collaborations [1]. Amidst a full-scale russian invasion, individuals find themselves scattered across various locations in Ukraine and beyond, rendering traditional offline lectures inaccessible to many. Consequently, education has transitioned to a personalized format, enabling students to select their preferred learning methods and schedules. Whether utilizing online meeting platforms like Zoom and Google Meet or studying materials independently via systems like Moodle, learners have the flexibility to tailor their learning experience. Moreover, the present circumstances have necessitated the incorporation of vocabulary relevant to wartime realities, enhancing students' adaptability and readiness to accept new reality.

Effective foreign language communication by economic students assumes a critical role in advancing national security objectives and fostering successful international engagements. Tailoring language instruction to cater to learners' specific needs, interests, and objectives not only enhances linguistic proficiency and communication skills but also fosters a deeper understanding of diverse cultures and viewpoints. Language proficiency emerges as a strategic asset facilitating intelligence gathering, diplomatic negotiations, and peacekeeping endeavors. English fluency by economic students is essential to Euro-Atlantic integration, enabling comprehension of European laws, direct communication with Europeans, and active participation in various spheres without reliance on interpreters [2].

In conclusion, the significance of English language proficiency during times of war underscores the multifaceted role of linguistic skills in navigating complex international environments. As economics students confront the realities of conflict, they must not only cultivate a strong command of English for practical purposes but also develop a nuanced understanding of cultural intricacies and effective cross-cultural communication. By embracing personalized learning strategies, students can enhance their language proficiency in a manner that serves both national security imperatives and the promotion of effective international cooperation. English-language education equips students with the tools to surmount the challenges of war, foster constructive international partnerships, and contribute meaningfully to the demands of the contemporary global landscape.

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THE ROLE OF THE BRAND IN INCREASING THE COMPETITIVENESS OF COMPANIES

Companies must work hard to stand out in today's hyper-competitive commerce world. Making a compelling brand is one of the most excellent ways to distinguish yourself. A solid brand can allow you a competitive advantage, influence what clients think of you, increment the esteem of your stock, and position you for victory [4].

So, what is a brand? A brand is a product or business that has a clear identity in the perception of consumers. It includes design, packaging, and advertising elements that distinguish it from competitors [1,2].

Nowadays, the concept of a brand has expanded, and managers who use marketing and communication methods and tools help distinguish a company or product from competitors to leave a lasting impression in the minds of customers.

Branding is important when planning business development for the future. A well-developed brand can increase the value of a business by giving the company more leverage in the industry. A good brand will not have any problems with boosting referral business. Strong branding generally means a positive impression of the company among consumers, and they are likely to do business with you because of the awareness and trust they have in your business. A well-designed company brand is largely responsible for this. It is the best and most effective business advertising technique [6].

Below are some examples of companies that successfully use the powerful power of branding to achieve their market goals.

For instance, the Apple brand is a great example of how a well-designed brand can increase a company's value. Apple has been able to create a cult status for its products that not only defines their quality, but also elevates them to the level of a status and taste symbol. People who choose Apple products are not only buying technology, they are expressing their lifestyle and social status.

Next, Coca-Cola has successfully created an emotional connection with consumers through its Christmas campaigns, which have become a tradition for many families. This increases loyalty and promotes positive brand perception.

Another excellent example is Nike, which successfully implements the strategy of associating its brand with an active lifestyle. The widespread use of sports ambassadors, sporting events and support of sports teams help Nike to remain a leader in its segment. They don't just sell sports shoes and clothing, they create a culture of fitness and improvement.

So, these examples demonstrate how a brand can influence a company's competitiveness. A brand plays a key role in enhancing the competitiveness of companies by enabling them to differentiate themselves from competitors and attract the attention of consumers. The path to success lies in aligning the branding strategy with the company's own goals and values, and in continuously maintaining and developing the brand to meet consumer needs.

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CURRENT PROBLEMS OF DEVELOPMENT OF THE TRANSPORT SECTOR OF UKRAINE

Today, the transport sector of Ukraine's economy generally meets only the basic transportation needs of the economy and population. The level of safety, quality and efficiency of passenger and freight transportation, energy efficiency, and man-made environmental impact do not meet modern requirements. There is a lag in the development of the transport network, especially in the development of public roads, compared to the pace of motorisation in the country.

In terms of quality and technical characteristics, such as depth, transshipment and storage facilities, technical condition of berths and equipment, level of automation and computerisation, Ukrainian seaports remained at the level of the late 80s and early 90s of the last century. Airports need significant modernisation.

The level of customer service remains low, and the existing transit potential and favourable geographical location of the country are not sufficiently utilised. There is a lag in the development of transport infrastructure, transport and logistics technologies, multimodal transport, and the level of containerisation, which results in a high share of transport costs in production costs.

Ukraine is actively involved in global social and economic processes: it has joined the World Trade Organisation and has set a strategic goal of gaining associate membership in the European Union. Transport, as an infrastructure sector, must develop at a faster pace to facilitate the country's rapid economic and social development and its participation in the international division of labour. To improve the efficiency of the transport system, a comprehensive transport renewal and modernisation programme is needed, which will include a set of measures to ensure regulatory and legal support and create a favourable investment climate, taking into account budgetary and non-budgetary sources of investment. The purpose of this strategy is to identify key issues, goals, principles and priorities for the development of Ukraine's transport system in terms of national needs and interests. Implementation of the transport strategy will contribute to a significant increase in the efficiency of the transport system as a whole, sustainable economic development and the well-being of Ukrainians.

Today's Ukraine stands out among other countries because a significant number of its cities are located on traditional transport and communication routes of the Eurasian continent. The country has a fairly high transitivity coefficient (transport attractiveness), but this indicator is, so to speak, potential, and can only be realised in a serious competitive struggle with other countries. Targeted consideration of potential opportunities will help Ukraine to achieve a new level of development on the way to implementing its main priorities, including in the field of transport services.

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EXPLORING THE FASCINATING WORLD OF CRUSTACEANS

Crustacea is a subtype of arthropods that have an articulated, shell-like skeleton that serves as a framework for muscles and other internal organs, as well as protection from injury and enemies [1].

Crustacea are a diverse and ecologically significant group of arthropods, encompassing a wide range of species found in marine, freshwater and terrestrial habitats. From the iconic lobster to the enigmatic mantis shrimp, crustaceans exhibit amazing adaptations and behaviors that fascinate scientists and enthusiasts alike. This article provides study of crustaceans, diversity, ecology, evolutionary history, and importance in various ecosystems.

Crustaceans clade has nearly 70,000 described species, most of which are aquatic [2], and they show extreme diversity in size, morphology, and ecological niche.The lifespan of crustaceans can reach 20 years [3]. Crustaceans have a characteristic body plan consisting of a segmented body, a chitinous exoskeleton, and paired appendages. Their diverse adaptations include specialized appendages for feeding, locomotion, and reproduction, as well as sophisticated sense organs for detecting environmental cues. For example, the powerful claws of crabs and lobsters are adapted to capture prey and protect against predators, and the filtering appendages of copepods allow them to feed on planktonic organisms.

Crustaceans inhabit a wide range of habitats, from the depths of the ocean to freshwater rivers and terrestrial environments. They play a critical role as primary consumers, predators, scavengers and ecosystem engineers, influencing nutrient cycling, precipitation dynamics and community structure. Many species exhibit migratory behavior, seasonal movements, and vertical migration that contribute to the dynamics of marine and freshwater ecosystems. An interesting fact: river crayfish can live in almost any reservoir of our country [3].

Reproductive strategies in crustaceans are very diverse. Many crustaceans have complex life cycles that include larval stages that are morphologically and ecologically distinct from adults. For example, larval stages shrimp are planktonic, drifting with ocean currents before settling and metamorphosing into juveniles and adults.

Crustaceans are of great economic and ecological importance worldwide. They support valuable fisheries, aquaculture and tourism industries, providing livelihoods for millions of people around the world. In addition, crustaceans are important prey for commercially important fish and marine mammal species, contributing to the stability and productivity of marine ecosystems.

Crustaceans face numerous threats, including habitat loss, pollution, overfishing and climate change. Declines in crustacean populations can have cascading effects on marine and freshwater ecosystems, leading to disruptions in food webs and ecosystem services. Conservation efforts to protect critical habitats, reduce bycatch, and promote sustainable fisheries management are essential to maintaining crustacean diversity and ecosystem integrity.

So, by studying their biology, ecology and conservation status, we gain a deeper understanding of the complex web of life that sustains our planet. As environmentalists, we must work together to protect and preserve crustaceans and the ecosystems they inhabit for future generations.

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INTEGRATION OF ART INTO STEM EDUCATION IN CHEMISTRY CLASSES

What is STEAM Education? To define STEAM we must first know what the acronym stands for. STEAM education is an acronym that stands for Science, Technology, Engineering, Arts and Math. They are a group of subjects that are all entwined with one another.

STEAM gives teachers the tools to employ project-based learning that will encourage children to form collaborative methods and understandings of the five fields of learning [1].

As a central science, chemistry is key in creating connections between different disciplines. Chemistry connects physical, life, and applied sciences, forming a basis for a deeper understanding of the world around us.

STEAM education in a chemistry lesson integrates the core principles of Science, Technology, Engineering, Art and Mathematics to enhance the learning experience. Here's how this multidisciplinary approach can manifest in a chemistry class:

Science and Chemistry: The natural connection is explored through experiments, chemical reactions, and the study of matter, highlighting the scientific method and critical thinking. Technology: Incorporating digital tools and software to simulate experiments, analyze data, or visualize molecular structures. Students might use computer simulations to model chemical reactions or online databases to research chemical properties. Engineering: Applying principles of design and problem-solving to create solutions to real-world chemical problems, such as designing a process to synthesize a compound or developing a water purification system. Art: Encouraging creativity in presenting chemical concepts, through drawing molecular structures, creating infographics, or using color reactions to produce art, thus making learning more engaging and accessible. Mathematics: Integrating mathematical concepts to calculate quantities, concentrations, and yields in chemical reactions, emphasizing the importance of accuracy and precision in chemistry [2]. By combining these disciplines, STEAM education in a chemistry lesson fosters a holistic understanding of how chemistry interacts with various aspects of the world, encourages creative problem-solving, and prepares students with a diverse set of skills for future challenges [3].

In my work, I explore the integration of art into STEM education in chemistry classes. The main task is to make chemical indicators from vegetables and flowers. And further use them to determine the acidity of the environment in the drawing process or vice versa: using color reactions to produce picture [4].

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ILMENITE MINING AND ENRICHMENT TECHNOLOGY

Ilmenite, the most common titanium ore in Zhytomyr Region, is one of the key ore commodities in the steel market and is of great importance for the economy and development of the global economy.

The main goal of our work was to review the largest ilmenite ore deposits, study the main stages of mining technology and methods of beneficiation of ilmenite ore, as well as the use of ilmenite concentrate in the metallurgical and chemical industries.

Ilmenite is a mixed oxide of titanium and ferric iron, which can be expressed by the general formula $FeTiO_3$. This ore can contain up to 40% Fe in its composition.

Fig. 1 shows the appearance of ilmenite concentrate from the Irshansk deposit in Zhytomyr region.

Figure 1. Appearance of ilmenite concentrate

Ilmenite is found on all continents, with the largest deposits in the Southern Urals, Sweden, Norway, Canada and Ukraine. Within the Ukrainian Shield, placer deposits of ilmenite were discovered in the early 1950s. Currently, there are two largest plants for the extraction and processing of ilmenite: Irshansk and Malyshivsky

GOKs. I would like to emphasise that Ukraine has the largest titanium reserves and resources in Europe [1].

Enriched ilmenite is widely used in the chemical industry, in particular for the production of titanium whites, which are widely used due to their range of useful properties. For example, in paint and varnish coatings, which are used to treat the most important structures for human life, such as bridges and even ships, namely their underwater parts. Ilmenite is also used in the steel industry to smelt pure titanium and its alloys. Titanium alloys are used in the chemical, petrochemical, medical, pulp and paper, and food industries; as well as in electronics, electrical engineering, nuclear engineering, electroplating, and weapons production [2-3].

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INNOVATIVE VIRTUAL REALITY TECHNOLOGIES

We are here today to discuss the future that innovative virtual reality (VR) technologies will bring us. This technology is no longer just a subject of science fiction - they are becoming a reality that is being implemented in various areas of our lives and promises to bring significant changes. We want to discuss how these technologies can help us in education, psychology, medicine and many other fields.

In education, they provide unique opportunities to create interactive and engaging learning environments that enhance learning and develop practical skills.

In psychology, they can serve as a powerful tool for treating phobias, post-traumatic stress disorder and other mental illnesses by allowing patients to relive traumatic events in a controlled virtual environment and overcome their fears.

In medicine, VR and AR can help educate and train medical personnel, as well as rehabilitate patients after injuries and strokes. We are on the cusp of a new era where virtual and augmented reality will not only revolutionise interaction with technology, but will transform the very essence of our way of life. We don't think many people are aware of what these technologies are and how they work, so we are going to talk about them in a way that everyone can understand.

Virtual Reality (VR) is a medium that allows us to immerse ourselves in a whole new world, completely disconnected from reality. With the help of special headsets and controllers, we can be transported into a three-dimensional space where our possibilities become limitless. Virtual reality is an opportunity to play, learn, travel and explore virtual worlds that are incredibly realistic and exciting.

Augmented reality (AR), on the other hand, does not take us away from reality, but rather expands it by adding virtual elements and information to our daily lives. With mobile devices with cameras, we see the real world through the device's display, but on this world, additional virtual objects can appear that expand our perception and interaction with the world around us. So what is the difference between these two technologies? Virtual reality immerses us in an alternative world, taking away contact with reality, while augmented reality enriches our reality by adding virtual elements to it. VR requires special equipment such as VR headsets, while AR can run on our regular mobile devices.

Finally, VR is usually a fully immersive virtual experience, while AR keeps our interaction with the real world on which virtual objects are displayed. These two technologies have unique opportunities and potential to transform different areas of our lives.

Everyone is already wondering how VR and AR will make life better and more comfortable in the future. Let's start with VR - this technology will help a lot in such industries as education, medicine, entertainment. To begin with, let's talk about how and why it will help in education, as an example I want to give how a Japanese school has built a VR school in the meta-universe. In this school, the VR system allows students to study with an avatar, more specifically, to attend classes from home, and at the end of the school they receive a high school diploma. I think some people have already thought that it doesn't make any sense, because students go to classes, and those who can't go to classes go to zoom and so on, but the future is not standing still and thanks to the development of this technology paralysed children, or other children with difficult illnesses, even being in hospital or at home will be able to go to school like everyone else. They will be able to go to class in their avatars and socialise by being able to communicate with each other.

Now let's get to how virtual reality technology can help in medicine - VR not only enriches the education of medical students by allowing them to immerse themselves in interactive body simulations and operating theatres, but also helps in the treatment of phobias and psychological disorders by providing a controlled virtual environment to overcome fears and anxiety.

The technology also improves surgical planning by allowing surgeons to visualise a patient's anatomical structures and develop accurate surgical plans. After a procedure, VR is used for rehabilitation, helping patients regain motor function through interactive exercises and simulations.

In addition, virtual worlds can help patients manage pain by providing distraction and a relaxing atmosphere. Finally, VR makes medical care more accessible by facilitating remote consultations and training, especially in remote regions.

We have finished talking about virtual reality, now we will start talking about augmented reality and how it will help to improve and simplify our lives, besides using the camera of the phone we can see additional virtual objects in our lives, it will be possible to do it directly thanks to augmented reality glasses, it will make life easier and more convenient because you can find information on the go, without taking out your phone, and also thanks to artificial intelligence to analyse the world around you and get information Let's explore this fascinating journey together and understand how we can use these technologies to benefit humanity.

Namely that the use of virtual and augmented reality in various fields such as education, medicine and everyday life promises significant benefits. These technologies enhance learning, aid in treatment and rehabilitation, make information more accessible and improve interaction with the world. With continuous development and innovation in this field, we can expect even greater changes in the future, leading to an improved quality of life.

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BARBITURATES: THEIR USE AND EFFECTS ON HUMANS

Relevance: The society of the 21st century is under constant stress, and the number of mental illnesses that are treated or maintained with appropriate means is increasing. Barbiturates are substances that are widely used in modern medicine to depress the nervous system, i.e. as sedatives, anticonvulsants, hypnotics. That is why it is necessary to know their structure and effect. It is equally important to understand the correct dosage and the occurrence of dependence on barbituric acid derivatives.

Objective: To analyse a number of text documents and statistical data to summarise the chosen topic. Prevention of false statements about barbiturates and their effects on the human body.

Materials and methods: Use of Internet resources, analysis of scientific literature taken from journals, research papers of different years of publication.

Results: Barbiturates are sedative drugs derived from barbituric acid (C4H4O3N2).

They are most often used to reduce the conductivity of excitation in the structures of the central nervous system. The effect is to block synapses, which causes a state close to anaesthesia. Quite often, barbiturates cause a hypnotic effect, deterioration of health, coordination of movements, and defects in the articulatory apparatus. Due to the different degrees of absorption and interaction with body substances, they have different duration of exposure. Intoxication with barbituric acid derivatives is difficult for the body to tolerate, as the central nervous system (CNS) is severely depressed. A person can die due to paralysis in the respiratory and vascular systems. The most important thing in such poisonings is prompt hospitalisation and timely removal of toxins. However, cases of deliberate use of high doses of sedatives are quite common, as they are highly addictive, so the line between treatment and addiction becomes thinner with each dose.

Conclusions: Thus, barbiturates are strong chemical compounds that can accumulate in the body and affect the central nervous system. At normal dosages, they help to stabilise a person's psycho-emotional state, improve sleep, and reduce seizures. An overdose leads to rapid intoxication, which can be fatal without timely treatment.

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DIGITAL TECHNOLOGIES IN PROFESSIONAL EDUCATION: INTERACTIVITY, GAMIFICATION AND STUDENT ENGAGEMENT

In modern paced digital age education is being influenced by advancements in information technology across all educational tiers. Interactive tools have become essential, for enhancing the standards and supporting the academic achievements of students. Integrating these tools into teaching practices encourages students to participate in hands on learning experiences fosters the acquisition of real world skills. Nurtures the growth of analytical thinking abilities.

Interactive methods engage listeners, arouse their interest and motivation, and teach them to think and act independently. The task of interactive learning technologies is to prepare a person for real life, to form a civic position, to move from a self-identifying student to a self-realizing personality. The main source of motivation is the student's interest, which results in a high level of activity in learning activities. The teacher acts as an equal partner of the students, performs organizational and consulting functions.

Gamification is an approach that uses game elements to stimulate motivation and engage students in learning. It can be used in the classroom to increase student motivation, create healthy competition, and ensure greater participation. Gamification can be implemented in a variety of formats, including learning platforms, apps, websites, and social media. It allows you to use game elements in assessment, motivation, collaboration, and other aspects of learning. Breaking the concept of a “game” down into constituent game design elements is tricky. That is why researcher Dr. Nick Yee proposed one way to model the elements of what motivates gamers:

1. Action (e.g. objectives)
2. Social (e.g. competition)
3. Mastery (e.g. scoring)
4. Achievement (e.g. awards)
5. Immersion (e.g. roleplaying)
6. Creativity (e.g. customization)

When teachers use elements like the ones listed above in the classroom, even if the result is not a game, the lesson has been gamified.

Student involvement can be expressed in different ways. For example, they may take notes, listen actively, ask and answer questions, make an effort during individual or group activities, ask the instructor for additional resources, or take on extra assignments. At the same time, the motivation for these actions should not be good grades, but a genuine interest in the subject matter. There are three types of student engagement that you need to know about:

1. Behavioral engagement refers to the actions of students: they don't skip classes and come to them on time, do their homework, and answer questions.
2. Cognitive engagement means a desire to learn: students ask questions and look for additional resources to dive deeper into certain topics.
3. Emotional engagement means enjoyment of the learning process and positive relationships with the teacher and other students.

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INFLUENCE OF DIFFERENT TYPES OF SOILS IN RADOMYSHL DISTRICT ON THE GROWTH AND DEVELOPMENT OF WINTER WHEAT

Every year, our country has been the leader in the ranking of wheat yields among European and global countries. We can confidently say that our country is an agricultural country. Wheat is the main grain crop in Ukraine and its potential is sufficient to provide food not only for the population of Ukraine but also for numerous consumers abroad. Meanwhile, experts from the European Union have unequivocally stated that the situation with land resources is rather disappointing. And it is primarily people's fault, because unfortunately we do not value the environment and what nature gives us, human pollution causes soil erosion and oxidation, and the situation is complicated by the use of land for urbanisation and infrastructure. Competition for land and water resources creates serious risks of geopolitical instability. Therefore, every year we will see a deterioration in the fertility of our land.We are fortunate to have many scientists who study the fertility and soil composition of different regions every day

The aim of this study is to investigate the fertility of some soil types in the Radomyshl territorial community using winter wheat and to give an impetus to preserve their fertility:Sod-podzolic clayey soils (Verlok village); Dark grey podzolised (oak forest, Osychky village); Soddy-medium podzolic sandy loamy soils (household plot, Radomyshl); Soddy-weakly podzolic sandy soils (birch forest, Krynychenka tract); Lowland peat soils (Bystriivka village); Podzolic chernozems

(Borshchiv village); Sod-podzolic boron soils (pine forest, Radomyshl, Krynychenka tract); Sod-podzolic loamy soils (Bystriivka village, Lysa Hora).

The experiment began on 6 December 2021 at 20:30. The selected soil samples were placed in containers. Wheat seeds were sown in each of the soil samples, 20 seeds to a depth of 2.5-3 cm, with a distance of 1-1.5 cm between the seeds. The soil was periodically moistened. For germination, the pots with soil and planted seeds were placed on the windowsill under the same light and ambient temperature (18°C). Observations were made daily, during which the number of germinated seeds and plant height were noted.

The total number of seeds that germinated on different types of soil samples was compared. It was determined that the best wheat germination in terms of the total number of seeds was on sod-podzolic loamy soils (all 20 seeds germinated), and the worst germination was on dark grey podzolic soils (only 4 seeds) collected in an oak forest. The research confirmed the hypothesis that different soil types affect the development of winter wheat. According to the results of the experiment, we can conclude that winter wheat grows best in podzolic chernozems, sod-podzolic loamy soils, lowland peat soils and sod-medium podzolic sandy loam soils. Seedlings are friendly, plants are strong. In addition to the introduction of legal and economic mechanisms, it is equally important to change people's attitudes towards land resources, to make them aware of the vital need to direct nature management in a rational and scientifically sound manner, and to raise the consciousness of the true owner of this unique natural gift with the appropriate attitude towards it.

The more fertile the soil is and the better it is cared for, the better the plants planted in it feel. If a person does not take care of the soil and does not protect it from destruction, the harvests will be meagre. No wonder people say: "The land loves care", "The price of land is the price of fertility".

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GEOGRAPHICAL "RECORD HOLDERS"

Geography is a fascinating science. It has incorporated many elements from different fields of knowledge. It was admired in ancient times and is still popular today. The mysteries of nature at sea and on land, in space and in the bowels of our planet - all this is studied by geography [1; p.3].

Geography is one of the oldest sciences. For almost 5000 thousand years, this science has been describing lands, seas, and oceans. Many people remember the geographer Jacques Paganel, the hero of Jules Verne's novel The Children of Captain Grant. Back then, more than 100 years ago, when the events described in the novel were unfolding, he expressed sincere concern about the future of geography, fearing that there would soon be nothing left to discover on Earth.

Indeed, hasn't the ancient science of the Earth lost its former purpose, hasn't it exhausted its possibilities? No! Only at first glance it may seem that geography has already fulfilled its great historical mission and has no prospects for development, that it has already lost the romance of exploration and discovery that once characterised it. In fact, the development of science is as limitless as the possibilities of cognition of nature [2; p.5].

Humanity has always been interested in records and extremes. Our planet, like sports, has its champions and its records. Geographical records can be found in all areas of the geographical envelope, and knowledge of these records helps us to understand more clearly the real scale of geographical objects and phenomena around us.

Interesting hydrographic records:

The largest sea in the world is the Sargasso Sea, located in the centre of the Atlantic Ocean, between North America and Europe. Its area reaches 7 million square kilometres, which is almost the same as Australia. In addition, this sea is the most external among the world's seas, and its shores are formed by the contours of ocean currents. That is why the Sargasso Sea is called the "sea without shores".

The smallest sea is the Sea of Marmara, sandwiched between the Balkan Peninsula and Asia Minor. Its area is only 11.5 thousand square kilometres, which is slightly smaller than the area of Ternopil region.

Among all the seas of the world, the Sea of Azov cuts deep into the Eurasian continent (in the south of the Eastern European Plain). The Azov Sea is also the shallowest among the seas. Its average depth reaches only 8 m, and its greatest depth does not exceed 15 m.

The Pantanal is the largest swamp on the planet, covering 200 thousand square kilometres. It is located within Brazil, Bolivia and Paraguay and is one of the areas with the highest biodiversity on Earth.

Little-known land records:

The farthest point of land from the World Ocean is located in China's Dzuosotoya Elisen Desert, in Xing Kiang. The closest point of the ocean coast is 2648 km away from this place.

The farthest point on the planet's surface from the centre is the summit of the Chimborazo volcano in Ecuador (which is achieved due to its location in the equatorial zone of the planet, in the geoid's lowest compression zone).

The most active volcano on Earth is Niragongo, in the east of the Republic of Zaire. It is relatively low (about 3,500 metres), but its large crater is constantly erupting and a large lava lake is gushing out, sometimes even overflowing its banks. For several thousand years, Stromboli has been the first lighthouse volcano in the group of the Lipar Islands off the coast of Italy. A similar "lighthouse volcano" is

Isalco on the coast of the Republic of El Salvador in Central America, but it is much younger, less than 200 years old.

Japan's Mount Fuji on the island of Honshu has gained the reputation of the quietest volcano, called the dormant volcano because it is active only once or twice every 100 years.

Unusual place names:

The longest place name in the UK, Llanfairpwllgwyngyllgogerychwyrndrobwllllantysiliogogogogoch, consists of 58 letters and translates as "St Mary's Church, which is located by a pond surrounded by hazel, in a ravine, next to the cave of St Tysilio's Church". This name was used for a newly opened railway station (April 1973) in Gwynedd, Wales, England. It was invented by a local bard. The official name of this place consists of 20 letters.

The longest Welsh name listed in the Ordnance Survey directory is Lower Llanfihangel-y-Creuddyn (26 letters), the name of a village near Aberystwyth. For commercial reasons rather than topographical reasons, the owners of a railway near Barmouth, North Wales, erected a 19.5-metre-long sign at one of their stations with a 67-letter name: Gorsafawddachaidraigddanheddogleddollonpenrhynarefrdraethceredigion.

The shortest place names in the world are: the name of the French village of I (population 143), which has been named after the town since 1241, the Danish village of A on the island of Funen, the Norwegian village of A, the Swedish village of A in Viholandet, the town of U in the Caroline Islands, and the Japanese city of Sosei, often called O. In West Virginia, USA, there was a place name "6" [3].

And this is not the whole list of interesting and unusual records of our planet. So, the inquisitive human mind is always on the way to discovering new things. And with it - new data, new achievements, new "record holders" in geography.

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WAYS OF IMPROVING SPEAKING SKILLS OF HIGH SCHOOL LEARNERS

Learners face a significant challenge in developing their speaking skills, especially among high school students. An initial questionnaire was used to pinpoint the specific areas of concern, recognizing this challenge. The findings from this inquiry underscored the urgent need for targeted interventions to bolster speaking proficiency among 11^{th}-grade learners. To facilitate effective lesson delivery, training materials and exercises have been developed to facilitate effective lesson delivery, including:

1) word and phrase cards:

2) listening activities related to speaking topics:

3) video materials for speech improvement:

4) language chat sessions;

5) models and visual aids:

6) the speaking task is titled "What is in your briefcase?"

Interpretations and outcomes regarding the enhancement of students' speaking skills are pivotal in educational research. Throughout the study, various factors influencing students' proficiency in English speaking were analyzed and identified. Effective communication in a foreign language demands continual practice, repetition, and support.

The research indicates active speaking practice is paramount in fostering students' speaking abilities. Consequently, more class time should be allocated to oral exercises and discussions, enabling rapid and effective language development. By encouraging students to express their thoughts and ideas, educators can foster engagement and enhance the learning experience.

Moreover, the study revealed that stress and insecurity hinder students' participation in oral activities. Many students feel apprehensive about public speaking and fear judgment, leading to reluctance to participate. Therefore, creating a supportive and nurturing classroom environment where students feel confident is crucial.

It is essential to emphasize that mistakes are integral to learning, encouraging students to communicate without inhibition. To improve students' speaking skills, I opted for language clubs and chats – an interactive approach promoting active communication exclusively in English. This method creates a platform for students to practice speaking in authentic situations and interacting with peers and native speakers.

In conclusion, students responded positively to this method, actively engaging in extracurricular language discussions. Evidently, this technique effectively enhances speaking skills, providing opportunities for real-world practice and constructive feedback.

Moving forward, addressing the challenges of improving students' speaking skills requires implementing practical tasks tailored to their specific needs and interests. Additionally, incorporating innovative methods and technologies in teaching can further stimulate student engagement and interest.

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FORMATION OF PERSONAL PHYSICAL CULTURE

Physical culture is an organic part of general human culture, its special independent area. At the same time, it is a specific process and result of human activity, a means and method of physical improvement of the individual. Physical culture affects the vital aspects of an individual, obtained in the form of predispositions that are transmitted genetically and develop during life under the influence of upbringing, activities and the environment. Physical culture satisfies social needs in communication, play, entertainment, in some forms of self-expression of the individual through socially active useful activities [1].

Over the years, the terms "physical culture" and "sport" have gradually become more modern and well-known among different segments of the population. But, unfortunately, today, physical culture is noticeably losing its value especially among modern youth. Children, teenagers, young people prefer gadgets [2].

In adulthood, a person's health largely depends on his physical culture, nutrition, absence of bad habits, etc. The holistic nature of physical culture makes it a powerful means of increasing the social activity of an individual.

The physical culture of an individual manifests itself in three main directions:

3. determines the ability for self-development, reflects the individual's focus "on himself", which is determined by his social and spiritual experience, ensures his desire for creative self-improvement;
4. physical culture – the basis of independent, proactive self-expression of the future specialist, manifestation of creativity in the use of physical culture tools

aimed at the subject and process of his professional work;

5. it reflects the creativity of the individual, aimed at relationships that arise in the process of physical culture and sports, social and professional activities. The richer and wider the circle of connections of the individual in this activity, the richer the space of its subjective manifestations becomes [3].

The main components of a person's physical culture are knowledge in the field of physical culture, methodical skills and physical self-improvement skills, value orientations, motives, interests and needs in relation to physical culture and sports activities, as well as the necessary level of physical development and physical fitness. Implementation of these components is carried out in socio-psychological and physical directions [4].

To improve a person, physical culture uses physical exercises, forces of nature, hygienic factors, mode of work, life, nutrition, and rest. It should contribute to the growth of the country's economic and defense potential, the satisfaction of people's spiritual needs, be an effective means of comprehensive personality development, and the formation of an active life position [4].

The main structure of the formation of the physical culture of the individual is a complex of interrelated features of heredity, education, training, living conditions, physical development, level of physical fitness, formation of the need for a healthy lifestyle, knowledge and understanding of the role of physical culture for the development of the personality, recognition of physical culture as a social -personal value [2].

The formation of the physical culture of the individual requires significant attention of teachers. Therefore, the issue of training highly qualified specialists in physical culture is not only one of the main tasks of higher educational institutions, but also a necessary need of modern society [2].

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WAVELET TRANSFORM FOR MULTIRESOLUTION ANALYSIS

Wavelet transform is a powerful mathematical tool for multiresolution analysis of images and signals. Unlike Fourier transforms, wavelets provide localized frequency information, making them suitable for analyzing non-stationary signals.

This study explores discrete wavelet transform (DWT) for image compression and compares it with other techniques like datatype scalar quantization, k-means-based vector quantization (see [1]), and discrete cosine transform (DCT). DWT decomposes images into wavelet coefficients across multiple scales, allowing for selective encoding of important features.

Experiments were conducted on custom dataset composed of undersampled classical datasets such as Set5, Set14, BSDS100, URBAN100, Manga109. To evaluate compression time, compression factor, peak signal-to-noise ratio (PSNR), and structural similarity index (SSIM [2]).

Results show that DWT achieves higher compression ratios than DCT, especially at extreme compression levels, while running faster (see fig. 3 and fig. 5). The choice of optimal compression method depends on the application requirements. Scalar or vector quantization may suffice for low compression needs, while DCT and DWT are preferred for higher compression. DWT provides an advantage for significant data reduction at the cost of acceptable quality loss (see figures 1, 2, 4, 6 and 7).

In conclusion, this study highlights the strengths of DWT for image compression, particularly when high compression is prioritized over minor quality degradation. The findings contribute to a better understanding of compression techniques and their trade-offs, guiding the selection process based on efficiency, quality, and computational complexity.

(a) int8 (CF: 1) (b) int4 (CF: 2) (c) int2 (CF: 4) (d) int1 (CF: 8)

Figure 1: Examples of Image Compression using Scalar Quantization

(a) K: 256 (CF: 1) (b) K: 16 (CF: 2) (c) K: 4 (CF: 4) (d) K: 2 (CF: 8)

Figure 2: Examples of Image Compression using Vector Quantization

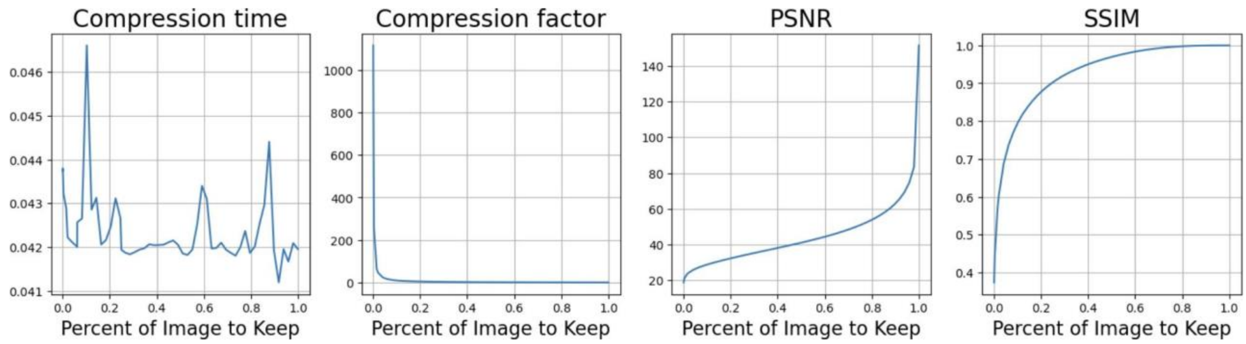

Figure 3: Metrics of DCT Image Compression for different wavelets

(a) 100% (CF: 1) (b) 25% (CF: 4) (c) 15.62% (CF: 64) (d) 0.39% (CF: 256)

Figure 4: Examples of Image Compression using DCT

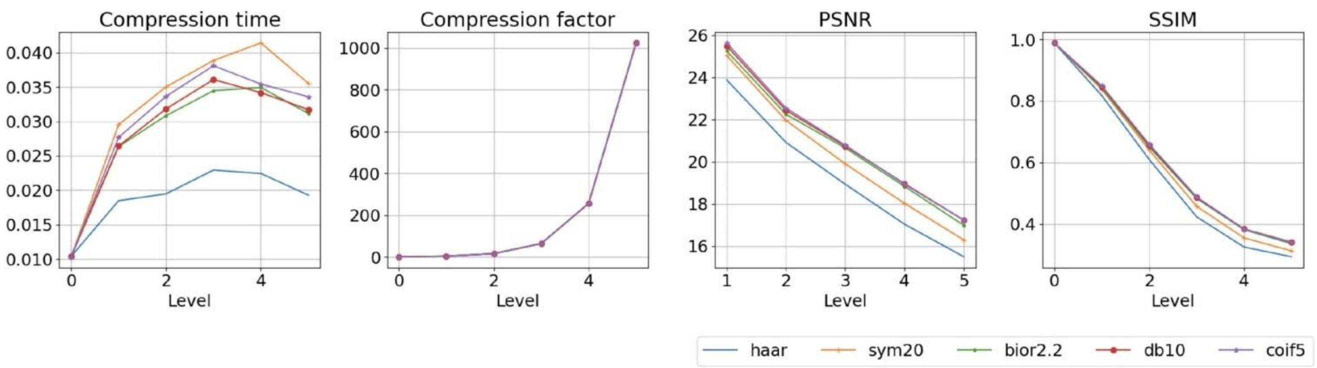

Figure 5: Metrics of DWT Image Compression for different wavelets


(a) Level 0 (CF: 1)


(b) Level 1 (CF: 4)


(c) Level 3 (CF: 64)


(d) Level 4 (CF: 256)

Figure 6: Examples of DWT image compression with Haar wavelet


(a) Level 0 (CF: 1)


(b) Level 1 (CF: 4)


(c) Level 3 (CF: 64)


(d) Level 4 (CF: 256)

Figure 7: Examples of DWT image compression with Symlet20

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DEVELOPMENT OF SPEED IN YOUNGER SCHOOL STUDENTS IN THE SCHOOL SOCCER SECTION

In today's world, an active lifestyle and regular physical activity are becoming more and more important for ensuring the health and harmonious development of children. In this context, school football sections become not only a means of sports training, but also a platform for the development of speed in younger schoolchildren. Taking into account the dynamic development of the modern sports environment and the importance of physical training already from elementary school age, the development of speed in this context acquires special importance.

Thus, the purpose of the conducted research is to identify the main aspects of speed in junior high school students during classes in school football sections.

Research results. M.D. Galai in his dissertation study points out that one of the important prerequisites for the development of speed in younger schoolchildren is the child's nervous processes, which are manifested in the peculiarities of the flow of excitation and inhibition processes in different parts of the nervous system [1]. O.V. Kutsenko in a scientific publication points out that the use of game activities and the introduction of some of its elements make it possible to avoid psychophysiological overstrain in children, which is important during the period of active biological and mental development of a child of primary school age [2, c. 40].

Chornobai I. developed a system of speed development in young football players, based on the application of the game method of training [3]. For the effective development of speed in young football players, the author recommends using exercises with different levels of intensity, the duration of which does not exceed 20 second. This process involves running small distances at the beginning of training, for example 15-20 meters from a high start, with a gradual increase in distance to 60 meters. In addition, in football sections, you can use exercises with imitation of running in place. However, unlike the systematic training of physical qualities, this method can be used at the initial stages of learning the technical elements of playing football.

Another effective method of developing speed in young football players can be the use of paired exercises, where one player sends the ball to the other side of the field with a certain advance, while the other player, in order to intercept the ball, must gain speed and catch up with the ball. Then this exercise is repeated with a change of players roles. This approach allows you to develop both muscle differentiation of effort and a sense of distance.

Considering the younger school age of the participants, it is important to gradually increase the distance and complicate the rules for performing auxiliary exercises. For example, if at the age of 7 players can send the ball without restrictions, then for children aged 8-9 years it is necessary to gradually limit this distance. Given the relationship between speed and speed-power qualities and muscular strength, the ball acceleration exercise can end with a strong hit. However, at the initial stage of learning to play football, it is important that the distance is small and increases gradually according to the age of the participants. This helps coach avoid the early onset of speed fatigue, which can negatively affect ball hitting performance.

The development of speed in sectional football classes is also possible when performing exercises with the ball, including receiving it on the chest, shoulders, knees and hips. However, in this approach, special attention is paid to hitting the ball as far as possible, which contributes to a more efficient performance of the task. In addition, the improvement of muscle connections is facilitated by foot strikes, when the student tries to hit the ball back and up.

Thus, our analysis of the main aspects of the development of speed in junior high school students during classes in school football sections revealed the importance of systematic use of various exercises and methods aimed at improving speed qualities, as a result of which physical fitness is improved, coordination of movements is developed, and technical skills are formed base of performance of the main elements of the football game.

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ADAPTIVE TOOLS AND RESOURCES FOR SPEECH THERAPY IN SCHOOLS

In the diverse of a school environment, each student brings a unique set of strengths and challenges. For students with musculoskeletal disorders, effective communication can be a hurdle. However, the landscape of speech therapy is evolving with the integration of adaptive tools and resources. These tools, specially designed to cater to individual needs, play a pivotal role in ensuring that every student has the opportunity to develop their speech and language skills comfortably.

Before delving into adaptive tools, it's essential to comprehend the connection between musculoskeletal disorders and speech challenges. Musculoskeletal disorders impact the muscles, bones, and joints, influencing various physical functions. In the context of speech, these disorders can lead to difficulties in articulation, vocalization, and overall oral motor control. Two common challenges faced by students with musculoskeletal disorders are dysarthria, characterized by weakened or paralyzed speech muscles, and dyspraxia, affecting the coordination of movements required for speech. Recognizing these challenges is fundamental to tailoring effective speech therapy interventions [2].

Technology plays a significant role in speech therapy, with interactive learning apps offering engaging activities targeting specific speech and language goals. These apps, adaptable to various difficulty levels, provide personalized learning experiences. Speech therapists can recommend or develop apps aligned with individual student needs, making learning enjoyable while addressing specific communication challenges.

The efficacy of adaptive tools is maximized when educators and speech therapists work hand in hand. Building a bridge between the classroom and therapy room ensures consistent support for students. Resources facilitating this collaboration include: Workshops that bring educators and speech therapists together provide practical training on the use of adaptive tools. These sessions deepen understanding and empower educators to seamlessly integrate these tools into classroom activities. Practical insights gained from workshops contribute to creating a more inclusive learning environment [3].

The digital age has given rise to online communities where educators, speech therapists, and even parents can share experiences and resources. Participation in these communities allows professionals to stay informed about the latest adaptive tools, exchange success stories, and seek advice from peers facing similar challenges.

Integrating speech therapy goals into lesson plans fosters a cohesive approach to addressing communication challenges. Educators and speech therapists working together identify opportunities for targeted interventions within the curriculum. This collaboration ensures students receive consistent support, reinforcing speech and language development throughout their academic journey. Open communication between educators and speech therapists is crucial for tracking progress and addressing evolving needs. Routine meetings, progress reports, and shared documentation provide a comprehensive overview of each student's development.

While adaptive tools have significantly improved support for students with musculoskeletal disorders, challenges persist. Financial constraints, limited awareness, and the need for ongoing professional development are hurdles that educators and speech therapists must navigate. Additionally, ensuring seamless integration of adaptive tools into the broader education system requires collaborative efforts from various stakeholders [5].

Looking ahead, continuous research and development of adaptive tools tailored to the diverse needs of students with musculoskeletal disorders are essential. Advocacy for policies promoting inclusivity and allocating resources for these tools will play a vital role in creating a more equitable educational landscape.

Adaptive tools and resources have transformed speech therapy, providing tailored support for students with musculoskeletal disorders. From AAC devices to collaborative lesson planning, these tools not only address communication challenges but also empower students to actively participate in the learning process. As educators, speech therapists, and policymakers continue to collaborate, the journey toward a truly inclusive education system becomes more attainable. Every student, regardless of their challenges, deserves the opportunity to thrive academically and socially, and adaptive tools pave the way for this inclusivity [2].

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ANALYSIS OF MODERN EDUCATIONAL TOOLS FOR TRAINING STUDENTS TO FLY DRONES

Introduction. Drone technology holds immense potential for revolutionizing education across various disciplines, from STEM fields to geography and environmental studies [1]. Training students in safe and responsible drone piloting equips them with valuable skills applicable in future careers and fosters innovation. This paper analyzes the modern educational tools available for training students to fly drones, highlighting their unique contributions to the learning process.

Drone Simulators (Tab. 1). Drone simulators provide a safe and controlled environment for students to learn the fundamentals of drone operation. They offer realistic flight dynamics, customizable control layouts mirroring various drone models, and gamified learning experiences with missions and challenges. Popular options like STEMPilot and AeroSIM RC cater specifically to educational settings, often integrating with existing STEM curriculum. These simulators allow students to practice maneuvers, develop spatial awareness, and experience potential risks without damaging real drones.

Table 1

Strengths and weaknesses of drone simulators

Strengths	Weaknesses
Safety: Eliminates the risk of crashes and injuries associated with real-world drone piloting.	**Limited Haptic Feedback:** Lacks the physical sensation of controlling a real drone.
Accessibility: Enables students to practice flight skills at any time and location.	**Environmental Limitations:** Cannot fully replicate real-world weather conditions and air resistance.
Affordability: Simulator software can be significantly cheaper than purchasing and maintaining physical drones.	
Customization: Allows tailoring the learning experience to different ages and skill levels.	

Flight Planning Software (Tab. 2). Flight planning software equips students with the skills for safe and responsible drone operation in real-world scenarios. Platforms like DJI Pilot and DroneDeploy offer features for pre-flight planning, including airspace restrictions, obstacle identification, and autonomous flight path creation. Students can learn to create flight plans that optimize data collection or image capture while adhering to regulations.

Table 2

Strengths and weaknesses of Flight Planning Software

Strengths	Weaknesses
Safety Enhancement: Promotes responsible drone usage by fostering awareness of airspace regulations.	**Software Specificity:** May require learning software specific to particular drone models.
Safety Enhancement: Promotes responsible drone usage by fostering awareness of airspace regulations.	**Limited Hands-on Experience:** Doesn't replace the need for practical flight training.
Mission Planning: Teaches students to plan efficient and effective drone flights for specific tasks.	
Data Integration: Can integrate with data analysis platforms for a seamless workflow.	

Conclusion. Modern educational tools offer a powerful combination for training students to fly drones. Teachers can use the necessary software to design unique piloted tasks that will develop students' piloting skills and knowledge.

Future research might include the study of virtual reality simulators, the use of artificial intelligence for autonomous drone control training, and cloud-based data analysis platforms accessible from anywhere.

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READINESS OF FOREIGN LANGUAGE TEACHERS TO MEET THE SPECIAL NEEDS OF STUDENTS WITH DYSLEXIA

Foreign language teachers rate their readiness to meet special educational needs and the inclusion of students with dyslexia in general education schools as quite low. The construct of a foreign language teacher's readiness to include students with dyslexia consists of two main components:

- knowledge about dyslexia and self-efficacy in the application of inclusive teaching methods with students with dyslexia
- relation to inclusion [1, p. 12].

Teachers' beliefs about their readiness to include students with dyslexia may vary depending on the level of school in which they work, as well as the type and experience they have of teaching students with dyslexia. Foreign language teachers express their concern about the lack of necessary knowledge and skills to create an inclusive learning environment, differentiation and adaptation of the teaching approach to meet the special educational needs of students with dyslexia [2, p. 132]. This, in turn, can negatively affect the desire and ability of teachers to apply inclusive practice in their lessons [3, p. 3]. They state that they often face difficulties and problems in differentiating learning, diversifying and adjusting teaching methods, tasks and methods of presentation or assessment.

Self-efficacy of teachers is closely related to their teaching practice. The greater effectiveness of inclusive teaching is generally found in the ability to create a supportive environment that accommodates different learning needs, learning styles, and abilities.Self-efficacy of teachers regarding the application of inclusive education strategies is, as a rule, low [4, p. 32].

Research findings confirm that, like background knowledge, teacher self-efficacy beliefs can be reinforced by teacher training. In fact, proper training of teachers can have a powerful effect in terms of increasing self-efficacy in creating an inclusive learning environment, in terms of reducing teachers' anxiety, and even developing a positive attitude towards inclusion and dyslexia [5, p. 370].

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THE APPLICATION OF THE RBF METHOD FOR THE PROBLEM OF DIFFUSION WITH NON-LOCAL EFFECTS

Introduction. Applying the collocation method with radial basis functions (RBF) is considered appropriate for solving the diffusion problem with a non-local effect, which describes processes involving dispersion and non-local interactions.

Formulation of the problem

Let $D \subset R^d$,d=2be a domain with the boundary Γ. We seek the function $u: D \rightarrow$ R,that satisfies the PIDE

$$-\Delta u(x)+\int_D k(x,z)u(z)dz=f(x), x\in D \tag{1}$$

and the Dirichlet boundary condition

$$u(x)=g(x), x\in\Gamma, \tag{2}$$

where $k: D\times D\to R$, $f: D\to R$, and $g:\Gamma\to R$,are sufficiently smooth given functions. It is known that the problem (1)-(2) is well posed, see [1].

Collocation method with RBF

We present the approximate solution u of the problem (1)-(2) in the form of a linear combination of RBFs and polynomial basis functions as follows:

$$u(x)\approx u_n(x)=\sum_{j=1}^{n}\alpha_j\,\varphi(|x-x_j|)+\sum_{l=1}^{q}\beta_l\,p_l(x), x\in\overline{D}, \tag{3}$$

where $\varphi: R\to R$ - radial function, $n,q\in N$, $n\gg q$, $|\cdot|$ denotes the Euclidean distance, coefficients, $\alpha_j\in R, j=1,2,\dots,n$ and $\beta_l\in R, l=1,2,\dots,q$ to be determined. Polynomials p_l, $l=1,2,\dots,q$ are the monomial basis functions in R^d. Center pointsx_j, $j=1,2,\dots,n$ should be placed inside the domain $x_j\in D$, $j=1,2,\dots,n$, $n\in N, n<n$ and on the boundary $x_j\in\Gamma$, $j=n+1,\dots,n$ [2].

The unknown coefficients α_j, $j=1,2,\dots,n$ and β_l, $l=1,2,\dots,q$ are solutions of the following semi-discretized system

$$\left\{\begin{array}{c}\sum_{j=1}^{n}\alpha_j\left(F_{i,j}^{(1)}+K_{i,j}^{(1)}\right)+\sum_{l=1}^{q}\beta_l\left(F_{i,l}^{(2)}+K_{i,l}^{(2)}\right)=f(x_i), i=1,\dots,n,\\ \sum_{j=1}^{n}\alpha_j\,\varphi(|x_i-x_j|)+\sum_{l=1}^{q}\beta_l\,p_l(x_i)=g(x_i), i=n+1,\dots,n,\\ \sum_{j=1}^{n}\alpha_j\left(F_{j,l}^{(2)}+K_{j,l}^{(2)}\right)+\sum_{j=n+1}^{n}\alpha_j\,p_l(x_j)=0, l=1,\dots,q,\end{array}\right\} \tag{4}$$

with coefficients

$$\begin{aligned}F_{i,j}^{(1)}&=\left(-\Delta\varphi_x(|x-x_j|)\right)_{x=x_i}, \quad i=1,\dots,n, j=1,\dots,n,\\ F_{i,l}^{(2)}&=\left(-\Delta p_{l,x}(x)\right)_{x=x_i}, \quad i=1,\dots,n, l=1,\dots,q\\ K_{i,j}^{(1)}&=\int_D k(x_i,z)\varphi(|z-x_j|)dz, \quad i=1,\dots,n, j=1,\dots,n,\\ K_{i,l}^{(2)}&=\int_D k(x_i,z)p_l(z)dz, \quad i=1,\dots,n, l=1,\dots,q.\end{aligned} \tag{5}$$

Center points' distribution

We assume that the boundary curve Γ has a parametric representation. Thus, central points are evenly distributed on the boundary curve Γ and inside the D on the generated diminished pseudo curves.

Full discretization

The domain integrals (5) can be written in the parametrized form

$$K_{i,j}^{(1)} = \int_0^1 \int_0^{2\pi} k\left(x_i, \rho\gamma(t)\right)\varphi\left(\left|\rho\gamma(t) - x_j\right|\right)J(\rho,t)dtd\rho, \quad i=1,\dots,n, j=1,\dots,n,$$

$$K_{i,l}^{(2)} = \int_0^1 \int_0^{2\pi} k\left(x_i, \rho\gamma(t)\right)p_l\left(\rho\gamma(t)\right)J(\rho,t)dtd\rho, \quad i=1,\dots,n, l=1,\dots,q,$$

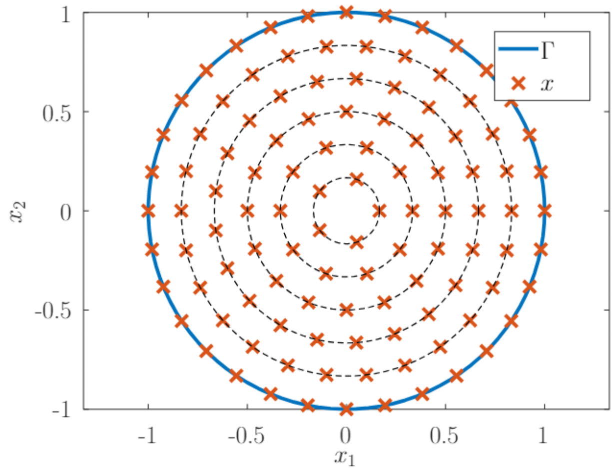
where the Jacobian $J(\rho,t)=\rho\left(\gamma_1(t)\gamma_2'(t) - \gamma_2(t)\gamma_1'(t)\right)$.

For the numerical computation of the parametrized domain integrals, we consider the quadrature formula, which applies the Gauss-Legendre quadrature for the integration along the radial parameter and the trapezoidal rule for the integration along the angle.

Numerical experiments

Let the boundary of the planar domain D be a unit circle with parametrization$\Gamma=\{\gamma(s) = (\cos s, \sin s), s \in [0,2\pi]\}$, the kernel$k(x,y) = |x-y|^2, x,y \in D$, the exact solution$u_{ex}(x) = |x|^2 - 1, x \in D$. Then the boundary function $g(x)=u_{ex}(x), x \in \Gamma$ and the source function$f(x) = \frac{-\pi}{6}(3|x|^2+1) - 4, x \in D$.

The central points are distributed and shown in Fig. 1a. For calculations, we use the multiquadratic radial basis function. The relative errors of the function values in the area at the test points are shown in Fig. 1b.



m	L	n	n	E_n
16	5	38	54	$4.2e-05$
32	10	155	187	$2.0e-08$
32	20	310	342	$2.8e-09$

a) Distribution of x_j *b) Relative errors*

Fig.1 Distribution of the center points $x_j$and relative errors of the approximate *solution.*

Conclusions

The obtained results of numerical experiments confirm the applicability of this approach.

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METHODOLOGICAL PROBLEMS OF STUDYING THE CONCEPT OF «RUSSKI MIR»

An important methodological problem in the study of the "Russki mir" ideology is the definition of the concept of "Russki mir". In the Ukrainian, Belarusian, and Polish languages, there is a clear distinction between the concepts of "Russki" and "Russian". While the term "Russki" usually refers to the ethnic component and indicates the corresponding type of identity, the definition of "Russian" is based on the understanding of the political identity of Russian citizens who may have different ethnic origins: Chuvash, Tatars, Buryats, Yakuts, Chechens, Ingush, etc.

It is even more difficult to translate this concept into other languages, in particular English, in which a semantic distinction between the concepts of "Russki" and "Russian" is impossible. Both of these concepts are translated through the concept of "Russian". And this, as V. Volkovsky reasonably argues, leads to the use of the term "Russian World", which ultimately, at the level of the ordinary mass consciousness of

Western European readers and listeners, leads to a sense of validity of Russian claims to identify the historical heritage of "Rus" and "Russia" [1, p. 22]. This once again indicates that a clear definition of the concept of the "Russki mir" with its linkage to the relevant historical era and socio-cultural context remains extremely relevant.

The Institute of History of Ukraine of the National Academy of Sciences of Ukraine interprets the "Russki mir" in a broad and narrow sense. In the broad sense, the "Russki mir" is interpreted as a systemic technology subordinated to the strategy of Russian foreign policy, aimed at reintegrating the post-Soviet territories into the sphere of Russia's political and economic dominance; increasing Russia's influence on the socio-political situation in countries with a Russian-speaking diaspora. In the narrow sense, it is an ideologeme that justifies the uniqueness of Russia, "Russian (or "Eurasian") civilization", and Russians, in order to motivate the latter's claims to regional or even global leadership [2].

Also, the interpretation of the concept will depend on the context in which it is used, in particular:

- cultural and historical context - "Russki mir" refers to the set of cultural and religious characteristics that characterize Russia and its influence on other countries from the former Russian Empire and the USSR. This includes the Orthodox religion, the Russian language, literature, art, and other aspects of culture. This interpretation does not emphasize geopolitics, but can be used to promote Russian culture abroad;

- geopolitical - "Russki mir" refers to Russia's geopolitical sphere of influence and the idea of unity and cooperation between Orthodox nations, including Russia, Belarus, Ukraine, etc.;

- ideological - "Russki mir" can mean an ideology or concept that supports the idea of the prevalence of Russian culture, influence and values in the political and cultural sphere

- ethnocultural - "Russki mir" refers to the ethnocultural heritage of the Russian people, their traditions, customs and community;

- religious context - "Russki mir" can refer to the sphere of influence and mission of the Orthodox Church, its role in protecting and promoting Orthodoxy as a key component of Russian identity.

The main marker or indicator of belonging to the "Russki mir" is the Russian language identity. In this regard, we recall that it was the "protection of Russian speakers" that became one of the key reasons for Russia's aggression against Ukraine and the temporary occupation of part of its territory. Thus, the spread of the Russian language is a direct cause of the war and the brutal deaths of hundreds of thousands of people.

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GESCHICHTE DER ENTWICKLUNG VON METHODEN ZUR SYNTHESE MAGNETISCHER MATERIALIEN AM BEISPIEL VON MAGNETIT

Moderne magnetische Materialien sind Gegenstand umfangreicher systematischer Untersuchungen, die mit grundlegenden wissenschaftlichen Aspekten verbunden sind, da die Kombination einzigartiger physikalisch-chemischer Eigenschaften solcher Substanzen ihre Verwendung für verschiedene technische Zwecke ermöglicht [1]. Magnetische Nanopartikel haben ein großes Potenzial in ökologischen, biomedizinischen und klinischen Anwendungen gezeigt. Sie werden oft in der Magnetresonanztomographie, Datenspeicherung, Katalyse, spezifischen

Transport von Arzneimitteln in Gewebe und Zellen des Körpers usw. verwendet.

Die magnetischen Eigenschaften von Nanopartikeln hängen von verschiedenen Faktoren ab, wie Form und Größe der Partikel, ihre chemische Zusammensetzung, kristalline Struktur, magnetisches Moment und spezifische magnetische Sättigung, magnetische Anisotropie usw. Magnetische Nanopartikel können in fünf verschiedene Typen klassifiziert werden, je nach ihrer Reaktion auf ein externes magnetisches Feld: paramagnetische, diamagnetische, ferromagnetische, ferrimagnetische und antiferromagnetische. Magnetische Nanopartikel werden auch nach ihren "schwachen" (diamagnetischen und paramagnetischen Nanopartikeln) und "starken" (ferromagnetischen, ferrimagnetischen und antiferromagnetischen Nanopartikeln) magnetischen Eigenschaften klassifiziert. Die Ausrichtung des magnetischen Moments einzelner Atome mit einem externen Magnetfeld in verschiedenen magnetischen Materialien [2].

Die ältesten Berichte über die Synthese magnetischer Partikel auf der Basis von Magnetit, die relativ stabile Kolloide bilden, stammen bereits aus den 1930er Jahren. Die erste stabile Suspension magnetischer Partikel wurde 1965 von Steve Papell hergestellt. Papells Magnetflüssigkeit bestand aus einer Dispersion von zerkleinerten Magnetitpartikeln (Fe_3O_4) (Durchmesser <25 μm), die mit Ölsäure modifiziert waren. Diese Partikel wurden in unpolarlöslichen Lösungsmitteln (Träger) dispergiert, um eine stabile Magnetflüssigkeit zu bilden. Später erhielt Rosensweig mehrere Arten von Magnetflüssigkeiten auf der Basis einer Dispersion von zerkleinerten Fe_3O_4-Partikeln in verschiedenen flüssigen Trägern wie Gas, Wasser, Fluorcarbonen und Estern.

Im Jahr 1982 erhielt Massart Magnetflüssigkeiten durch ein chemisches Verfahren, das die Fällung von Fe(II)- und Fe(III)-Hydroxiden beinhaltete [2]. Später modifizierte die Massart-Gruppe die Fällungsmethode, um ultrastabile und hochkonzentrierte Magnetflüssigkeiten mit verschiedenen magnetischen Partikeln auf der Basis von Spinellferriten wie $(M_{1-x}^{2+}Fe_x^{3+})_A(Fe_{2-x}^{3+}M_x^{2+})_BO_4$ (M = Mn, Co, Ni, Cu, Zn) zu erhalten. Die Stabilität solcher Dispersionen wird durch hydrothermale Behandlung der Proben mit $Fe(NO_3)_3$ als Reagenz erreicht, was zur Bildung einer schützenden eisenhaltigen Schicht führt, die die Oberfläche der Nanopartikel passiviert [1].

Der nächste Entwicklungsschritt in der Synthese magnetischer Nanopartikel begann mit der Entstehung und Entwicklung der Sol-Gel-Synthese durch den Nobelpreisträger Richard Feldman, der eine neue Wissenschaft der Nanochemie und Nanotechnologie begründete.

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MORPHOLOGY OF THE SPINAL CORD OF THE DOMESTIC CHICKEN (GALLUS GALLUS FORMA DOMESTICA L., 1758)

Evolutionarily, the spinal cord is a very ancient structure in the body of vertebrates that has changed throughout the entire phylogenetic development of vertebrate species.

Its main functions are coordination of body movements, transmission of nerve impulses to the brain and vice versa, reflex function, regulation and innervation of internal organs, etc.

Studies of the structure and functions of the spinal cord are of great importance for neuromorphology, humane and veterinary medicine.

In fact, neurocytes (cells of the nervous system) regenerate very slowly: unlike many other somatic cells in the body, they have a limited ability to regenerate. This makes it important to observe measures of prevention and treatment in case of damage to this system, and accordingly, to study it at the tissue and cellular levels.

As an example of the morphological structure of the spinal cord, our research was conducted on domestic chicken (Gallus gallus forma domestica L., 1758).

Macro- and microscopic research methods were used in the work.

We investigate microscopic structure, shape and cellular typing of neurons on preparations impregnated with silver nitrate according to Bilzhovskyi-Gros and Ramon-i-Kahal [1].

According to the analysis of neurohistological studies, the cross-section of the chicken spinal cord has clearly defined gray and white brain matter. The gray matter is centrally located and has dorsal and ventral horns. Lateral horns in the gray matter are weakly expressed.

The dorsal horns of the gray matter have an elongated shape, and their apex is expanded and ends with a point.

Nerve cells in the gray matter of the spinal cord of chicken are unevenly located, they form clusters - the nuclei of the ventral, lateral and dorsal horns.

The neuroplasm of large neurons, which are mainly located in the ventral horns of the spinal cord, is characterized by moderate or increased eosinophilicity (that is, the ability to be stained with an acidic red dye known as eosin. This ability is used as an indicator of the presence of certain components in cells or substances, such as proteins or nucleic acids, and may indicate their chemical or structural nature)

The nuclei of the nerve cells of the dorsal horns of the spinal cord are poorly outlined against the background of neuroplasm. Bright neuroplasm is characteristic of such nerve cells. In the ventral horns of the gray matter of the brain, neurocytes are mostly medium and large in size and have a multifaceted shape. Small nerve cells, of which there are much fewer, are sometimes found near such cells.

Moreover, this study proves that clusters of multifaceted and star-shaped neurons with a large number of dendrites are often observed in the medial and lateral areas of the ventral horns. Such clusters of nerve cells usually form single groups (3-4 cells) that form the lateral, medial, and central nuclei of the ventral horns. The central zone, in most cases, is represented by an uneven arrangement of nerve cells, which are mainly medium and small in size. Such nerve cells are located at a considerable distance from each other. Gliocytes of the gray matter of the spinal cord are located around neurocytes, which form groups of 3-4 glial cells. The dorsal horns of the gray matter are represented by single neurocytes that have an oval or irregularly rounded shape and are concentrated in the middle part of the dorsal horn. Somewhat closer to the gray ganglion and the central spinal canal are singly located large and medium nerve cells.

It is commonly suggested that Clarke's nucleus, or a cluster of nerve cells, is formed from large cells with pronounced processes. Medium and small neurocytes are located near such nerve cells. Multipolar neurons are most often found in the lateral horns of the gray matter of the spinal cord. The largest concentration of them forms the lateral (sympathetic) nucleus. The intermediate zone of the lateral horn and its lateral and medial nuclei are formed by medium neurocytes that have a multifaceted shape. Small neurocytes are found singly.

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INCREASING THE EFFICIENCY OF USING THE RESOURCE POTENTIAL OF THE ENTERPRISE

The efficiency of an enterprise is reflected in economic indicators that depend on the interconnection of processes that include many factors that affect the enterprise functioning. In the situation of constant changes in supply and demand for sales products and factors operating in the enterprise, fluctuations in the competitive environment, and other global factors, the mandatory goal of enterprise management is to create and assess the existing and prospective capabilities of the company, i.e. its potential. This is due to the need for an appropriate level of performance efficiency and increased competitiveness in the market. One of the ways to improve the enterprise is to increase the efficiency of the use of resource potential [1, c. 83].

Today, a significant number of methods and tools have been created to identify the resource potential of an enterprise. Most of them, which are confirmed by science and practice, are described in economic scientific works. Each of them differs in depth, direction of research, and conclusions of certain indicators. I would like to draw attention to the increase in the efficiency of the use of the main components of the resource potential [2. c. 97].

The problem of resource potential at an enterprise has been and is paid considerable attention by such economists as V. Shiyan, I. Lukinov, A. Onishchenko, B. Paschaver, E. Figurnov, E. Lapin, V. Avdeenko, V. Kotlov and others. Their scientific works pay attention to the disclosure of the concept of resource potential of an organisation as an economic category, its components, the effect on the functioning and activity of the organisation, and the improvement of means of assessing the resource potential of an enterprise [1, c. 83].

It can be said that resources are factors of production by which an organisation continues to fulfil its purpose. However, resources alone do not create goods, and mere enrichment with the same resources does not guarantee success. It is important to develop the enterprise capabilities in the form of resource potential to continue its activities in a particular occupation [3, c. 704].

Resource potential plays a significant role in the productive activity of an enterprise, as it is a way to obtain the highest possible income and increase competitiveness. In the etymological sense, the concept of potential means means, reserves, sources that are available and can be used, launched, to implement a certain decision, plan, task, or ability of a particular person, group of people, or state in a certain area. Potential in general is the ability to implement anything, so it can be accumulated, calculated as a degree of accumulation, and applied. In turn, an ability is a way, condition, or circumstance that is necessary for the realisation of something. One of the main features of potential is its ability to be created. Potential is closely related to the nature of the enterprise goals. The formation of an enterprise potential is understood as the process of taking measures to provide market opportunities for the organisation by changing its characteristics and indicators to the required degree that meets the set goals [1, c. 83].

It can be noted that the resource potential is a system of interrelated components, accordingly, it can be argued that it has all the features of a system that can be considered in detail in the following principles (Table 1).

Principles of effective use of resource potential at the enterprise

Name	Meaning
Systemicity	The use of all means of enterprises should be balanced, preventing significant deviations from the norm in the process of creating and selling products, taking into account the effect of external and internal factors
Structuredness	The structural features include the integrity of the resource potential, according to which all components implement the common target goal set for the system. The joint activity of the resource potential elements, as a prerequisite for ensuring its structural completeness, guarantees consistency in work and allows obtaining new characteristics that were not inherent in the elements before the start of their activity
Target orientation	Mutual activities of all structural units should be organised and perform functions in accordance with the task
Economic self-sufficiency	To guarantee competitiveness in the chosen field of activity, the organisation should create an action plan, both for a certain period of time and for the future
Consistency	There should be organised joint activities in technology, marketing research, and the movement of economic resources among the organisation's structural units. In the external environment,

	organisations should organise mutual actions regarding taxation, customs quotas, tariffs, profitability, etc.
Adequacy	The actions of business units should adequately respond to the effect of external and internal environmental factors and consider reasonable courses of action
Social justice	Today, in the context of productive use of resource potential, the use of labour potential is essential, so business owners and managers need to take a humane approach to the activities of this type of resource. This can include coordinated actions by management and employees regarding the number of hours of work and breaks, optimal remuneration, social guarantees and other factors that motivate them to work

Based on sources 3, 4.

To determine the effectiveness of the use of the enterprise's resource potential, one can use such terms as resource efficiency and resource intensity, which are calculated both in general and by its main elements (land, salary, energy, material, depreciation). The higher the resource efficiency and the lower the resource intensity, the better the use of the enterprise's potential [4, p. 36].

Comprehensive indicators that establish the use of the organisation's resource potential should cover all its elements, for example, land, fixed and current assets, labour resources [4, p. 36].

The ways to improve efficiency are as follows:

Increase of human resources potential – an effective system of labour incentives, use of approaches of environmentally oriented personnel management based on the environmental management system (EMS); analysis of personnel policy and its continuous improvement; provision of labour resources in accordance with production needs [5, p. 129].

Increase of material potential – optimisation of production, implementation of a system of rational environmental management based on the EMS; equipment renewal and timely maintenance; efficient inventory management; clear planning of the programme and production sequence [5, p. 129].

Increase of financial potential – effective financial control and financial planning; optimisation of the structure of activity financing; coordination of financial units of the enterprise; development of a competitive financial strategy that does not contradict the overall strategy of the enterprise [5, p. 129].

Increasing the information potential – creation of a system for collecting, processing and analysing information; automation of this system; monitoring of information risks [5, p. 129].

Thus, theoretical understanding of the essence of resources as the basis of economic development, identification of their sources, development of ways, forms and methods of their use allow formulating the principles of intensification of economic policy to intensify economic processes. Given the complexity of the Ukrainian economy, the identification of resource opportunities and the efficiency of its use should become a priority in the strategy of any enterprise. The tendency of economic growth to depend on the state of potential is obvious, which has always been noted by the creators of the theory of economic growth, and is confirmed by business practice.

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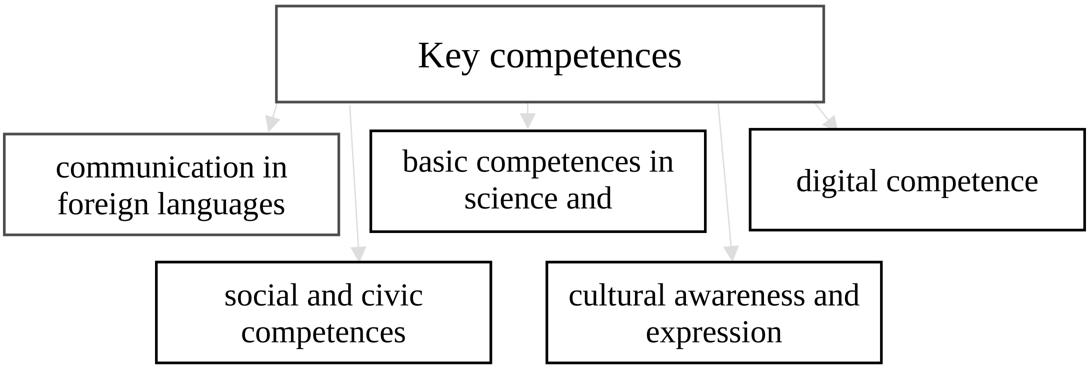
FORMATION OF KEY COMPETENCIES IN ENGLISH LESSONS

In the modern world, the development of key competencies attracts considerable attention in any field of activity, and the education sector is no exception. A review of scientific literature has shown that key competencies are a set of skills or abilities that distinguish a student from other students. Since education is an important component of society, it will always be centered on the development of the individual and the formation of his or her skills and abilities, as well as the formation of key competencies. Modern teaching methods include the development of key competencies that make English lessons more effective and prepare students for life in the modern world.

In the 2017/2018 school year, Ukrainian secondary schools are implementing updated foreign language programs for students in grades 5-9. These new programs differ from the previous ones in that they offer a broader approach to the learning process, not limited to traditional topics of situational communication. Instead, they introduce four integrated content areas: "Environmental Safety and Sustainable Development, Civic Responsibility, Health and Safety, and Entrepreneurship and Financial Literacy. These lines are aimed at developing students' skills to apply knowledge and skills in various subjects in real-life situations to overcome the fragmentation of learning [1].

The aim of learning is to form subject and key competencies that are necessary for personal development, active civic participation, social inclusion and successful employment in modern society. Foreign language teachers, almost at every lesson, through the content of learning and various forms and methods, actively form students' life skills, realizing the potential of competencies in the field of "Foreign Languages" [2].



Communication skills in a foreign language are the foundation of learning English. Lessons focus not only on grammar and vocabulary, but also on developing students' ability to express their thoughts, understand their interlocutor, and communicate effectively. Role-playing games, debates, and collaborative dialogues are just a few examples of the methods teachers use to develop students' communication skills.

English classes can also be used to collaborate with other subjects, such as science and technology. This can include reading and discussing scientific texts, using online resources for research and presentations, and discussing the impact of technology on our lives.

Modern English language teaching also includes the development of digital skills. The use of online resources, multimedia materials, and specialized programs helps students develop computer skills, information retrieval, and the use of digital tools for learning.

English lessons provide opportunities to discuss social and civic issues. Through discussions of topical issues, role-playing and project assignments, students learn to understand their rights and responsibilities, develop tolerance and teamwork skills.

Learning English allows students to learn about the culture and traditions of English-speaking countries. Through literary texts, music, movies and games, students expand their knowledge of world culture and learn to express their own thoughts and feelings about different aspects of culture.

Thanks to the integrated approach to learning English, students develop not only language skills, but also key competencies necessary for successful life in the modern world. Teachers contribute greatly to the development of these skills by creating stimulating and interactive lessons.

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IMPROVING THE PHYSICAL QUALITIES OF SCHOOLCHILDREN WITH THE HELP OF STRENGTH EXERCISES WITH THEIR OWN BODY WEIGHT

The current era sees a heightened interest in the foundational strength training of schoolchildren and students, given the notable shifts in the social, ecological, and economic aspects of societal living. Today, motor development and health of schoolchildren in Ukraine tend to deteriorate. Almost 90% of children have health abnormalities, more than 50% have unsatisfactory motor training [1].

The level of strength training not only reflects the development of motor functions as a whole, but is one of the main and most noticeable signs of physical improvement. This presents the physical education teacher with the difficult task of planning the educational process in such a way that it ensures the necessary level of strength training of the students. The difficulty lies primarily in determining the optimal ratio of lesson time allocated to the development of strength qualities and the formation of motor skills. At the same time, it is necessary to take into account that in most cases, learning new program material should be preceded by general strength training, which ensured more effective, and most importantly, correct formation of motor skills [2].

In an era dominated by technology and sedentary lifestyles, the physical well-being of schoolchildren has become a growing concern. With the prevalence of childhood obesity and related health issues on the rise, there is an urgent need to implement effective and sustainable strategies to improve the physical performance of the musculoskeletal system in schoolchildren. One promising avenue is the incorporation of strength exercises using their own body weight into school curriculums.

The implementation of strength training in schools will help to expand and improve the school's sports activities in the future, which will give the school more recognition and increase funding. A few tips how it should happen:

- Implementation of strength exercises with own weight in physical education classes. Teachers can design lesson plans that fully integrate these exercises, ensuring that students get regular exposure to a variety of movements.

- Fostering a culture of physical activity by encouraging students to perform exercises with their own weight outside of scheduled physical education lessons. This may include creating special sports clubs, organizing fitness challenges, or conducting extracurricular activities focused on bodyweight strength training.

- The involvement of parents and caregivers is critical to the success of any fitness initiative. Therefore, Schools can provide resources and information to educate parents about the benefits of bodyweight exercise, encouraging them to support and participate in physical activity with their children at home.

Bodyweight exercises utilize the individual's own body weight as resistance, making them suitable for children. Start with basic movements and gradually progress as strength improves. There are many different exercises with your own weight, among which the main ones are: squats, push-ups, pull-ups, planks, burpees, jumps, as well as variations of the listed practice. So, I recommended the following example of a program plan for one lesson with body weight exercises:

1. Before starting any exercise routine, it's crucial to begin with a proper warm-up to increase blood flow and prepare the muscles for activity. Include activities like jogging, jumping jacks, or dynamic stretching.
2. Then the main part of the lesson begins. The first exercises will be for the lower body; all children start with 10 squats, followed by 5 lunges. They repeat this sequence 4 times with a 2-minute rest in between.
3. After a few minutes of rest, upper body exercises are performed. Start with pull-ups, aiming for 5-10 reps. For those who can't, perform Australian pull-ups with double the reps. Afterward, take a 2-minute rest and proceed to push-ups, aiming for 20-25 reps. Similarly, for those unable to do regular push-ups, perform push-ups from the knees. Repeat this circuit four times with a 3-minute rest between each set.
4. At the end of the workout, a cool-down is performed.

Note: the number of reps and sets for each student can be individual, and for girls it is possible to perform all exercises at half strength.

So, Musculoskeletal fitness comprises such elements as the strength and endurance of the muscles of the legs, arms, and trunk, a high level of which makes it possible for the entire body to function properly [3]. Low motor fitness, on the other hand, is a risk factor for falls, which frequently lead to bone fractures [4].

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THE THEORETICAL FOUNDATIONS OF THE MODELING MASS SERVICE SYSTEMS

The vast majority of phenomena and processes that computer science explores are complex. It is necessary to build mathematical models to study them. Data on the purpose and operating conditions of the studied system serve as initial information when building mathematical models of system functioning processes. This information determines the main purpose of the simulation, the requirements for the mathematical model, the level of abstraction, the choice of the mathematical modeling scheme, etc.

The mathematical model of the simulation object (system) is represented as a set of values describing the process of functioning of the real system. The following subsets are most often used in the description:

- set of X - input influences on the system;
- a set of influences of the external environment;
- set of internal (own) parameters of the system;
- set of initial characteristics of the system.

One of the most studied systems is the mass service system (MSS), the process of functioning of which is, in fact, the service process, which consists in providing one or another service, which is determined by the functional purpose of the system. Typical service systems include repair and medical services, transportation systems, airports, train stations, etc. Such systems have gained special importance in information processes. These are primarily computer systems, information transmission networks, operating systems, databases and data banks. The experience of modeling various types of discrete systems shows that approximately 80% of these models are based on MSS.

Each MSS consists of a certain quantity of service units (also called service channels (these are machines, robots, communication lines, cashiers, sellers, etc.)) and is designed to serve a certain flow of the applications (requirements) arriving at certain random moments of the time.

Service of the request continues for some time, after that the channel becomes free and ready to receive the next request. The random nature of the application flow and service time leads to the fact that in some periods of time a large number of applications accumulates at the entrance of the MSS (they either enter the queue or leave the SMO unserved). In other periods, the MSS will work with underload or be completely idle.

The operation process of the MSS is a random process with discrete statuses and continuous time.

The MSS status changes leap-like at the time of certain events (the arrival of a new application, the end of service, the moment when an application that cannot wait leaves the queue).

The process of functioning of the MSS generally includes the following stages: receipt of requirements; waiting (if necessary) in line; service in the device; output of the request from the system. It is necessary to describe: the process of receiving applications into the system; application maintenance process in the system; service discipline to formalize the MSS.

If the intervals of receipt of all applications are constant, then such a flow is called deterministic or regular. But, as a rule, the arrival intervals are random variables, and the corresponding flow of applications is called stochastic or random.

To describe the stochastic flow (stochastic transfer process) of applications, it is necessary to specify the distribution function of the random arrival interval for each application.

For this we can use: the method of inverse functions, the method of piecewise linear approximation, modeling a random variable based on empirical data, selection method or different mathematical methods of generating random numbers (congruent (linear) method, Lemer's algorithm, mixed generator, additive generators, McLaren-Marsal method, arithmetic procedures, quadratic congruent method and etc.).

For the simulation of MSS there is a need to use mathematical methods of generating random numbers in order to avoid repetitions. therefore, the prospects for further scientific investigations are the use of Pearson, Kolmogorov and Student criteria to determine the subordination of distributions to one law or a certain model. As well as a statistical evaluation of the parameters of the equal probability distribution and calculation of all the characteristics of the investigated MSS.

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ZOMBIES: MECHANISMS OF FORMATION AND FUNCTIONING OF THEIR BRAINS

Zombies are one of the most mysterious and enigmatic subjects, often the subject of discussion in literature, film and scientific research. The concept of a zombie varies depending on cultural contexts and creative imaginations, but there is a certain consensus that it is a creature that is in a state of uncontrollable behaviour and has limited brain function. In this essay, we will consider various theories about how zombies are formed and how their brains work.

1. Historical overview of the zombie concept.

The first references to zombies have their roots in African and Caribbean mythology, where they are associated with religious rites and magical practices. However, the concept of zombies has also been explored in modern science, where scientific explanations for their existence and brain activity were sought.

2. Mechanisms of zombie formation.

There are various hypotheses regarding the mechanisms of zombie formation, including chemicals, infectious diseases and psychological influences. One hypothesis is the use of the tetrodotoxin poison, which can cause a state of paralysis and reduced consciousness, turning a person into a controlled creature. Other studies point to the possibility of using other poisons or microorganisms that affect brain activity.

3. The functioning of the zombie brain.

Although the exact mechanisms of the zombie brain remain a matter of speculation, there are some general assumptions. The zombie brain may lack higher cognitive functions such as language, thinking and memory, making them capable of only basic instinctive reactions. Some researchers believe that the zombie brain can be inverted into a state of hypnosis or control through manipulation of the influence on neural networks.

4. Correlation of zombies with real phenomena.

Although the concept of a zombie is mostly perceived as a myth or legend, there are some real-world phenomena that can be used to explain this phenomenon. For example, certain types of parasites can control the behaviour of their hosts, which may be similar to the concept of zombies. In addition, there are cases of people who are in a state of paralysis or other neurological disorders that can give the impression of zombies.

In conclusion, the concept of zombies remains one of the most interesting and mysterious topics in culture and science. Although scientific evidence for the existence of real zombies is limited, research in this area continues, and the possibility of certain behavioural control mechanisms remains a subject of interest to a great number of people.

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COMPETITIVE STRATEGIES IN THE MODERN MARKET ENVIRONMENT, THEIR FORMATION AND PRINCIPLES

Competition leads to the emergence of a significant number of competing firms in both domestic and foreign markets. Growing market demands force enterprises to constantly increase their strategic potential, explore possible options for its effective use, demonstrate new competitive advantages and implement competitive strategies. Having analysed the interpretation of the term competitiveness by some scholars, we can first of all conclude that there is no single term.

H. Hrytsyshyn proposed the following interpretation of the concept of competitiveness, taking into account the fact that this concept is stable and exists constantly and means the ability to conduct a quality competitive struggle, that is, to resist in the competitive struggle [3, p. 132].

V. Adamik and H. Verbytska emphasise that "competitiveness is an economic category, i.e. the ability of an enterprise to influence the market situation, i.e. the ability to produce products that meet consumer requirements at a relatively low level and at relatively low cost [4, p. 70].

However, analysing this concept, it can be concluded that it does not take into account the possible non-price potential of product competitiveness.

Competitive strategy explains the basis of competitive behaviour of enterprises in the market and the process of gaining advantages over competitors. It is formed on the basis of the following behavioural models and approaches that are inextricably linked to management and is aimed at creating and improving the long-term competitive position of enterprises.

When developing a competitive strategy at an early stage of activity, an enterprise faces the issue of identifying and implementing profitable long-term methods of competition in the industry. Given the number of competing companies and the competitive advantages they have, there is no single and universal competitive strategy. Only strategies compatible with the skills and capital of specific enterprises will lead to success [8].

Taking into account and adhering to the principles of strategy formulation creates an effective tool for a company to achieve its goals. This ensures a high level of competitiveness and flexibility.

The following approaches and schemes are used to formulate competitive strategies:

- step-by-step process of strategy formulation;
- factor scheme for determining the company's competitive strategy;

- mechanisms for the formation of alternatives;
- cyclic and hierarchical models of the strategy formation process;
- assessment of the level of competitiveness of enterprises [8, p. 475].

The proposed approaches to the formation of a competitive strategy do not take into account the importance of the current competitive position of the organization when choosing a strategy, underestimate the role of the competitive environment, and do not provide flexible mechanisms for responding to changes in the internal environment. The optimal approach is to adapt a number of approaches to develop a unique strategy that works for the enterprise.

Therefore, in order to formulate competitive strategies, it is necessary to focus on the basic approach to formulating a competitive strategy. Ultimately, if it is possible to create new rules, they can be adapted to the specific problems and challenges faced by the enterprise.

The approach to studying the competitiveness of an enterprise is determined by the conditions of competition in different markets, the diversity of organizational and economic forms of enterprises.

From the point of view of marketing, business competitiveness is the ability of an economic unit to function effectively in the market on the basis of supplying goods that meet the needs and preferences of buyers in terms of quality, quantity and range, at the right time, on more favourable terms [8].

Based on this, the mechanism of forming a marketing strategy adapted to the desired level of competitiveness, based on compliance with the strategic intentions and goals of the enterprise, makes it possible to carry out cost-effective activities and have a strong competitive position [10, p. 87].

Formation of the marketing strategy of an enterprise in order to increase competitiveness is achieved through the implementation of the following measures

- assessing the competitiveness of other producers by analyzing the impact of macro- and micro-environmental factors as well as assessing the competitiveness of other producers;
- formulation of competitive strategies in different market segments and for different types of products;

- ensuring the unity of the enterprise's strategic development, which ensures that the set of competitive strategies is consistent with the mission of the enterprise and integrated into the basic strategy of the enterprise [5, p. 60].

The competitive strategy of an enterprise allows it to answer the question of how it will compete in the target market. As a result, the company can withstand competitive pressure and win the competition. At the same time, a competitive strategy is always the same thing. It is about satisfying the needs of consumers in a way that is better than that of competitors.

The successful functioning of a company depends not only on the efficient operation of its internal systems, but also on the influence of external factors that help companies find various opportunities for effective existence in the market.

A systematic analysis of the impact of such factors is necessary for the company's management. It should be emphasized that the company's management should respond to changes in a timely manner and take appropriate measures to strengthen its competitiveness, as well as to predict the avoidance of such actions in the future and the scenario of development of its existence in the market [6, p. 433].

Thus, ensuring the competitiveness of an enterprise is a process that requires specific measures and management, as well as forecasting future development scenarios. It is necessary to formulate management, especially marketing strategies. All important organisational components, such as personnel structure, qualifications, technology, equipment, products and markets, are the main key to ensuring business competitiveness and take into account all aspects and factors of influence.

In conclusion, it can be said that the process of formulating an effective competitive strategy is an essential element for any business to succeed. Therefore, it is desirable to distinguish not only between external and internal factors of competitiveness, but also between those that are created (controlled) and those that are taken into account (uncontrolled).

Through the implementation of a competitive strategy, enterprises can achieve their goals, ensure a sufficient level of profitability and increase their own competitiveness, realise competitive advantages and achieve more sustainable development.

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PERSONAL FACTORS OF PROSOCIAL BEHAVIOR OF YOUNG PEOPLE

The harmonious relationship between the individual and society is expressed, in particular, in the phenomenon of prosociality. Prosociality is manifested in a person's ability to respond to the needs of other people, actively influence social processes, sensitivity to events around and the skill of establishing positive relationships. The individual realizes his prosociality through the processes of social interaction, manifesting prosocial behavior in relation to others.

Socialbehaviour is any behaviour that is aimed at benefiting another person or persons [4]. Prosocial behavior refers to a wide range of actions aimed at benefiting other people, without one's own benefit. Unlike selfishness, whose motivation is to increase one's own well-being, prosocial behavior is behavior aimed at increasing the well-being of others, such as helping, reassuring and cooperating [5]. According to R. Pavelkiv, N. Korchakova and V. Bezlyudna [2], prosocial behavior is an action which brings good to another person. This integrated concept unites into a single structure both altruistic human behavior based on a system of moral principles, and behavior based on other motives (egoistic, presentational and principled motives).

The question of personal factors of prosocial behavior remains debatable. Currently, in the scientific discourse, there are developed models of prosocial personality that highlight its most important qualities, such as empathy, faith in justice, social responsibility, and internal locus of control [2]. Analyzing the structure of prosociality, N. Korchakova [1] distinguishes prosocial identity, motivational, cognitive-reflective, emotional and behavioral components in it. Criteria for the functioning of the cognitive-reflective component include an understanding of prosocial norms with their mental representation and reflexivity, which is manifested in the ability of the system to direct theyou are your own activity on yourself. It is obvious that the communicative competences of the individual play a significant role in this component. The criteria for the functioning of the motivational component include: a) "value-based attitude towards the other", b) "ability to take responsibility in situations with a potential prosocial context" and c) "disinterestedness". The criteria for the functioning of the behavioral component are a) "activity-reactivity", b) "initiative-passivity", c) "complexity-simplicity" and d) "extensiveness of prosocial self-realization". Thus, prosocial behavior is a manifestation of a complex personal construct that begins to form from early childhood and continues to form throughout life.

In the process of empirical research, it turned out that an increase in the level of communicative characteristics in students affects the manifestation of prosocial trends. The level of students' communicative and verbal training has a significant impact on their empathic abilities and altruistic behavior. Also, with the growing propensity for selfless help, students' communicative and speech control increases [3].

Therefore, prosocial behavior is an action that benefits another person. Personal factors of prosocial behavior include empathy, belief in justice, social responsibility, internal locus of control, etc. A connection between prosocial behavior and communicative competence of the individual was also revealed: young people with a high level of communicative and speech training have empathic abilities and are prone to altruistic behavior.

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REVOLUTIONARY BREAKTHROUGH IN THE FIELD OF ARTIFICIAL INTELLIGENCE

Artificial intelligence is an intelligent machine that can perform tasks that always require human intelligence. It can be trained to perform simple tasks like recognition speech and images, or more harder tasks like playing a game or driving a car.

The first artificial intelligence was presented at a scientific conference at Dartmouth College. Its name was «Logic Theorist». It can imitate the human way to perform tasks.

The first virtual collocutor «Elise» was created in 1966 year and is a prototype of modern chat-bots and virtual assistants.

The biggest popularity of artificial intelligence began extremely grow after 30 November 2022. It was then that OpenAI company presented to public new ChatGPT chat-bot with generative artificial intelligence. In two month after release, the number of active users reached more than 100 million, which become historical record among other programs. That popularity it gained for understanding context of the conversation and for detail and clarity of answers to user`s request.

Believed that ChatGPT became the very breakthrough in the field of artificial intelligence, because after its release began to appear more and more new artificial intelligences. For example, Midjourney and DALL-E 2 can create images to user`s request, Stable Diffusion can create videos in addition to photos, MusicGen can create music, and there are many others that can help in almost all areas of daily life.

If earlier services for creating images were very bad at drawing hands, now they can do it well, although not without errors. This shows that this industry is gradually developing.

OpenAI company has now stopped training new fifth version of ChatGPT as a response to a request letter from more than 50 thousand people. The reason was the fear that this new version would become an artificial generalized intelligence, that can successfully perform any intellectual task that a human can perform. It can become a very big level threat like pandemic or nuclear weapon.

In general, field of artificial intelligent have great chances for further development. This will become a threat to some professions or humanity depends on how this newest tool will be used.

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GAMES AS AN INNOVATIVE MEANS OF TEACHING COMPUTER SCIENCE

Modern education is facing challenges due to the growing need for student engagement and motivation, which is greater than ever before. The lack of student interest in learning and the complexity of subjects such as computer science have prompted teachers to look for new methods to stimulate student interest.

The purpose of this article is to study and analyze the use of games as an effective tool for organizing computer science education in educational institutions.

The use of games in education opens up many opportunities to improve the quality of education. The main aspects that make this learning strategy effective and useful include:

- Engagement and motivation: Games stimulate learners and make learning fun and engaging.

- Practical skills: Games provide opportunities for problem solving and problem solving, which helps build practical skills.

- Collaboration and communication skills: Some games promote collaboration and communication among learners, developing their social skills.

- Personalization of learning: Games can be customized to respond to the needs of each student, which helps to take into account individual characteristics.

- Progress tracking: Many gaming platforms provide feedback and help teachers track student progress.

- The right to make mistakes: Games allow students to learn from their mistakes and inspire further development [1].

Currently, there are many gaming platforms and applications for the educational process, among which the following programs and applications are highly effective in teaching and popular: Kahoot, Code.org, Scratch, Tynker, Lightbot, LearningApps, Human Resource Machine, Wordwall [2].

When choosing specific game platforms for education, it is important to consider their possible advantages in the context of the educational process. The selection of specific gaming platforms for education is based on their potential benefits that can positively affect learning.

Various research methods have been used to study the impact of games on student learning, including:

- Experimental research.
- Literature reviews.
- Observations.
- Questionnaires and interviews [3].

The study confirmed that most students consider games in the classroom to be an effective and interesting teaching method. Games stimulate interest in the subject, improve learning, and have a positive effect on students' emotions and motivation. Most of the study participants expressed a desire to continue learning with the use of games, which indicates their desire for learning and development.

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THE ROLE OF EMOTIONAL INTELLIGENCE IN EFFECTIVE COMMUNICATION

Communication is a vital skill in both personal and professional contexts. Effective communication involves not only the exchange of information but also the ability to understand and manage emotions, both one's own and those of others. This is where emotional intelligence (EQ) comes into play.

Emotional intelligence refers to the capacity to recognize, understand, and regulate emotions. Individuals with high EQ are better equipped to navigate social situations, build strong relationships, and communicate effectively.

In the realm of communication, emotional intelligence plays a crucial role in several aspects. Firstly, it enables individuals to comprehend the underlying emotions behind verbal and non-verbal cues, allowing for more accurate interpretation of messages. Secondly, it fosters empathy, enabling individuals to see situations from different perspectives and respond appropriately. Thirdly, emotional intelligence helps in managing conflicts and difficult conversations by promoting self-control and the ability to respond constructively rather than reactively.

Furthermore, emotional intelligence is particularly valuable in professional settings, where effective communication is essential for teamwork, leadership, and client interactions. Individuals with high EQ are better able to motivate and inspire others, negotiate effectively, and build trust and rapport.

In conclusion, emotional intelligence is a vital component of effective communication. By cultivating emotional intelligence, individuals can enhance their ability to connect with others, navigate social situations with greater ease, and achieve successful outcomes in both personal and professional contexts.

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COMPARATIVE ANALYSIS OF THE MAIN FORMS OF ACCOMMODATION FACILITIES FUNCTIONING AS A TOOL FOR EFFECTIVE MANAGEMENT IN HOTEL CHAINS

Hotel chains have become an important and necessary component of the global economic system, meeting the needs of modern society for comfortable and efficient accommodation during travel and leisure. An important prerequisite for the successful operation of hotel chains is a successful choice of the form of business of accommodation facilities as key elements of their activities.

In the current business environment, the most common forms of operation of hotel chains, in particular in Ukraine, are: contract management, lease and franchising. At the same time, preference is given to the form of doing business on a franchise basis.

Hotel franchising is a business practice that allows entrepreneurs to own hotels through partnerships with certain hotel chains or large hotels already operating in the market.

A franchisor is a person who transfers to others the technology of producing goods or providing services. Accordingly, a franchisee is a person who obtains a license (franchise) for the technology of producing goods or providing services.

The advantages and disadvantages of the hotel business based on a franchise agreement are shown in Table 1. Obviously, the use of this form of business in hotel chains provides significant advantages for accommodation facilities and thus increases the demand for franchising.

As for contract-based management, the business owner appoints a management company to manage the hotel business on his or her behalf. Some management companies own a brand, and in this case the hotel operates under the management company's brand. The owner remains the owner of the property and business and retains most of the risks and rewards of operation, but pays the management company to provide day-to-day management of the hotel (Table 2).

Table 1

Analysis of the advantages and disadvantages of the hotel business on the basis of a franchise agreement

	Franchisee	Franchiser
Advantages	- minimizing the risks of starting a business, avoiding the "trial and error" stage; - high profitability due to a ready-made niche in the market; - Reduction of operational risks through the use of proven technologies and proven methods of doing business; - 60% guaranteed booking for the next year; - the possibility of conducting training courses and consultations for employees; - reduction of costs for search of suppliers, financial intermediaries, marketing, support of automated booking systems, etc.	- the ability to expand the business with minimal investment and penetrate new markets; - additional income from franchisee payments.
Disadvantages	- dependence of success on the franchisor's reputation; - loss of individuality, limited independence, and entrepreneurial initiative; - removal of former managers from management positions; - inconsistency of business methods, focus and goals of the franchisor's advertising campaigns; - unwillingness to deduct remuneration (royalties) after the payback period (2-3 years).	- income is limited only to payments received from the franchisee; - in case of non-compliance by the franchisee with the established (fixed in the agreement) service quality standards, the possibility of acquiring a negative image.

Source: compiled by the authors based on [1] and [2].

Table 2

Analysis of the advantages and disadvantages of managing an investment vehicle on a contractual basis

	Hotel owner	Management company
Advantages	- the management company does not own a share of the property of the hotel company; - freedom of choice belongs to the management company or the manager; - investment in the company regardless of the management company's position; - maximum profit after deduction of remuneration for the manager.	- significant expansion of the sphere of influence; - income is increased at minimal cost; - no need to make payments to the hotel owner.

Disadvantages	- Elimination of operational control; - mandatory payment of remuneration to the manager; - prohibition of interference in the management process; - Difficulties with early termination of the contract.	- limited income in the amount of only management fees; - dependence on the financial situation of the owner; - loss of employment and, accordingly, termination of activities after the expiration of the contract.

Source: compiled by the authors based on [1] and [2].

The use of a lease agreement allows tenants to enter the hotel market and strengthen their position in it. In many cases, the tenants are entrepreneurs whose place in the hotel market is in question due to financial difficulties. The basis of the relationship is a rental (leasing) agreement, which defines the rights and obligations of the parties, as well as the cost and term of the lease. The advantages and disadvantages of managing an accommodation facility on the basis of a lease agreement are shown in Table 3.

Table 3

Analysis of the advantages and disadvantages of managing an accommodation facility on the basis of a lease agreement

	Landlord	Tenant
Advantages	- the ability to maintain its own position in the service market and expand production using the latest tenant management methods; - receipt of income from the lease of property; - the lessee does not own the leased property of the hotel company; - a convenient opportunity to terminate the agreement with the tenant in case of non-compliance with the prescribed terms and conditions.	- entering the service market with minimal investment; - receipt of a significant share of dividends from the total income of the enterprise; - rather large powers in choosing management, recruitment, technology, equipment, etc; - the possibility of privatizing the enterprise after the lease term expires
Disadvantages	- in case of irrational management of the lessees, there is a risk for the lessor of deterioration of the economic performance of the enterprise; - lack of operational control over the leased enterprise; - there are a number of difficulties for early termination of the agreement; - loss of a certain amount of income as a result of their receipt by the lessee as remuneration.	- restrictions on the use of the leased company's resources; - unattractiveness of the leased premises for modernization or diversification of production; - loss of a job, termination of activities after the expiration of the lease agreement.

Source: compiled by the authors based on [1] and [2].

Thus, based on the above study and the research of experts, the most optimal for hotel chains is to use franchising as a form of business organization. This phenomenon is quite widespread among the countries of the world, and in Ukraine it is gradually but successfully gaining ground.

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PROSPECTS FOR THE INTRODUCTION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN HIGHER EDUCATION

A comprehensive study of the introduction of artificial intelligence technologies into various spheres of society from various perspectives (social, economic, ethical and legal) is of particular relevance today. It is important to identify opportunities and threats, as well as to define the limits of artificial intelligence application in practice.

Artificial intelligence (AI) is a rapidly developing branch of computer linguistics and computer science that focuses on the development of intelligent machines capable of performing tasks that would normally require human intelligence. These tasks can range from simple activities such as speech or image recognition to more complex tasks such as gaming or driving.

This paper deals with the issue of introducing artificial intelligence technologies into the field of higher education. The article discusses and analyses promising areas of artificial intelligence application in higher education. The author come to the conclusion that artificial intelligence does not compete with teachers either in teaching or in assessing students' knowledge. Artificial intelligence is a valuable, albeit auxiliary, tool that can help perform and improve many different tasks performed at universities, organise effective educational processes, and build the necessary communications. The effective use of artificial intelligence technologies in higher education allows to choose the most appropriate learning strategies adapted to the individual abilities and needs of students, as well as to the requirements of the labour market.

The article proposes to introduce artificial intelligence technologies into the professional training of information technology specialists. It was identified several vectors for using the potential of artificial intelligence in education, including:

Personalisation of programmes and platforms. Students should study the same material in the same conditions. Individual differences in abilities, skills, and motivation lead to different ways of learning. The growing demand for personalised and adaptive platforms demonstrates the importance of individualisation in any education system (Sharma, Szostak, 2018).

This demand is fundamentally changing the traditional higher education system: universities are no longer able to provide traditional educational services. Universities will have to abandon the traditional model of a single curriculum. The proposed model of professional development is based on a large amount of data to analyse and understand the needs of each individual student. The learning process automatically adapts to the needs of each individual student. The learning process automatically adapts to the learning needs of each individual student.

Extracurricular learning. The ability to study anywhere and anytime. In practice, this means that mobile phones and tablets will become the main learning tools. New technologies mean learning in a traditional classroom more interactive ways of learning outside the traditional classroom. This means that hybrid use of both classroom and learning, which will facilitate the use of the Internet of Things. The ability to connect and interact with different devices on the same network.

An example of the application of this technology is the ability to fully prepare a classroom for learning, taking into account the needs of individual students. This is done without human intervention. The technology can be used for the following purposes.

Attendance management and examination processes can be fully automated. When expanding such a system the entire technological infrastructure of the university can be monitored and managed.

Efficient support services. An example of the implementation of such technology is Deakin University in Australia. It became the first university in the world to implement the Watson supercomputer. Watson combines the capabilities of artificial intelligence and analytical software to answer user questions. It is an analytical software that answers user questions. The purpose of this technology is a round-the-clock online student support service that can instantly answer any question.

The use of blockchain technology Modern higher education institutions have begun to use blockchain to transfer data on courses and programmes completed by students, as well as grades and performance of individual students.

Blockchain is being used to register data on courses and programmes completed by students, academic performance, and intellectual property for research purposes. The goal is to register data on intellectual property for scientific research. In this way, all references to publications can be traced and the significance of research can be traced. Technology opens up new opportunities for academic mobility.

The article analyses the existing solutions for using artificial intelligence technologies in education and selects two of them: adaptive learning and exam control. Adaptive learning is considered one of the most promising technologies. As a rule, the initial level of knowledge and competences of students varies considerably. Therefore, standardised programmes may be too easy for some students and too difficult for others. An individualised approach to teaching is also needed, but this is not easy to achieve with large numbers of students. Teachers are often faced with the challenge of how to ensure the success of weak students and encourage strong ones. Adaptive learning technologies can track each student's progress, create individualised schedules for each block of broadcast courses based on ability, and inform teachers about their level of preparation. However, the national education agency views high-tech education as simply distance learning and follows the paradigm of linear online courses.

Exam observation technology helps to solve the problem of objectivity in remote exams. It makes it possible to monitor groups of students simultaneously. The presence of unauthorised persons in the frame, unauthorised voices in the room, detecting how often candidates look away from their monitors, and tracking changes in browser tabs. All these actions are recorded as violations. In special cases, the system signals the examiner to pay attention to the offender. The examiner is then monitored using webcams.

Considers the possibilities of using artificial intelligence technology in education, systems that include elements of artificial intelligence that have already been implemented abroad, and the possibilities of using artificial intelligence technology in education. The systems that include elements of artificial intelligence, which have already been implemented abroad, are considered, and the directions of improving the professional training of specialists in the field of information technology are outlined. Directions for improving the training of specialists in the field of information technology are outlined.

Theoretical studies have shown that it is necessary to use the following elements of artificial intelligence. For example, personalisation of programmes and platforms, extracurricular learning, the Internet of Things, helpdesks and the use of blockchain technology. And the use of blockchain technology. Two solutions were selected for the pilot study Adaptive learning and examination control in the training of future IT specialists. Implemented. The pilot study made it possible to verify the adequacy of the methodology for collecting and analysing empirical data.

The research objectives and details of the research situation confirmed the adequacy of the methodology for collecting and analysing empirical data. Given the positive effect of the teaching methodology, expect further development of online courses for specialists in the selected fields.

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ДЛЯ НОТАТОК

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