SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

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这些会议文集结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。
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These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examine technical, juridical and sociological aspects of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

Authors are responsible for the accuracy of cited publications, facts, figures, quotations, statistics, proper names and other information.

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AIC 财务潜力的系统动态建模的主导因素
DOMINANTS OF SYSTEM-DYNAMIC MODELING OF THE FINANCIAL POTENTIAL OF THE AIC

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注释：本文作者基于系统动力学模型，论证了决定农业综合体和区域层面金融潜力增长量的主导因素。并指出，农业综合体金融潜力的增长调控机制应以预防措施为基础，以促进金融资源和企业未实现金融潜力的增长和有效利用。

关键词：农业综合体金融潜力、社会经济发展、增长机制、企业金融资源、贷款协调、投资增长激活。

Annotation. *The author of the article substantiates the dominant factors of system-dynamic modeling that determine the volumes of growth of financial potential created at the level of the agro-industrial complex and regions. It is established that the regulator of growth of the financial potential of the agro-industrial complex should be based on preventive measures to promote growth and productive use of financial resources and unrealized financial potential of enterprises.*

Keywords: *financial potential of the agro-industrial complex, socio-economic development, growth mechanism, financial resources of enterprises, harmonization of lending, activation of investment growth.*

In our opinion, financial potential as a factor in the sustainable development of the agro-industrial complex (hereinafter referred to as the AIC) and regions is determined by the nature of the solution to two key problems. First, where and how to mobilize financial resources in the amounts necessary to ensure the appropriate level of economic growth. Second, how to distribute the produced gross domestic product (hereinafter referred to as GDP) so that this again contributes to economic growth as much as possible. It is necessary to identify the main components of financial potential as a factor in the economic, social and environmental growth of the AIC in the current economic conditions.

V. V. Leontiev in his work "Economic Essays: Theories, Research, Facts and Policy" defined the prerequisites for the possible mobilization of financial resources for the sustainable development of the agro-industrial complex:

– scientific and practical solutions to the problems of assessing and extracting land rent and natural resource rent in favor of society;

– taxation of profits based on the discount rate on capital;

– rationalization of tax rates and their justified inter-sectoral alignment;

– correction of price relationships between the fuel and energy complex and the industries that produce the final product;

– the use of direct and indirect influence levers in the area of distribution of gross profit and the flow of capital into structure-forming industries;

– closing of obsolete production facilities and stimulation of priority areas of technological re-equipment of the economy [1, p. 126].

The problem of resource provision for sustainable development is key. It has two main focus areas: on own financial resources and on attracted investments from outside.

The situation with ensuring the needs of sustainable development with internal financial resources that are at the disposal of enterprises and concentrated in the banking system is quite tense. Their volumes, which are concentrated directly at enterprises, are extremely limited.

The main component of internal financial resources of enterprises are working capital, which has a fairly stable growth rate. And their volumes are quite significant. But the problem is that the predominant part of working capital is in a non-working state: accounts receivable and accounts payable, that is, funds in settlements exceed the volume of GDP. At first glance, this seems to be a significant reserve for increasing financial potential, but in reality these resources can be considered lost.

The volumes of the depreciation fund and profit are quite insignificant. Particularly negative is the tendency of the decrease in comparative prices of profit volumes, considering that it is profit that is the main source of increasing the financial resources of enterprises. In general, the volumes of internal working resources are catastrophically insignificant for the Russian economy. Enterprises do not have sufficient funds not only for development, but also for ensuring current activities.

The situation with resource provision is quite tense in the Russian banking system.

Thus, the problem of resource provision of the financial potential of the agro-industrial complex growth is extremely complex and cannot be solved by concentrating the action on a certain direction. It is necessary to make maximum efforts in absolutely all areas. Only such an approach will provide a synergistic opportunity to mobilize a sufficient volume of resources. At the same time, in

order to increase the financial potential, it is necessary to establish the priority of individual sources and determine the element with the help of which the balancing of needs with resources will be carried out (Fig. 1).

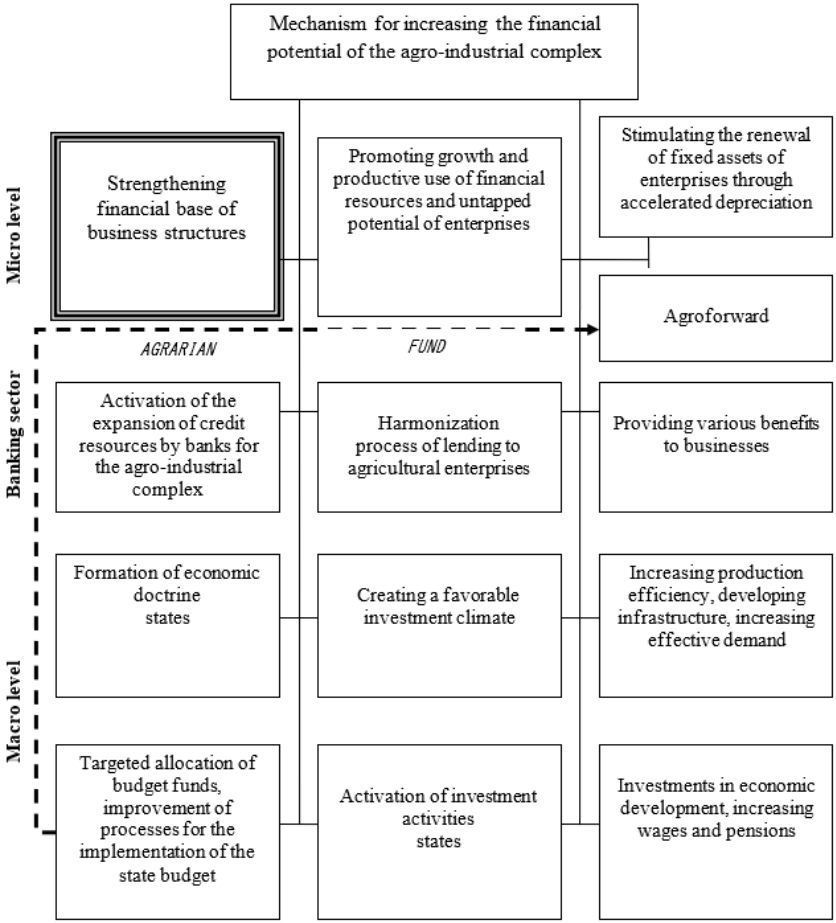

Figure 1. *Mechanism of system-dynamic modeling of increasing the financial potential of the agro-industrial complex*

Firstly, it is necessary to promote in every possible way the growth and productive use of financial resources of enterprises. The mechanism for increasing the financial potential of the agro-industrial complex should be based on the priority of financial resources of enterprises, and not the state budget. It is necessary to

review the procedure for paying taxes using the accrual method, which leads to the "washing out" of working capital. It is necessary to abandon any withdrawal of depreciation charges from enterprises, which is practiced during the period of macroeconomic stabilization. That is, the dominant mechanism for increasing financial potential should be strengthening the financial base of entrepreneurial structures of the agro-industrial complex.

Secondly, more attention should be paid to the banking system, primarily its resource potential. The trend towards growth of citizens' deposits should be supported by various methods of financial policy, primarily tax policy. In the conditions of a stable, resource-rich economy, income from citizens' financial transactions can and should be taxed on a general basis.

However, when resources are insufficient, when it is extremely necessary to increase them, but the main source and reserve for growth may be the savings of citizens, then it will be both appropriate and justified to provide various benefits.

Thirdly, despite the problems with attracting foreign investment for the Russian economy, an important component of the growth of financial potential should be the creation of an investment climate. Without an influx of external financial resources, it will be extremely difficult to solve the problem of developing the agro-industrial complex and regional development. In our opinion, without solving the two previous problems, foreign investors will not come and will not work effectively: they need a favorable internal market environment. Then and only then will their investments be able to become a significant factor in the acquisition of stable positive dynamics by the agro-industrial complex economy.

Fourthly, based on the limited financial resources of enterprises and banks at the present time, taking into account the problems with attracting investments, it is necessary to intensify the investment activity of the state. It is necessary to realize the obvious reality: internal resources are sufficient for stable functioning, but insufficient compared to the needs for economic growth, and hopes that external investments will save from all adversities are groundless, even if some favorable investment climate has been created. Therefore, a dilemma arises regarding the financial support of further development: either, using the existing financial potential, promote a gradual increase in the rate of economic growth, or sharply intensify the investment process and, along this path, increase the rate of economic growth. Of course, if there were no precipitous decline in the economy and living standards, a gradual nature of development could be taken as a basis. Moderate rates of GDP growth - up to 3% annually - will lead to this, but this restoration of lost living standards will stretch out for several decades, which is completely unacceptable.

Thus, in previous years, a stable economic base has been created in Russia. At present, Russia is a country with an average level of development and above-av-

erage income (according to the World Bank classification,2018.), which in fact means the exhaustion of the potential for "catch-up" growth [2]. At the same time, in order to achieve the target benchmarks defined by the President of the Russian Federation, the rate of economic growth in Russia should be from 3% to 3.5% annually [3].

Thus, the need to achieve annual growth of Russian GDP by an average of 8% requires extraordinary, clearly strategically defined actions [3]. In the near future, for sustainable development, it is advisable to make wider use of the conceptual provisions of Keynesianism with a corresponding increase in the role of public finances in meeting the needs of socio-economic development. A concrete manifestation of such a policy should be public investment in economic development, an increase in the level of wages and pensions in order to ensure growth in the level of solvent demand.

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2020年《商业海关术语解释通则》在对外贸易交易中的应用国家细则
NATIONAL SPECIFICS OF THE USE OF BUSINESS CUSTOMS INCOTERMS 2020 IN FOREIGN TRADE TRANSACTIONS

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摘要：外贸交易的实施取决于根据《国际贸易术语解释通则》选择合适的交货基础。同时，许多对外经济活动（FEA）的参与者低估了国家法律框架对标准化要求应用的影响。因此，本文旨在分析不同国家合作伙伴在实践中应用《国际贸易术语解释通则2020》的特点，并提出在合同中参考的建议。

关键词：外贸交易、交货基础、《国际贸易术语解释通则2020》、《适用国家条件》。

Abstract. *The implementation of foreign trade transactions is based on the choice of the delivery basis in accordance with Incoterms®. At the same time, many participants in foreign economic activity (FEA) underestimate the influence of national legal frameworks on the use of standardized requirements. Accordingly, the purpose of this article is to analyze the features of applying Incoterms 2020 in the practice of partners from different countries and to develop recommendations for their consideration in contracts.*

Keywords: *foreign trade transaction, delivery basis, Incoterms 2020, national conditions of application.*

Any foreign trade transaction involves residents from different countries, which creates legal uncertainty, as each participant operates in accordance with their national legislation. To standardize relations between residents of different countries, international practice has developed a legal framework consisting of international legal instruments — conventions, guidelines, agreements — as well as trade customs.

According to Article 5 of the Civil Code of the Russian Federation, a trade custom is defined as “a rule of conduct that has developed and is widely used in a

particular area of business or other activity, not provided for by legislation, regardless of whether it is recorded in any document" [1]. This includes the International Commercial Terms — Incoterms.

These rules were initially developed by the International Chamber of Commerce (ICC) in 1936 with the aim of standardizing international sales contracts. As global trade evolved, changed, and became more complex, the rules underwent periodic revisions. Currently, a practice of updating Incoterms every decade has been established (though revisions may occur at any time should significant trade changes necessitate it). The most recent edition, Incoterms 2020, was adopted as ICC Publication No. 723 and became effective on January 1, 2020, maintaining the validity of previous versions [2].

Nevertheless, it's important to note that trade customs constitute dispositive (also known as a supplementary or non-mandatory) norms. Consequently, when they conflict with national regulations, the latter take precedence. This fundamental principle creates country-specific variations in the application of Incoterms when contracting with partners from different jurisdictions. Accordingly, when parties from different countries select Incoterms rules for incorporation into international sales contracts, they must carefully consider that domestic laws and regulations of various nations may impose restrictions on the application of certain Incoterms 2020 provisions. Therefore, let us scrutinize the application specifics (national regulatory barriers) of Incoterms 2020 in international transactions.

As previously mentioned, the Incoterms rules were developed by the ICC. At the same time, at the national level, customs authorities may develop their own regulatory legal acts introducing local terms.

Let us examine a case: A Russian company concludes an import deal with a Chinese manufacturer of printing equipment under Yelets's, Lipetsk Region DDP Incoterms 2020. According to these rules, the Russian buyer expects that the Chinese seller will manufacture the equipment within the agreed timeframe, provide export packaging and labeling, deliver it to the specified destination point, complete customs clearance both in China (for export) and in Russia (import duties and VAT), and provide the goods along with all documents to the Buyer's disposal. The buyer will only need to unload the goods from the vehicle, conduct the goods acceptance procedure, and register the equipment as fixed assets in the accounting records.

However, while the equipment was delivered to the Russian buyer's warehouse within the agreed timeframe, it was not cleared through Russian customs - meaning the 20% customs duty and import VAT ((customs value + customs duty)*20%) were not paid. Although the seller's quoted price should have already included all these expenses. Naturally, the Russian importer found itself in an unpleasant situation and incurred additional costs - but why did this happen?

This situation requires reference to information provided in the letter of the Russian Federal Customs Service No. 16-30/50631 dated August 25, 2021, regarding the completion of Chinese customs declarations. According to this document, the selection and completion of the "Transaction Type" field in the customs declaration must comply with the "Transaction Type Classifier" approved by China's General Administration of Customs. Currently, this Classifier includes 7 transaction types: CIF (code - 1), C&F (code - 2) (which corresponds to the standard Incoterms CPT term), FOB (code - 3) (where FOB delivery terms correspond to FCA, FAS terms), C&I (code - 4), market price (code - 5), warehouse price (code - 6), and EXW (code - 7, added in 2024) [3].

In cases where the contract and/or invoice specifies a transaction type different from those approved in the "Transaction Type Classifier," the enterprise must select the closest matching transaction type from the approved Classifier when submitting the customs declaration.

This means that for China, many Incoterms 2020 terms face national barriers — essentially being replaced by local terms. For certain categories of imports (with further differentiation by product type — e.g., high-tech equipment requiring local delivery terms like *CIP* instead of *DAP*), the use of *EXW* may be restricted for exports from China (*FCA* is required).

A similar situation exists in Brazil, where customs regulations often mandate terms with mandatory customs clearance (*DDP* or *DAP* rather than *FOB*).

Differences in interpreting Incoterms can also stem from restrictions on risk transfer. For example, India prohibits terms where the seller does not control transportation (*EXW*, *FCA*) for imports of pharmaceuticals and agricultural products, recommending *CIP* or *CFR* instead.

In Russia, transactions with "unfriendly countries" require terms that minimize buyer risk (e.g., *DAP* in preference to *FOB*).

Currency and tax requirements can also introduce national characteristics to the use of Incoterms 2020. In Argentina, for transactions in USD/EUR, the DDP term is mandatory if the seller is a foreign company (requiring payment of local taxes). In Iran, using CIF requires cargo insurance only with Iranian companies.

Transport rules may also modify standard Incoterms formulations. For example, in Saudi Arabia, only FOB is permitted for petroleum product deliveries (CIF and CFR are prohibited). In the EU, "green" deliveries (e.g., hydrogen) require terms accounting for carbon footprint (FCA with eco-standard specifications).

Many countries impose insurance restrictions under CIF and CIP terms. For instance, when using these terms for shipments to countries like Azerbaijan, Kazakhstan, Argentina, India, and China, insurance for foreign transport is only allowed up to the entry point, but not for subsequent domestic transport. In countries like Bahrain, Algeria, and Bangladesh, insurance for foreign transport is entirely prohibited [4].

Thus, the examples provided demonstrate that trade customs cannot always be applied "as they are" but require adaptation to national regulations. How then should this factor be accounted for in dealings with foreign counterparts?

An action algorithm may include the following steps:

1. Verification of local laws which can be done by consulting the foreign partner and reviewing requirements on customs service websites (e.g., General Administration of Customs China);
2. Additional contract terms. Example: *"Delivery under CIP terms (Incoterms 2020), in compliance with Article 12 of Argentina's Tax Code"*. For complex markets (China, Middle East), it is advisable to include duplicate provisions: *"Delivery under DAP terms (Incoterms 2020), subject to the EAEU Medical Goods Import Rules as of 12.2024"*.
3. Insurance and guarantees: For countries like Iran or Venezuela, include a clause: *"Cargo insurance—only with a local provider"*.

In summary, while Incoterms 2020 remains a universal tool, it is critical to account for local amendments in key countries. Updates in customs regulations, tax codes, and industry-specific requirements (especially for pharmaceuticals or energy resources) must be monitored. In case of discrepancies, the contract should explicitly reference the relevant national legislation or provide a detailed description of the selected Incoterms term.

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提高人力资源质量作为区域经济体系发展的密集要素
IMPROVING THE QUALITY OF HUMAN RESOURCES AS AN INTENSIVE FACTOR IN THE DEVELOPMENT OF REGIONAL ECONOMIC SYSTEMS

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摘要：本文探讨的是俄罗斯联邦区域经济增长的实际问题。在当前经济动荡和地缘政治紧张的背景下，企业发展和提升竞争力，在俄罗斯联邦开展业务，尤为重要。人力资源是生产的关键要素之一，其质量直接取决于人力资源。企业必须投入资金来提升专业技能和能力，因为这是进一步发展经济和改善居民生活质量的条件。

关键词：均衡发展、人力资源素质、企业竞争力、俄罗斯联邦新区。

Abstract. *The article is devoted to the actual problem of the growth of the regional economy of the Russian Federation. In the conditions of modern economic turbulence and geopolitical tension, the issue of development by enterprises and increasing their competitiveness, carrying out activities in the Russian Federation, is of particular importance. Human resources are one of the key factors of production. The quality of the work performed directly depends on it. Financial expenses for improving professional skills, abilities become mandatory for organizations, as this is a condition for further economic development and improving the quality of life of the population*

Keywords: *balanced development, human resources quality, enterprise competitiveness, new territories of the Russian Federation.*

In the context of globalization and ongoing integration of national economies, the importance of effective human resource management (HR) is growing every year. Over the past decades, there has been a significant change in the HR management paradigm: from simple HR policy to a strategic approach aimed at optimizing all processes related to labor costs, motivation and development of employees. Foreign economic activity, as an area requiring effective interaction with different

countries and cultures, especially actualizes the need for competent HR management.

The role of human resources in the economy is multifaceted. First of all, they are one of the key factors of production. The quality of the work performed, as well as the measurable quantity of the reproduction process, directly depend on them. Consequently, they thus influence economic growth [2].

In modern conditions, human resources play a key role in the economy of any country. They not only form labor productivity, but also become the basis for innovative processes and sustainable development. Human capital covers not only the qualifications and knowledge of employees, but also their motivation, creativity and ability to learn.

According to the World Economic Forum report, countries with high investment activity in human resources demonstrate higher rates of economic growth [4]. For example, Scandinavian countries show better results in quality of life and citizen satisfaction, which is directly related to the high level of education and social guarantees.

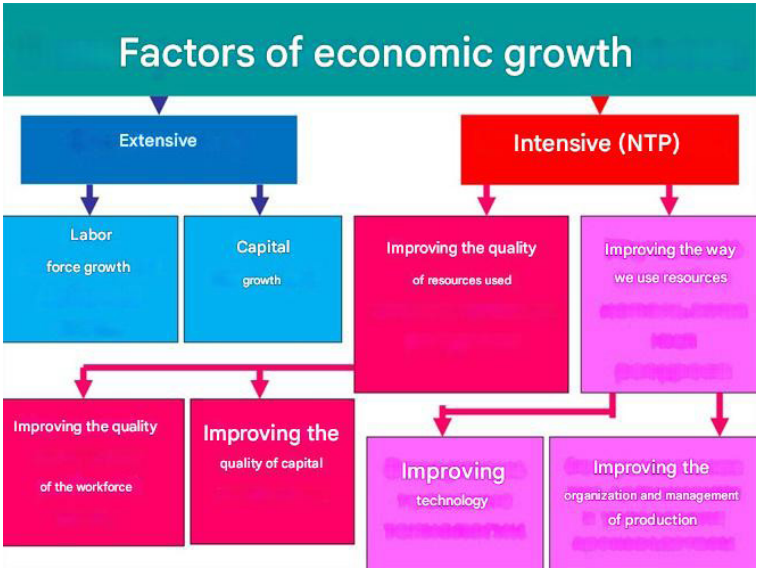

Figure 1. *Factors of economic growth*

Investments in human capital are always justified, since in the long term they provide a significant in scale and long-term result in the form of increased productivity and quality of labor. Also contributing to it is the result of increasing the

potential of the workers themselves. The development and expansion of competencies and resources is a certain motivation for further improvement, increases interest in the activity being studied, and also improves the quality of work due to greater awareness of less obvious aspects of work processes [1].

Human resources play a crucial role in the economy, contributing not only to the growth of individual companies and regions, but also the development of the entire country. Financial expenses for improving professional skills and abilities become mandatory for organizations, as this is a condition for further economic development and improving the quality of life of the population. (Fig. 2)

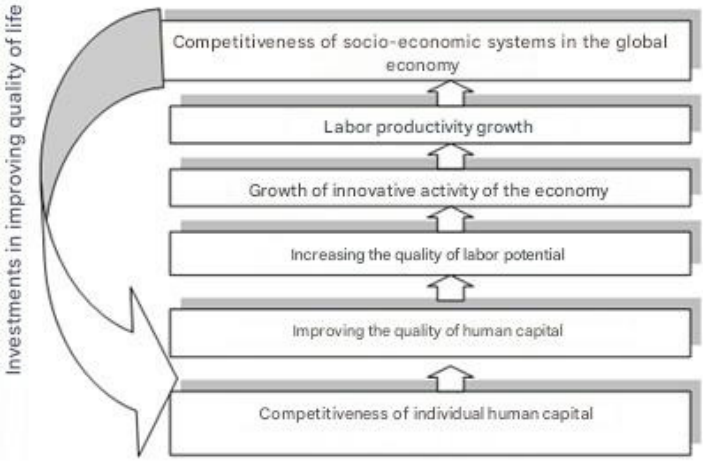

Figure 2. *Investments in improving quality of life*

Thus, human resources are a central asset in ensuring the competitiveness of a country. Therefore, financial investments in human capital and ensuring comfortable working conditions are mandatory conditions for achieving long-term success in the region's economy

It is important to note the importance of attracting and retaining talent. In a globalized world where intellectual capital is becoming a key asset, companies must create attractive working conditions, including flexible schedules, remote work opportunities, and professional development programs [3]

In Russian regions where demographic fluctuations and migration flows are observed, changes are also taking place in the labor market, so the importance of human resources is increasing. According to the Federal State Statistics Service, Russia has a fairly low unemployment rate and there is a high demand for labor resources. But at the same time there is a gap between the required level and the

existing qualifications of workers, which leads to financial investments by employers professional retraining of employees (Fig. 3)

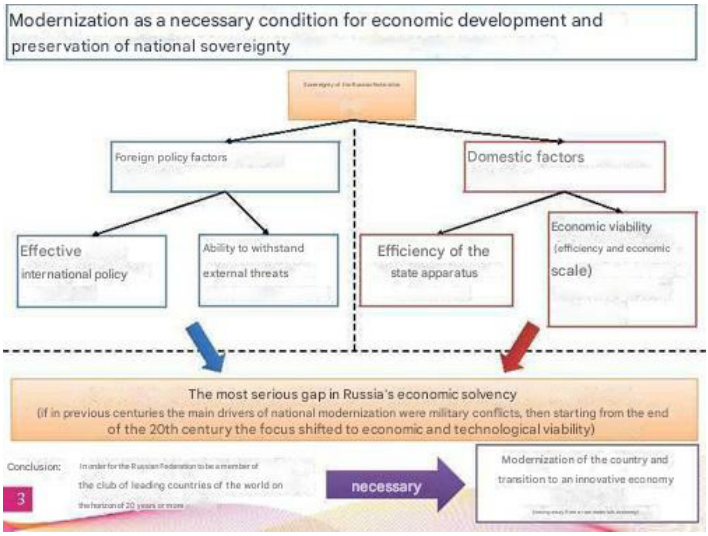

Figure 3. *The need for modernization as a condition for economic development and preservation of national sovereignty*

The level of professional competences implies the following levels of employees: labor force, highly qualified personnel and management personnel. Accordingly, these groups have different development and management strategies. For example, the labor force often requires more intensive training, while highly qualified specialists may require flexibility in working conditions and opportunities for further development.

Functional focus ensures the implementation of business processes, administrative activities and R&D. For example, companies focused on innovation will focus on attracting specialists in the field of scientific research and development, which is confirmed by research on innovation management.

By method of involvement: human resources can be permanent, temporary and contractual. Modern trends show the growing popularity of flexible forms of employment, which offer companies the opportunity to adapt to changing market conditions.

By motivation and engagement: this includes employees with high, medium and low levels of motivation. Emotional intelligence and corporate culture play a crucial role in maintaining high employee engagement, as shown by the findings

of Goleman, who emphasizes the importance of social and emotional skills in personnel management [5].

Personnel training is of particular importance due to the turbulence of the external environment and the rapid change of business process technologies. Modern trends in approaches to training are focused on the individual employee and his needs. Effective training not only increases work efficiency, but also employee satisfaction, which reduces staff turnover. Employee involvement in their professional activities increases, as does the level of resource development. Large corporations such as Microsoft or Google actively invest in the training and development of their employees. Moreover, in this area they manage to pursue several goals at once: competent integration of training programs with corporate strategy increases the specificity of the knowledge obtained, hence there is a reduction in misunderstandings or errors in the work process, a significant increase in productivity and involvement, as well as in staff satisfaction.

Another interesting aspect is the use of technology in the learning process. The emergence of online platforms and e-courses opens up new horizons for corporate training. The integration of technology into the learning process allows for flexibility, accessibility and diversity of formats, which significantly increases employee engagement. In this case, we are talking about both the learning formats in general and the use of technology in the process. For example, if earlier training always implied in-person attendance, the need to go somewhere, spend time, effort and money on travel, now with the development of distance learning, all these shortcomings have been leveled out, it has become possible to spend fewer resources on training, engaging in the process as fully as possible. Hence, more employees can take the initiative to learn new things [5].

Today, mentoring is of great importance in the transfer and development of professional competencies, which increases the speed of adaptation and training of personnel. A mentor also has some non-obvious advantage: the need to train an employee who does not yet have all the aspects of the current professional activity makes you take a fresh look at work processes, systematize them, find their weak points and gaps, raise controversial issues for discussion. There is also an invaluable opportunity to strengthen them due to a new approach of a person with different experience, possible availability of additional knowledge and resources. There are also a number of problems in the process of implementing training programs, insufficient motivation of employees for development and a lack of resources. To solve these issues, a systematic approach is required, which includes careful planning and constant monitoring of the effectiveness of educational programs.

Technological innovations such as the use of artificial intelligence and digital technologies in general provide new opportunities in the field of personnel selection and adaptation. According to Indian scientists, accelerated methods of processing arrays of information

They can speed up and simplify the recruitment procedures in any organization in the region according to the required criteria. [6]

Conclusion Modern technologies, such as digitalization and the development of remote work, have a significant impact on the use of human resources in regional businesses. The ability to work remotely opens up new opportunities for attracting talent, but at the same time poses challenges for HR specialists in training, managing distributed teams, ensuring effective communication and maintaining corporate culture in a virtual environment.

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平台型就业：概念与关键特征
PLATFORM WORK AS A NEW FORM OF EMPLOYMENT: THE CONCEPT AND KEY CHARACTERISTICS

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摘要：全球经济数字化进程的加速导致劳动力市场发生深刻变革，其显著特征是平台就业的兴起和快速扩张。本文探讨了平台就业的概念并识别其核心特征，重点探讨了数字平台如何以全新的动态方式协调和组织工作。本文概述了数字就业平台的主要类别，每种平台都代表着不同的任务分配和员工参与模式。随着数字技术不断渗透到经济活动中，平台就业已成为现代劳动力市场的重要组成部分——它重塑了就业结构，促成了新的劳动力参与形式，并在工作方式、时间和地点方面提供了前所未有的灵活性。本文强调了数字平台在重新定义就业边界方面的核心作用，并强调了其在不断变化的就业格局中日益增长的重要性。

关键词：劳动力市场、平台就业、数字就业平台、平台经济、零工经济、数字化。

Abstract. *The accelerating digitalization of the global economy has led to a profound transformation of the labor market, marked by the emergence and rapid expansion of platform employment. This article examines the concept of platform employment and identifies its core characteristics, focusing on how digital platforms mediate and organize work in new, dynamic ways. It outlines the main categories of digital employment platforms, each representing distinct models of task allocation and worker engagement. As digital technologies continue to permeate economic activity, platform employment has become a vital component of modern labor markets – reshaping job structures, enabling new forms of workforce participation, and offering unprecedented flexibility in how, when, and where work is performed. The article underscores the central role of digital platforms in redefining the boundaries of employment and highlights their growing importance in the evolving landscape of work.*

Keywords: *labor market, platform employment, digital employment platforms, platform economy, gig economy, digitalization.*

What is platform employment

Over the past years, there has been rapid growth in the number of digital platforms, their types, and the proportion of population who perform their work activities in a virtual environment (Schwellnus et al., 2019). For instance, according to the International Labor Organization, the total number of platforms has increased fivefold between 2010 and 2020 (Sinyavskaya et al., 2021). Industry 4.0 and digital transformation are the main catalysts of fundamental changes which currently lead to the proliferation of qualitatively new principles of business processes' organization, altering social relations and the labor sphere. As Chudinovskikh (2021) correctly states, not only is the labor market transformed by digital employment platforms (DEPs) – the employment model itself is undergoing a major change. As a result, a new type of employment – *platform employment* – is becoming a vital institutional mechanism in today's labor market. In addition to large-scale digitalization and computerization, Bobkov and Chernyh (2020) also attribute the spread of DEPs to the following factors:

1. The vibrant development of the population's digital skills which is explained by modernization of education and requalification systems and the introduction of information and communication technologies (ICTs) in them.

2. Globalization and the increasing interconnection of labor markets in different countries, which, together with the use of cyber-physical systems, leads to the blurring of spatial and temporal boundaries and the formation of cross-industries.

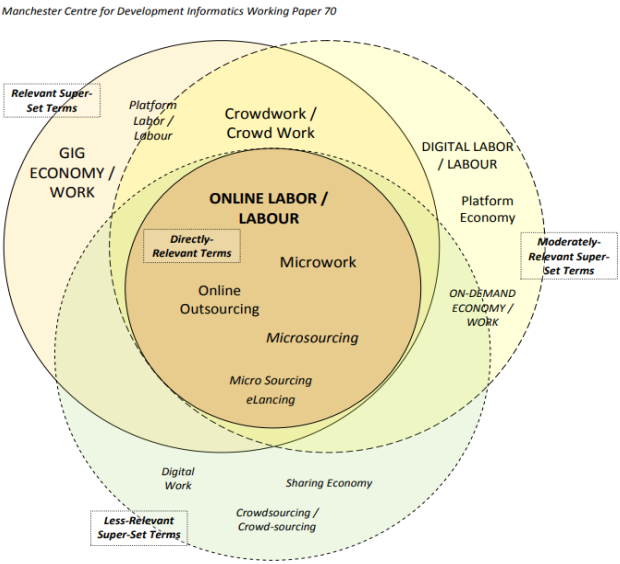
3. Demographic trends, namely, the early entry of youth into the labor market, growing numbers of working mothers, and the overall aging of the population. For such social categories platform employment often becomes the main source of income.

4. The expansion of the shadow economy and alternative forms of employment, which can be legalized through platform activities.

Another factor worth mentioning is the COVID-19 pandemic due to which platform employment has entered a new stage of its evolution. The mass transition to remote work and the use of e-commerce contributed to a significant influx of new users to DEPs and, consequently, to the expansion of their influence. Thus, according to the Eurofond 2020 data, more than 37% of all workers in the European Union have become remote workers while in Russia, by estimates of the Higher School of Economics, the growth of platform employment amounted to 8-13% (Gimpelson & Kapelyushnikov, 2020).

It has to be stressed that there is no single, universally accepted concept to describe DEPs-based labor. Instead, a wide range of terms is used – digital labor, online labor, crowdsourcing, freelancing, on-demand economy, gig economy, platform employment, etc. (Heeks, 2017; Mirzabalaeva & Shichkin, 2020). The academic community is still unable to reach consensus on defining this socio-eco-

nomic phenomenon, and a vast variety of terms identifying DEPs-based labor is represented in Figure 1.



Source: based on (Heeks, 2017).

Figure 1. *Relevance of Literature Terms to Digital Gig Economy Work*

It can be seen that some of these terms overlap with each other, creating borderline notions, and some terms are mentioned in articles more frequently than others. As for this article, it uses relevant super-set terms – *gig economy* and *platform employment* – to describe unique socio-economic infrastructure created and maintained by DEPs. Nevertheless, both platform employment and DEPs themselves are incorporated in the gig economy, being its constituent parts and narrower concepts. Since gig economy cannot exist without DEPs by definition (which will be provided below), the conclusions about its contribution to the creation of public value can also be applied to platforms. However, this is a logical simplification that represents one of the research limitations that may be overcome during the further, more detailed research on digital platforms.

The *gig economy* is understood as a new economic model including a variety of short-term employment forms which are based on digital platforms (Nekhoda & Pan Li, 2021). Under that approach DEPs themselves are described as "two-sided digital systems that match workers on one side of the market to customers – final consumers or businesses – on the other side on a per-service – "gig" – basis''

(Schwellnus et al., 2019, p. 6). Such formulation allows to exclude unilateral B2C trading platforms (e.g., Amazon.com, eBay, AliExpress) from the focus of this article as well as ignore multilateral platforms that do not mediate between the employer and the potential employee (e.g., Tinder, Kickstarter, Twitch). The prime examples of DEPs are Amazon MTurk, TaskRabbit, Uber, Upwork, Clickworker, Profi.ru, and others.

Therefore, *platform employment* (i.e., platform labor, platform work) is a flexible form of occupation aimed at solving certain issues or performing specific tasks in exchange for material remuneration which is implemented via digital platforms as a link between service providers and service consumers – clients (Mirzabalaeva & Shichkin, 2020; Nekhoda & Pan Li, 2021). Now the role of DEPs in the gig economy will be considered in more detail.

It is essential to understand that platforms themselves are not generators of goods or services – they act as brokers in the labor market, a third party in the interaction between client and provider receiving a certain percentage of each completed transaction between them (Schmidt, 2017; Bobkov & Chernyh, 2020). DEPs are the pillars of the gig economy, the major environment for interaction between various market actors which equalizes the labor demand with its supply by accepting orders in digitized form. As a result, DEPs are considerably changing the traditional model of work's organization leading to the diversification of employment forms and creation of a new social relations type, the core of which is ICTs (Schmidt, 2017; Schwellnus et al., 2019). By drawing on the Eurofound (2018c) report, the following characteristics of platform employment can be identified:

1. It is characterized by multisubjectivity (the presence of at least three categories of actors – client, provider, and intermediary represented by employment platform).

2. Labor relations are formed in a virtual environment, within blurred spatial and temporal boundaries – that is, within digital platforms.

3. Work is defined as a set of specific, predetermined tasks or solutions to clearly defined problems.

4. Work is contracted or outsourced.

5. Service delivery itself and task performance are based on a request or "gig".

Platform work is a publicly available and facilitated option for earning both permanently and periodically. The digital platforms' integration in the structure of the labor market remarkably increases its flexibility and inclusiveness as well as contributes to higher employment rates and overall national well-being (Sinyavskaya et al., 2021). Turning to Public Value Management, it is worth emphasizing that the platform model of labor organization involves sharing mechanisms – the joint use of ICTs and creation of common activities ecosystems aimed at

resource synergy and public value creation. This also implies improving the efficiency of government regulation and solving such societal problems as unemployment (Nekhoda & Pan Li, 2021). The transition of employer-employee (i.e., client-provider) interactions into a virtual reality via the use of platforms allows the expansion and extension of value chains, which progress due to collaborative contribution of all stakeholders (Lukichyova, 2020; Chudinovskikh, 2021).

Summarizing all the information given above, the cumulative effect of Industry 4.0, the widespread use of ICTs, and the emergence of the platform economy has led to a fundamental transformation of the labor market and establishment of the agile (gig) employment. The boundaries between employers and employees, producers and consumers are becoming less and less clear, new forms of work (remote work, cloud work, micro-tasking, crowdsourcing, etc.) are actively developing, and more attention is being paid to the joint approaches towards public value creation. All these trends signalize that a comprehensive qualitative transformation of the socio-economic sphere is occurring in the 21st century.

Organizational forms of platform employment

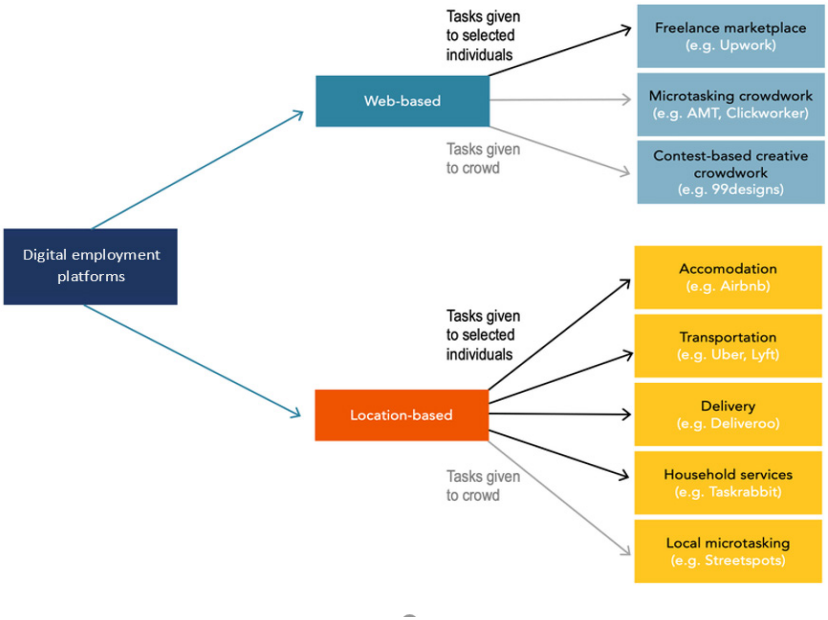
The gig economy is characterized by a wide range of employment organizational forms, each of which has its unique structure and characteristics. Since there are several criteria for distinguishing various types of platform employment (for example, the level of providers' qualification, the rate of their autonomy, the scale and nature of the task being performed, the form of service provision, etc.), it is currently impossible to develop their universal categorization (Bobkov & Chernyh, 2020). Hence, if DEPs typology is based on the performance of certain tasks, then the following employment platform types can be distinguished – *platforms for analysis and sorting* which rely on posting reviews and professional recommendations on the Internet; *matching platforms* that allow balancing the labor demand with its supply; *platforms that add value to a product or service* (Stewart & Stanford, 2017).

On the basis of the "job execution mode" criterion, two broad categories of DEPs can be identified – *web-based* and *location-based*. The former includes freelancing, outsourcing, and microwork, linking the client and provider in an online environment. More precisely, the whole process of interaction between the key actors occurs remotely. The latter category implies the performance of services in a geographically defined area, with a provider role often being assigned to a third party. The *location-based* category includes platforms that provide delivery, transportation, repair, or accommodation services (Bobkov & Chernyh, 2020; Sinyavskaya et al., 2021). It should be emphasized that within *web-based* DEPs the payment is usually decentralized, in contrast to *location-based* DEPs where standards and rates for provided services are defined in advance by the platform. In addition, *location-based* DEPs have more responsibility for selecting and con-

trolling their providers. It is explained by a stronger centralization and stricter organizational design of such systems (Stewart & Stanford, 2017).

Another categorization is focused on the economic resource that underlies the platform's functioning. This approach distinguishes between *employment platforms* themselves focused on specific production tasks, and *capital platforms* aimed at improving the efficiency of selling or leasing assets (Farrell & Greig, 2016). However, problems arise when applying the abovementioned DEPs categorizations in practice as most existing platforms combine characteristics inherent in different "ideal" types. A prime example is platforms like Airbnb that provide accommodation and rental services also including room service.

Therefore, the integrated typology of DEPs can be represented in Figure 2.



Source: based on (Schmidt, 2017).

Figure 2. *Classification of digital employment platforms*

According to research conducted by Sinyavskaya et al. (2021), the process of matching supply and demand within DEPs can be implemented by using a bidding system or through competitive market mechanisms. The first approach entails the setting of specific tariffs and prices beforehand by internal platform instruments – that is, such information is transparent to service providers. Furthermore, in accordance with this data, they can either accept or reject incoming

orders, guided by their subjective preferences. The second model is characterized by a competitiveness typical for interaction between service providers and taking a form of a struggle for clients – the platform evaluates potential provider's chances in accordance with ratings, test tasks, or the classic price competition. Within this approach, service providers are limited in their ability to choose an order freely, and their income can be lower than the minimum wage. Nevertheless, some researchers (Lukichyova, 2020; Nekhoda & Pan Li, 2021) mention that the risks of labor precarization can be reduced if the platform takes certain measures to protect its users and their interests – for instance, introduces minimum rates for services in accordance with current national legislation and labor standards.

Regarding the economic status of service providers using DEPs, they can fall into the classic employee-employer dichotomy (if the platform acts as a head-hunter) or be considered self-employed (if the platform acts as an intermediary). Notably, the second category of platform workers accounts for a much larger share of the gig economy than the first one (Bobkov & Chernyh, 2020; Chudinovskikh, 2021).

Accordingly, all varieties of digital employment which were described above represent the nature of the gig economy and are aimed at reducing the transaction costs of the standard hiring process. There is no consensus on the interpretation of this new phenomenon (platform employment) in modern science, nor is there a single, generally accepted classification of DEPs' types. Despite this fact, it is undeniable that the platforms' impact on the labor market is fundamental as they lead to the collapse of classic interaction models, transform employment relationships between various economic agents, and create a unique social institution with its own advantages and disadvantages.

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精神障碍所致健康损害严重程度的认定标准：国际标准、国内刑事立法与司法实践的冲突

CRITERIA FOR DETERMINING THE DEGREE OF SEVERITY OF HEALTH HARM RESULTING IN MENTAL DISORDER: CONFLICT OF INTERNATIONAL STANDARDS, NATIONAL CRIMINAL LEGISLATION AND JUDICIAL PRACTICE

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摘要：本文分析了导致精神障碍的典型损害机制，并在此基础上提出了一种刑事法律评估算法。结论是，只有当精神障碍成为唯一后果或所有后果中最严重时，它才会影响犯罪的定性。为了统一执法实践，提出了一项关于专家在结论中指出对特定案件具有法律意义的最严重后果的义务的提案。

关键词：健康损害、损害严重程度、精神障碍、丧失一般劳动能力、丧失专业劳动能力。

Abstract. *The article analyzes typical mechanisms of causing harm that resulted in a mental disorder, on the basis of which an algorithm for their criminal-legal assessment is proposed. It is concluded that a mental disorder affects the classification of a crime only when it is either the only consequence or the most serious among others. In order to unify law enforcement practice, a proposal has been formulated on the obligation of experts to indicate in the conclusion the most serious consequence that has legal significance for a particular case.*

Keywords: *harm to health, severity of harm, mental disorder, loss of general ability to work, loss of professional ability to work.*

In September 2025, new rules for determining the severity of harm to health, approved by Order of the Ministry of Health of Russia dated 08.04.2025 No. 172n (Registered with the Ministry of Justice of Russia on 02.06.2025 No. 82483) [1], will come into force. For the first time at the stage of the modern Russian criminal legislation, a mental disorder will be officially considered a sign of not only serious, but also moderate harm to health. This approach is associated with the position of the Constitutional Court of the Russian Federation, expressed in the reso-

lution of 11.01.2024 No. 1-P «On the case of verifying the constitutionality of part one of Article 111 and part one of Article 112 of the Criminal Code of the Russian Federation, as well as paragraph 3 of the Rules for Determining the Severity of Harm Caused to Human Health, in connection with the complaint of citizen B.» [2]. Since the adoption of the Criminal Code of the Russian Federation in 1996 and up to the present time, mental disorder is legally associated exclusively with serious harm to health (Article 111). The criminal law provisions provided for in Articles 112 and 115 of the Criminal Code do not contain an indication of this feature. Nevertheless, in judicial practice there are situations in which the victim was caused moderate harm to health, as a result of which he developed certain mental disorders. Following accepted medical methods, experts participating in a criminal case are obliged to identify all the results of criminal impact on the victim (physical injuries, mental trauma) and determine their severity. However, the criminal law assessment of such criminal acts and their consequences is ambiguous in law enforcement practice. Court decisions demonstrate different legal positions when the consequence of harm to health is a mental disorder. The appeal to the highest judicial body of constitutional review of the Russian Federation for an explanation of the criminal-legal assessment of a mental disorder as serious or moderate harm to health is caused to a large extent by the lack of relevant explanations in the rules for determining the type of harm to health adopted by health authorities. This is evidenced, for example, by the wording of paragraph 6.8 of the Order of the Ministry of Health and Social Development of the Russian Federation dated 24.04.2008 No. 194n (as amended on 18.01.2012) «On Approval of Medical Criteria for Determining the Severity of Harm Caused to Human Health» (Registered with the Ministry of Justice of the Russian Federation on 13.08.2008 No. 12118) [3], which does not contain any characteristics of a mental disorder, with the exception of an indication that it must be in a causal relationship, i.e. be a consequence of harm to health. According to the said document, a mental disorder must be recognized as serious harm to health regardless of its duration, curability, impact on the general and professional ability of a person, as well as the mechanism of its infliction. In the previously effective order of the Ministry of Health of the Russian Federation dated 10.12.1996 No. 407 «On the introduction of the Rules for the conduct of forensic medical examinations into practice» [4], which includes the Rules for forensic medical examination of the severity of harm to health, two types of mental disorders were successfully distinguished: 1) a mental disorder that is a consequence of harm to health (for example, a severe traumatic brain injury resulting in dementia), 2) a mental disorder that is an independent manifestation of harm to health. However, when describing the moderate severity of harm to health, the fact that experts can assess a mental disorder as short-term and not severe is not explained in any way. The provision of Art. 112 of the Crim-

inal Code states that moderate harm to health excludes the consequences contained in Article 111 of the Criminal Code. For clarity, it is worth referring to examples from judicial practice that illustrate the lack of uniformity in the assessment of mental disorder as one of the signs of harm to health. In 2018, citizen S. was sentenced to imprisonment for six years for intentional infliction of grievous bodily harm. While drinking alcoholic beverages in the local area, a conflict arose between S. and the victim, during which S. struck the latter at least five times on the head and torso with a shovel handle. As a result of his actions, the victim suffered bodily harm in the form of an open craniocerebral injury, closed blunt chest trauma and multiple hematomas. The first two bodily injuries were assessed by experts as grievous bodily harm posing a danger to life. A forensic psychiatric examination established that the victim developed an organic personality disorder caused by a brain injury (code F 07.0 according to ICD-10), which is associated with a significant change in the usual behavior before the illness and a possible limitation of working capacity [4]. S.'s actions entailed two consequences related to serious harm to health - danger to human life and mental disorder. In such a situation, according to paragraph 5 of the order of the Ministry of Health and Social Development of the Russian Federation dated 24.04.2008 No. 194n, the severity of harm to health is established by the feature that corresponds to the greater degree of severity of harm, namely danger to life. Thus, in the case under consideration, mental disorder is a secondary feature, collateral in relation to the inflicted physical injuries. Its absence would not in any way affect the classification of the crime and, within the framework of criminal-legal classification, the presence of bodily injuries (physical harm) dangerous to human life is sufficient. The correct wording of the charge in the sentence under consideration is noteworthy, in which the court differentiated between two consequences of the crime: causing serious bodily harm dangerous to human life and mental disorder. In law enforcement activities, combining disparate consequences provided for in Article 111 of the Criminal Code often indicates gaps in the evidence base and a desire to strengthen the prosecution's position. Thus, in 2009, a conflict occurred near a café between F. and A., during which A. used obscene language to insult F. In response, F. struck A. in the face twice, after which he walked away several meters. The victim, A., fell, hit his head on the asphalt and suffered a severe craniocerebral injury, which resulted in a mental disorder. The court found F. guilty under Part 1 of Article 111 of the Criminal Code and sentenced him to four years' imprisonment. The cassation court upheld the sentence. F.'s defense considered the expert opinion on the mechanism of the head injury and the consequences in the form of a mental disorder to be erroneous and asked to reclassify F.'s actions under Part 1 of Article 118 of the Criminal Code. Witnesses testified that after inflicting two blows, F. moved some distance away from A., who at that time covered his face

with his hands, after which he fell and hit his head. The experts assessed the injury as life-threatening, and the mental disorder as a consequence of a traumatic brain injury [6]. Based on the cassation ruling, it can be concluded that the blows themselves did not cause serious bodily harm, and the victim received life-threatening harm as a result of the fall. There is undoubtedly a cause-and-effect relationship between the actions of the convicted person and the consequences, but the circumstances of the case related to public obscene language addressed to F., the time gap between the blows and the fall, the vagueness of the expert opinion on the assessment of the actions of the perpetrator closest to the consequence (blows to the face) do not provide grounds to believe that F. acted intentionally in relation to the victim. At the same time, a mental disorder is too isolated a consequence in the chain of the mechanism of causing harm to health «blows to the face - fall - traumatic brain injury - mental disorder» to be considered one of the main criteria for determining the degree of causal A. harm. Another example of a formal approach to assessing the circumstances of a case, when a literal interpretation of a criminal law norm and the lack of a comprehensive assessment of the validity of expert opinions led to a controversial result, is the sentence handed down by the Zamoskvoretsky District Court of Moscow in 2022. While at the home of the victim P., the defendant T., out of jealousy, struck her multiple times with his fists and palms on the face and various parts of the body, as well as twice on the legs with a charger cable. As a result, the victim suffered minor bodily harm, according to the conclusion of the forensic medical examination. At the same time, the forensic psychiatric examination established that P. had a mental disorder in the form of post-traumatic stress disorder, which consisted of obsessive memories of what happened, nightmares, fantasies and ideas, which reduced her ability to adapt. Based on this conclusion, the actions of the perpetrator were qualified as causing grievous bodily harm [7]. In this case, the court made a conclusion, not based on the law, that a mental disorder is classified as serious harm to health due to the danger to human life. In the case under consideration, the court and experts focused exclusively on the formal criteria for determining the severity of harm to health, without taking into account the nature of the physical harm inflicted on the victim (minor harm to health) and the actual impact of the mental disorder on the quality of life of the victim. A different approach is demonstrated by the verdict of the Dzerzhinsky District Court of Novosibirsk in 2017. Citizen L., a homeless person, out of personal hostility inflicted at least five kicks on the 68-year-old victim in the head, face and torso, causing the latter a traumatic brain injury in the form of a moderate contusion of the brain and abrasions. As a result, the victim partially lost his memory and speech, as well as his household skills. According to the forensic medical examination, the physical injuries were classified as moderate harm to health. However, a forensic psychiatric examination revealed that the victim had a mental

disorder in the form of organic dementia (senility), indicating that before the attack, the victim had a mild cognitive disorder caused by vascular damage to the brain. At the same time, the elderly man led an active lifestyle. After the crime was committed, the victim developed a chronic mental disorder, which significantly worsened his quality of life [8]. The incident was qualified by the court as intentional infliction of serious bodily harm, which resulted in a mental disorder. As can be seen, in this case, a mental disorder acted as the main and only feature, according to which the harm caused was assessed as serious. At the same time, the experts and the court did not limit themselves to stating the very fact of the onset of a mental disorder as a result of illegal actions, but assessed its duration, incurability, and impact on the social well-being of the victim. In the future, this approach will be reflected in the ruling of the Constitutional Court of the Russian Federation, which, using similar criteria, legalizes judicial practice on the possibility of recognizing a mental disorder as harm of moderate severity. Thus, the results of the study of judicial practice show that it is possible to identify two typical mechanisms of causing harm to health in the form of bodily harm, resulting in a mental disorder, and the corresponding qualification algorithm: 1) a person is caused physical harm that is dangerous to life, as a result of which he or she developed a mental disorder. Such harm is recognized as serious by the sign of danger to life (Article 111 of the Criminal Code). Mental disorder, which is causally related to this harm, is in this case a subsidiary sign and has no criminal-legal significance for qualification, since the severity of harm is established by the most serious consequence; 2) a person was caused physical harm that is not life-threatening, which entailed the development of a mental disorder. In this case, it is necessary to establish two circumstances: a) whether the harm that is not life-threatening is related to serious harm by its outcome or it constitutes harm of moderate severity depending on the duration of the health disorder or the percentage of loss of general working capacity; b) the severity of the mental disorder itself. When, as a result of muscular impact on him, the victim, in addition to a mental disorder, was caused other harm specified in Art. 111 of the Criminal Code damages that do not raise doubts about their irreversibility (for example, there was a complete loss of speech), then the harm is recognized by the courts as serious and the mental disorder has a subsidiary nature. If the physical harm is classified by the expert as moderate or minor harm to health, then the main component of the criminal-legal qualification becomes the severity of the mental disorder, which will be an independent feature. In general, a mental disorder should be used to assess the severity of harm to health only in the case when it is the only qualifying feature (according to medical terminology), the only consequence (from the point of view of criminal law) of the committed socially dangerous act. It is by this feature that the severity of harm to health will be determined. In connection with the change in the criteria

for assessing the severity of harm to health in order to improve law enforcement practice and ensure a uniform interpretation of criminal law norms, it seems appropriate to state paragraph 11 of the Order of the Ministry of Health of Russia dated 08.04.2025 No. 172n [1] as follows: «11. In the presence of two or more qualifying features, the severity of harm caused to human health is determined by the feature that corresponds to the greater severity of harm caused to human health. The forensic medical examination report must indicate only the qualifying feature that corresponds to the greater severity of harm caused to human health». Such an approach would allow the forensic medical examination report to provide a comprehensive medical assessment of the harm to health caused to the victim, but at the same time, the courts would be relieved from describing in the verdict any, even minor, injuries that will not be important for the classification of the crime if the harm is recognized by experts, for example, as life-threatening. In modern judicial practice, as has already been indicated, there is a tendency to form incorrect legal constructions when classifying bodily injuries accompanied by mental disorders – «mental disorder dangerous to life», «serious harm dangerous to life, resulting in mental disorder», «minor harm to health, which resulted in mental disorder», etc.

Another problem in determining the severity of harm to health associated with the development of a mental disorder is related to the conceptual vagueness of the understanding of a mental disorder in international practice, which creates difficulties in distinguishing between the elements of crimes provided for in Articles 111 and 112 of the Criminal Code. The difficulty that has arisen is not in the legal field, but in the field of psychiatry. The Constitutional Court of the Russian Federation, checking the compliance of Articles 111, 112 of the Criminal Code and paragraph 3 of the Rules for Determining the Severity of Harm Caused to Human Health with the basic law of the Russian state, sent a request to the V.P. Serbsky National Medical Research Center of Psychiatry and Narcology for clarification of the concept of a mental disorder. According to the information set out in the response of the V.P. According to Serbsky, the concept of mental disorder covers all diseases accompanied by mental disorders, regardless of their types and characteristics, severity and duration, which is consistent with the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10, version 2.27 dated 09/02/2024) [9] currently used in Russia. However, medical specialists of the V.P. Serbsky National Medical Research Center for Pedagogical Sciences, participating in the forensic psychiatric examination, criticize this approach and categorically state that it «contradicts the data of modern psychiatry on the significant difference in the depth and duration of mental damage in different mental disorders» [10, p. 11]. In their scientific study of this problem, the authors try to neutralize the broad concept of mental disorders used by the international standard by

introducing the term «maladaptation» by analogy with such a consequence as the loss of general ability to work. In their opinion, maladjustment, being a violation of personal functioning in different spheres of life, should be assessed using time criteria - up to 21 days, less than 120 days [10, p. 11-12]. Accordingly, mental disorders as consequences of illegal actions can be differentiated and qualified under Art. 112 or 115 of the Criminal Code. The above allows us to conclude that even a general familiarization with publications on mental disorders leads to the conclusion that, as in any area of scientific knowledge, in the field of psychiatric pathology at the level of individual specialists, scientific movements, states there are different approaches to classifying certain mental deviations, pathologies, experiences as mental disorders. In particular, a telling example of the unacceptability of some scientific views on mental disorders at the state level is the suspension by the order of the Government of the Russian Federation dated 31.01.2024 No. 200-r [11] on the territory of the Russian Federation of the plan of activities for the implementation of the International Statistical Classification of Diseases and Related Health Problems, Eleventh Revision (ICD-11) in connection with the divergence of opinions regarding the diagnoses of «pedophilia» and «gender inconsistency», which do not correspond to Russian traditional moral and spiritual-ethical values. It should also be noted that the previous ICD-9 was in effect in the USSR, and then in the Russian Federation with a section on mental disorders, the content of which was adapted taking into account the approaches to the concept and types of mental disorders developed by Soviet scientists. In modern conditions, the current ICD-10, applied in Russia, is criticized by specialists for using the vague term «mental disorder instead of the concept of «mental illness», which characterizes pathology, and not any conditions, including neuroses, personality accentuations, mental retardation, personality disorders. In scientific literature, it is proposed to distinguish between the concepts of «mental disorders» and «mental disturbances», «anomaly» and «pathology», «mental health» and «psychological health». Mental disorders, according to some researchers, are not associated with pathological changes in the psyche, but are caused, in particular, by extreme situations in the form of accidents, disasters, armed conflicts, etc. [12, pp. 681-682]. In this regard, among mental disorders that are not related to mental disorders, it is proposed to single out the concept of «mental reaction», i.e. a short-term, up to six months, abnormal response to an abnormal situation or external influence [12, p. 684]. It appears that such situations and external influences also include criminal acts. In such cases, taking into account the research of Russian scientists in the production of forensic medical examination, including forensic psychiatric examination, mental suffering, fear, anxiety, stress experienced by the victim of a crime could be assessed not as a mental disorder, but as a mental disorder or mental reaction of a certain duration, which would affect the differentiation of the severity of harm to health.

It is noteworthy that the International Classification of Diseases of the 11th [13] revision is distinguished by a more detailed elaboration compared to the previous version (ICD-10), and the changes made to it are often due to social commitment, cultural characteristics, the struggle for falsely understood interests of certain groups, which led to the refusal to implement it in the sphere of Russian healthcare. It can be stated that over its long history, the international statistical classification of diseases, known under various names, has undergone a significant transformation. Initially created as a tool for the unified collection of data on causes of mortality in different countries, today it has become a powerful mechanism by which the World Health Organization exercises control over medical diagnostic practice, including in the area of deviant behavior. Mechanical borrowing of the international standard, defining any mental disorders as a mental disorder, has had a negative impact on the practice of applying criminal law provisions provided for in Articles 111 and 112 of the Criminal Code, which require precise differentiation of the severity of harm to health. The refusal to apply the latest edition of the International Classification of Diseases in the territory of the Russian Federation precisely because of the ideological and politicized nature of the section on mental disorders is an indicator that perhaps Russian scientists should be given the opportunity to develop a national standard for the classification of mental disorders based on domestic experience in scientific and practical research of the human psyche.

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精神障碍造成的健康损害严重程度的刑法评估：回顾性分析与现代方法
CRIMINAL-LEGAL ASSESSMENT OF THE SEVERITY OF HARM TO HEALTH RESULTING IN MENTAL DISORDER: RETROSPECTIVE ANALYSIS AND MODERN APPROACH

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摘要：本文探讨了区分造成精神障碍的健康损害的刑事责任规则。分析了俄罗斯联邦宪法法院关于将精神障碍认定为中度损害的法律立场，并关注了这种做法对执法实践可能产生的影响。在分析国内历史经验的基础上，提出了俄罗斯关于健康损害刑事立法的具体改进领域。

关键词：健康损害、精神障碍、丧失一般劳动能力、丧失专业劳动能力、其他严重后果。

Abstract. *The article examines the rules for differentiating criminal liability for causing harm to health that resulted in a mental disorder. It analyzes the legal position of the Constitutional Court of the Russian Federation regarding the possibility of recognizing a mental disorder as harm of moderate severity. Attention is paid to the possible consequences of such an approach for law enforcement practice. Based on the analysis of domestic historical experience, specific areas for improving Russian criminal legislation on causing harm to health are proposed.*

Keywords: *harm to health, mental disorder, loss of general working capacity, loss of professional working capacity, other serious consequences.*

The famous legal expert Vladimir Danilovich Spasovich noted in his works back in the 19th century that the criminal legislation of that time was usually limited to only establishing the term «insanity», delegating the decision on the presence or absence of such a mental state in each individual case to judicial practice and medical experts. However, in his opinion, «the science of criminal law cannot be satisfied with such a simple solution to the issue by referring all mental injuries to the field of forensic medicine» [1, p. 127]. In the 21st century, the ruling issued by the Constitutional Court of the Russian Federation on January 11, 2024, in the case

of verifying the constitutionality of Part One of Article 111 and Part One of Article 112 of the Criminal Code of the Russian Federation, as well as paragraph 3 of the Rules for Determining the Severity of Harm Caused to Human Health, confirmed this position, enshrining the need for a judicial assessment of both the diagnosis established by experts and its impact on the life and social well-being of the victim [2], despite the fact that Russian legislation associates any mental disorder exclusively with serious harm - Art. 111 of the Criminal Code and paragraph 6.8 of the Order of the Ministry of Health and Social Development of the Russian Federation dated 24.04.2008 No. 194n (as amended on 18.01.2012) «On Approval of Medical Criteria for Determining the Severity of Harm Caused to Human Health» (Registered with the Ministry of Justice of the Russian Federation on 13.08.2008 No. 12118) [3]. Using the example of a criminal case, according to the materials of which the victim B. suffered multiple bodily injuries recognized as moderate harm to health and resulting in a mental disorder, which, as having led to long-term and persistent maladaptation of a moderate degree, was also assessed by the court as moderate harm to health, the Constitutional Court of the Russian Federation made the following conclusions: 1) the direct object of the crimes provided for in Articles 111 and 112 of the Criminal Code is the physical, mental, and social well-being of the victim; 2) the objective side of the crime provided for in Article 111 of the Criminal Code is characterized by the use of violence (commission of a violent act) associated with physical injuries or with the occurrence of a mental disorder in the victim; 3) the mechanism of formation of a mental disorder may be caused by factors of traumatic, intoxication and psychogenic origin; 4) a causal relationship must be established between the use of violence and a mental disorder; 5) a mental disorder in itself cannot be automatically and formally equated with other signs of serious harm to health provided for in Article 111 of the Criminal Code (for example, complete loss of speech, hearing, vision, termination of pregnancy, etc.), which obviously significantly affect the quality of life and social well-being of the victim; 6) a mental disorder that may be the only consequence of violence used or be the result of physical injuries suffered must be assessed taking into account its negative impact on the social well-being of the victim (for example, a person may be recognized as incompetent or of limited capacity, registered - under dispensary observation, prevent the performance of certain work functions, deprived of the right to drive a vehicle, the right to own a weapon, etc.); 7) a mental disorder must be recognized by the court, taking into account the conclusion of a forensic medical examination, as severe, associated with the use of violence against the victim, and also be comparable with other consequences provided for in Article 111 of the Criminal Code, in its nature, persistence, duration, negative impact on the future life of the victim.

Thus, the Constitutional Court of the Russian Federation did not support the legislative construction of a mental disorder as a knowingly grave harm to health

(Article 111 of the Criminal Code) and the provisions of the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) [4], according to which mental disorders include all diseases accompanied by mental disorders, regardless of their types and characteristics. As a result, on June 4, 2025, the criminal case, where the victim is B., was resumed by the Presidium of the Supreme Court of the Russian Federation due to new circumstances [5]. It is worth noting here that many specialists in the field of forensic psychiatry adhere to the same position regarding the characterization of a mental disorder, which was expressed in the ruling of the Constitutional Court of the Russian Federation. Thus, the authors of one of the scientific forensic studies, having analyzed a number of articles of the Criminal Code of the RSFSR of 1960, draw attention to the terms used by the legislator «mental illness», «chronic mental illness», «temporary mental disorder», «mental illness or other neuropsychiatric disorder» and conclude that the previous criminal law more correctly distinguished the concepts of mental illness and mental disorder [6, 23]. In their opinion, the introduction of the general category of «mental disorder» into the Criminal Code of the Russian Federation of 1996, although it corresponds to ICD-10, does not in any way characterize the degree of expression of social maladjustment of a person, the duration, persistence and impact of a mental disorder on the quality of life in the future [6, 23-24]. This approach has not always met with approval in the works of authoritative scholars in the field of criminal law, who believe that the division of mental disorders depending on the signs of maladaptation and the impact on the life of the victim requires interdisciplinary discussions, since it is necessary to determine the capabilities of forensic doctors in conducting more complex examinations, analyze the readiness of the judicial community for a multi-stage criminal-legal assessment of mental disorders, and take into account the established domestic criminal-legal tradition, in which mental disorder is traditionally considered as serious harm to health [7, 126].

Indeed, a systematic interpretation of the provisions of criminal law provisions provided for in Articles 21 and 111 of the Criminal Code of the Russian Federation of 1996 makes one wonder how the concepts of «mental disorder», «chronic mental disorder», «temporary mental disorder», «feeblemindedness» and «other morbid mental state» relate to each other. The answer to this question lies in the fact that these concepts describe heterogeneous criminal law phenomena, namely the mental state of the person who committed the crime (Article 21 of the Criminal Code) and the socially dangerous consequence in the form of harm to human health, which relate to different features of the crime - to the subject of the crime (to the dichotomy of «sanity-insanity») and to the objective side of the crime. At the same time, the problem remains that the medical criterion of insanity is differentiated by the legislator in contrast to a mental disorder as a consequence of serious harm to health. At the very least, the rules of logic, based on Article 21 of

the Criminal Code, suggest that feeblemindedness and other morbid mental states are not mental disorders, which are exhaustively divided into two types - chronic and temporary. Based on this, we can conclude that Russia's adherence to international standards, according to which all diseases accompanied by mental disorders, regardless of their types, characteristics, severity and duration, are covered by the concept of a mental disorder, nevertheless does not prevent the gradation of mental disorders that characterize insanity. Such a practice of a detailed description of the medical criterion of insanity is characteristic of almost all states. As is rightly noted in the literature, "the emergence of forensic psychiatry as a branch of psychiatry occurred due to the state's need to correctly assess the mental state of individuals who committed socially dangerous acts, which ultimately determined the degree of their responsibility before the law" [8, pp. 97-98]. Of course, initially the object of research was mental anomalies and pathologies of persons who committed criminal offenses. Thus, in the Russian translation of the Handbook of Forensic Medicine of 1828, compiled by the German doctor of medicine and surgery Adolf Genke, it was proposed to distinguish between mental disorders proper and "sensual desires, indignations, passions" that are not mental illnesses (anger, sadness, lust) [9, pp. 218-219]. The author attributes stupidity, dullness and feeblemindedness to weaknesses of the mind, pointing out the need for the forensic doctor to establish whether they were permanent or transient, curable or incurable [9, pp. 227-232]. Madness as a violation of self-awareness can be, according to A. Genke, permanent or wandering, feverish or chronic, general or specific [9, p. 232-234, 239]. Rabies, as the highest degree of insanity, is a short-term clouding of consciousness, which must be distinguished from simple anger [9, pp. 259-262]. Summing up his research, A. Genke concludes that criminal liability «applies only to rational beings, capable of self-control and free» [9, 222]. Over time, the initially established system of expert criteria for assessing mental disorders of persons who committed socially dangerous acts began to extend to victims of attacks on their health.

It cannot be said that in matters of regulating the criteria for determining the type of harm to health, mental disorder has always been assessed as serious harm. In the Code of Criminal and Correctional Punishments of 1845, liability was differentiated depending on the type of mental disorder and the method of its infliction. Mental disorder was considered a serious or less serious health disorder depending on its importance, curability or incurability [10, pp. 503-504]. The judicial practice formed within the framework of the application of the Code of Criminal and Correctional Punishments of 1845 was summarized and published in 1915 by the well-known representative of the scientific community N.S. Tagantsev in an unofficial edition of the said normative legal act, which is a valuable source of information on law enforcement activities of that period. During the historical period under consideration, a provision was established in specific ju-

dicial acts according to which the rules of the medical charter on the distinction between serious, less serious and minor injuries and wounds are mandatory only for doctors when they draw up their reports. The opinion of experts on the severity or easiness of the injuries caused to the victim is not mandatory for the court, since the severity of the harm is the subject of a special factual question, resolved not on the basis of medical evidence, but according to the inner conviction of the judges [11 p. 911, 913]. It is noteworthy that the Code does not directly mention mental disorder as a consequence of serious or less serious harm to health. Liability for causing this type of harm is provided for in other articles. According to one of them, criminal liability occurs for the intentional use of poisonous or potent substances that lead to a disorder in mental faculties (Article 1486), and according to the second (Article 1487) - for the use of any other means or method [11, p. 918-919]. Nevertheless, the punishment in the cases mentioned was similar to the punishment for causing serious or less serious injury, depending on the severity of the disorder, the incurability or curability of the disease.

In Soviet times, mental illness was considered by legislators to be a serious bodily injury (Article 149 of the Criminal Code of the RSFSR of 1922, Article 142 of the Criminal Code of the RSFSR of 1926, Article 108 of the Criminal Code of the RSFSR of 1960). It is noteworthy that if in the Criminal Code of 1922 mental illness was listed through a comma along with other consequences, then in the Criminal Codes of 1926 and 1960 it is indicated as a type of loss of working capacity: «intentional serious bodily injury resulting in... mental illness or other health disorder, combined with significant loss of working capacity» (Article 142 of the Criminal Code of 1926), «intentional bodily injury resulting in... mental illness or other health disorder, combined with permanent loss of working capacity of at least one third» (Article 108 of the Criminal Code of 1960). Due to the ambiguity of legislative formulations, a discussion arose in legal literature about what type of working capacity is meant (general or professional), and whether loss of working capacity should be considered an independent consequence of harm to health or whether such a criterion is subsidiary in relation to other consequences [12, pp. 38-39]. At the same time, in the context of the problem under consideration, the relationship between serious bodily injury and other types of harm to health seems interesting. Article 150 of the Criminal Code of 1922 established liability for less serious bodily injury that is not life-threatening, but caused a permanent health disorder or long-term impairment of the functions of an organ. Due to the fact that serious bodily injury represented either a life-threatening health disorder or consequences that are not life-threatening, in particular in the form of mental illness, the question arises about distinguishing the latter from the case of less serious harm to health. According to the Rules for Drawing Up Conclusions on the Severity of Injuries (approved by the People's Commissariat of Health of the RSFSR, the

People's Commissariat of Justice of the RSFSR, circular of 16.11.1922 No. 146), a health disorder that is not life-threatening but permanent should include those in which the victim does not exhibit symptoms that make the doctor fear for the life of the victim, but there is an incurable disease or a disease of a long-term, chronic nature, such as a hernia, fecal and urinary fistulas, uterine prolapse, traumatic neuroses, etc. (note 8) [13]. Thus, an example of a permanent health disorder that is, according to Article 150 of the Criminal Code of 1922, a less serious bodily injury is traumatic neuroses. Accordingly, at that time, mental disorders in the narrow sense of the word, i.e. in the form of mental (psychic) illness were a sign of serious physical injury, and other mental disorders (traumatic neuroses, for example) - less serious physical injury. In the 1934 article «Questions of classification, prevention and treatment of so-called traumatic neuroses» I.A. Yushchenko traced the historical development of the doctrine of traumatic neuroses and showed how the development of theories about the nature of neuroses was influenced by regional medical practice, the views of the most authoritative representatives of the medical community, and the peculiarities of peacetime and wartime. The author himself proposed to define traumatic neuroses neurotic disorders as dynamic reactive states that do not produce any persistent, destructive processes in the central nervous system [14]. In our time, in the work devoted to traumatic neuroses, modern specialists in the field of psychiatry, continuing the historical analysis of post-traumatic stress disorder (PTSD), distinguish three models of the emergence and dynamics of PTSD - psychodynamic, cognitive and two-factor, none of which, in the opinion of the authors, cover the entire spectrum of post-traumatic reactions, requiring additional study [15, pp. 208-210]. A subsequent review of medical criteria for the severity of harm and their reflection in the Criminal Code of the RSFSR of 1926 and 1960 shows that the concept of mental illness is not disclosed in contrast to other consequences of harm to health, but it is indicated exclusively as a sign of serious bodily harm. Nevertheless, experts in the field of criminal law, based on a study of judicial practice, conclude that in order for mental illness to be recognized as serious bodily injury, it must be of a long-term nature, and therefore short-term pathological affect and short-term reactive states do not apply to this type of bodily injury [16, p. 72].

Returning to the International Classification of Diseases and the experience of its implementation in individual countries, we can come to the conclusion that psychiatric science is not precise, there are different approaches to mental manifestations, as evidenced by the existence of adapted versions of the ICD, the content of which is adjusted under the influence of various factors, including political, not medical ones. For example, in the Criminal Code of the Republic of Kazakhstan, serious harm is considered to be harm that has caused not only a mental, but also a behavioral disorder (disease), including that associated with the use of

psychoactive substances (clause 11, Article 4) [17]. In accordance with paragraph 395 of section 57 of the Rules for the Organization and Production of Forensic Examinations and Research in Forensic Authorities, approved by the Order of the Minister of Justice of the Republic of Kazakhstan dated April 27, 2017 No. 484 (Registered in the Ministry of Justice of the Republic of Kazakhstan on May 26, 2017 No. 15180), a mental disorder should be understood as a mental illness (mental illness), the group of mental illnesses does not include reactive states associated with damage to the nervous system (psychoses, neuroses) [18]. The fact that Kazakhstan has begun the process of transition to ICD-11 does not prevent it from adhering to the literal meaning of the international concept of mental disorders. The Russian Federation followed the same path and, in pursuance of the decision of the Constitutional Court, by order of the Ministry of Health of Russia dated 08.04.2025 No. 172n, the procedure for determining the severity of harm caused to human health was approved (Registered in the Ministry of Justice of Russia on 02.06.2025 No. 82483), according to which only a mental disorder that is persistent and pronounced in nature is considered serious harm (clause 5.1.8), and in all other cases, the criterion of the duration of the health disorder or the degree of persistent loss of general working capacity is used to assess the severity of harm to health.

Based on the results of the conducted research, it seems possible to predict a number of criminal-legal risks in the law enforcement sphere: 1) expansion of discretionary powers of law enforcement and judicial bodies in connection with the use of evaluative categories in the acts of the Constitutional Court of the Russian Federation and the Ministry of Health of the Russian Federation («severe» mental disorder, «persistent and pronounced nature» of mental disorder, «social well-being of the victim», «threats to social well-being», etc.); 2) partial decriminalization of the main elements of crimes, a mandatory feature of which is causing serious harm to human health through negligence, if the court does not recognize the mental disorder that occurred as a result of the harm caused as severe, affecting his social well-being and quality of life; 3) partial decriminalization of qualified and especially qualified offenses related to causing «other grave consequences», which the Supreme Court of the Russian Federation includes causing grave harm to health of at least one person (for example, Part 2 of Article 205 of the Criminal Code); 4) an appeal to the Constitutional Court of the Russian Federation with similar complaints about taking into account the criteria of social well-being, the impact on the subsequent life of a person, quality of life in relation to other consequences in the form of drug addiction or substance abuse, termination of pregnancy, as well as recognizing a short-term mental disorder for up to 21 days as minor harm to health. In order to prevent possible legal conflicts and minimize risks, it seems advisable to develop new versions of Articles 111, 112, 115 of the Criminal Code based on the categories provided for in Article 21 of the Criminal Code.

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在刚果民主共和国这样的挑战背景下，沉迷于社交网络愚蠢行为的轻浮青年会面临什么样的未来?

WHAT FUTURE HOLDS FOR A FRIVOLOUS YOUTH ADDICTED TO THE STUPIDITY OF SOCIAL NETWORKS IN A CONTEXT OF CHALLENGES LIKE THE DRC?

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摘要：青年是人生的黄金时期，介于童年（依赖性强、不成熟、对生活过度漠不关心）和老年（人生的终点，退休、进一步成熟或死亡）之间。青年时期非常重要，在高龄导致智力缺陷之前，他们的体格和智力都十分活跃。因此，青年是任何有意识的民族的希望之源，也是加速国家发展、摆脱支配、依赖和社会经济欠发达的时期。社交网络对大脑功能的影响已毋庸置疑，这方面的研究也层出不穷。即使忽视了它的危害，也丝毫没有减轻其后果的严重性，而这些后果是巨大的。

关键词：非洲青年、青少年、成瘾、轻浮、挑战、DRC、社交网络、大脑、注意力、痴呆。

Abstract. *Youth is the prime of life and a period between childhood, which is subject to dependence, immaturity, and an exaggerated carelessness about life, and old age, which is the end of the latter for an age of retirement, further maturation, or otherwise death. This age group being important and including both physical and intellectual vigor before any mental deficiency due to advanced age, youth is therefore the bearer of the hopes of any conscious nation and the time to accelerate the country's development to free itself from dictates, dependence, and*

socio-economic underdevelopment. And, the impact of social networks on brain function is no longer in doubt, and studies abound in this direction. Its ignored harmfulness does not in any way diminish the enormity of its consequences, which are substantial.

***Keywords**: African youth, youth, addiction, frivolity, challenge, DRC, social networks, brain, attention, imbecilization.*

1. Introduction

Africa is today considered the continent with a youth population that covers more than half of its population and the Democratic Republic of Congo is one of these countries that has more than 70%. The vast majority of its population therefore constitutes a youth called upon to be proactive in the face of the challenges and issues of the continent and the country. At the same time, Africa is considered the continent with strong development potential and capable of providing solutions to multiple causes due to climate change and the aging of the Western population, but also remains the last of the continents in its socio-economic development. The DRC ranked 174th country on the human capital index in 2020 [1]and is among the five poorest countries in the world with a population living on less than $2.15 a day in 2023 [2].

While the life expectancy of a European has reached 77 years on average, Africa is at 62 years [3]and the Congolese at 60.4 for men and 64.4 for women [4]. Taking into account the fact that life expectancy differs from one continent to another and from one country to another, African youth are therefore called upon to live differently from what other peoples may give as an image on social networks. Although the world is interconnected, it nevertheless remains different on the criteria on which to base its policies and implement the SDGs and others. And this population estimated at 109,947,445 inhabitants as of Monday, September 9, 2024, equivalent to 1.34% of the total world population with the median age of 15.8 years [5].

And in this interconnected world, the Internet is the most powerful tool that puts into perspective the notion of globalization and globalization without barriers or borders between states. Nations cooperate in almost all areas of society, from simple friendship agreements to security and defense in the cyber domains, regardless of the distances that may exist between these states.

Social media is one of the many interconnections and advantages that the internet offers to bring people separated by geography and time zones closer together,

[1] http://www.banquemondiale.org/country/drc/overview , consulted on 09.09.2024 at 12:16 p.m.

[2] Idem

[3] http:// www.inegalites.fr , consulted on 09.09.2024 at 1:00 p.m.

[4] According to IHME on http://www.fr.wikipedia.org , consulted on 09.09.2024 at 1:00 p.m.

[5] http://www.worldometers.info/world-popilation/democratic-republic-of-the-congo-population// ; consulted on 09.09.2024 at 13:12

but also to enable the sharing of culture and knowledge between peoples. This tool, which allows young people to open up to the world and learn from different cultures and interact with others in a multicultural world, has been one of the major revolutions of homo sapiens sapiens.

Another incredible network is being invented every day in Silicon Valley and around the world thanks to access to the internet and platforms like YouTube, where young people meet in virtual classrooms and learn at their own pace, making the material accessible to everyone at any time. Algorithms, parameters, and codes, etc., are being created and multiplied in open spaces in the internet sphere, and networking beyond ethnic and cultural communities is a major asset for completing and sometimes acquiring skills that would not otherwise have been possible.

2. Frivolity and addiction

If all of the above were ignored, social media would be canonized without question. However, the downside remains that these useful and important platforms are as dangerous as cancer and radicalization.

Personalities and channels abound on the various social networks, with rather varied content touching on all areas of life in general. And, a number stand out from the crowd by the mass of those who subscribe to their accounts and assiduously follow their content and publications daily and in real time by setting up notifications and messaging.

As for content, today, those with the most subscribers or followers are in the entertainment field, not the scientific one. On Instagram alone, in 2020, it totaled 1.393 billion monthly active users, and in December 2021, it would have reached 2 billion users, [6]along with its competitor, TikTok, which in 2024 continues its meteoric rise. And in France, 72.2% of TikTok users are under 24 years old, and among them, 39% are between 18 and 24 years old. This network had reached 1.7 billion active users worldwide in 2022. [7]It is not possible to give with as much accuracy or approximation the rate of use and users of these networks in the DRC and among young people, but the trend and surveys have shown that only one in two had both networks on their smartphone. And that's without counting people in the age group considered children and those who consider themselves old and younger, who use it daily.

The trend observed on these networks being more about entertainment, including the challenge of dances, filters, clothing, plastic surgery, vehicles, and bad buzz, young people are therefore on a bad trajectory. Without, however, denying the place of entertainment in human development, the figures are alarming regard-

[6] http// : www.blog.digimind.com/fr/agences/instagram-chiffres-et-statistiques-france-monde-2020 , consulted on 09.09.2024 at 2:13 p.m.

[7] http// : www.blog.digimind.com/fr/agences/tiktok-chiffres-et-statistiques-france-monde-2020 of February 3, consulted on 09.09.2024 at 2:13 p.m.

ing its impact on performance, the quality of work, and the absorption of attention that these social networks have on poor youth who have enormous challenges to overcome.

On average, the time spent on the application (tiktok) is 48 minutes per user per day in 2019 (40 minutes in 2018) and a user opens the application 9 times per day. [8]Considering this trend of increasing minutes and hours spent on the network, i.e. the period of confinement and the increase in interactions and content, we can realize how exponentially this figure has climbed in this year 2024 in the world and in the DRC in particular which has a youth who were already facing an unemployment rate of nearly 60% by the words of governments and nearly 90% by civil society and the opposition. Confinement and post-confinement with its repercussions have pushed young people onto these platforms and increased their network time.

From the answers and journeys of the most followed and recommended accounts of young Congolese people, we find dance challenges of all kinds, the most popular of which are «krakra» which requires young girls to move their backsides, and the girl in a red swimsuit who moves her hips in all directions. A challenge that hardly brings a psychosocial advantage to the follower and also content on sexual performance and female pleasure. The tragedy is to see older women, over fifty and young minors who indulge in the questions of these content creators without embarrassment or any form of modesty, without age restrictions for those who must follow these interviews.

Another is to find all the bad buzz, fake news, and images filled with explicitly sexual scenes that are published by young people on these platforms where age restrictions seem to have been forgotten. This creates a breeding ground for unconsciousness and carelessness on the part of young people regarding the real issues and challenges facing them. These new youth stars are influencers who are the subject of controversy and scandals of all kinds; some of which are affiliated with adult sites and films. Touting a supposed luxury and dream life that the Porta Potty scandal has brought to light.

This youth once lacked concentration or only experienced a loss of attention due to an effect of exogenous and environmental factors such as certain antihistamines, sleeping pills, noise, stress, heat, agitation, quality of the environment, today through their addiction to screens, the young person is quickly caught by a notification sound or a vibration of their mobile phone and has difficulty refocusing immediately after.

Hence the digital break law passed in France and already applied to this back-to-school season by more than 200 French high schools [9]in order to improve the

[8] http://www.blog.digimind.com/fr/agences/tiktok-chiffres-et-statistiques-france-monde-2020 of February 3, consulted on 09.09.2024 at 2:13 p.m.

[9] http://www.education.gouv.fr ; consulted on 09.09.2024 at 3:26 p.m.

collective life of students. But, this decision is actually based on the harm observed by all, because children have been victims of harassment on social networks, victims of pedocriminals behind fake child profiles, etc. and even the famous case at the launch of Facebook at Harvard to elect the ugliest person (ugly) in the university. Things that can cause more harm than good to the victims.

There are a growing number of scammers (a term used by West African countries to refer to internet scammers) on social media, fake accounts of political and religious figures to extract money from the most gullible in exchange for a promise of a job or some kind of privilege. There are threats to publish private images that are on social media because the victim has not given in to blackmail and threats.

Psychologists speak of an impairment in concentration and analysis in the person who becomes addicted to screens. These «external distractors,» as the multiple requests we receive from our networks are called. This, on the one hand, constitutes an enormous danger for a youth already behind in terms of their educational system and technological advances. It's a vicious circle that is created by this addiction to screens and social networks in particular, knowing that it is on networks that we concentrate the majority of our time in front of screens.

Our brain is programmed to release a hormone of pleasure or joy every time we deploy our energies and strengths in a work or task that advances or succeeds, and excites us to start a new challenge or task, with social networks, like tiktok, it is released more quickly and without any effort on our part. It is enough just to scroll or simply activate the arrow so that the videos follow each other without scrolling manually. Each video that is proposed is by the tiktok algorithm which has previously studied and noticed your choices of preferences by the videos that you have either searched for or watched for a while by suggestions and center of interest. Thus, a cycle opens in the brain, to receive dopamine without the slightest effort, and like any addictive, the lack is felt quickly and we start to scroll between two tasks, two sentences of a book or a course.

This vicious cycle drives us to seek dopamine, and this dopamine creates addiction, resulting in a loss of attention which leads to a lack of motivation for other activities in life, and finally boredom and depression.

According to researchers, 40% of girls who spend more than five hours a day on social media show signs of depression, compared to 15% of boys. This vast study involved nearly 11,000 adolescents aged 14, not counting the sleep disorder which is added to other existing ailments. [10]A study by University College London and published in the medical journal The Lancet relayed by the Resolution Foundation think tank published on Monday, February 26, 2024, reported «that

[10] http// : www.mmj.fr/depression-et-reseaux-sociaux-adolenscentes ; from April 30, 2019 from University College London and published in the medical journal The Lancet, consulted on 09.09.2024 at 7:12 p.m.

young people today have the worst mental health of all age groups... and that 34% of 18-24 year olds reported symptoms such as depression...» [11]. This was confirmed by Radio France after investigation and confrontations and intervention by a teacher and researcher in cognitive psychology named Séverine Erhel who relies on a 2020 study by saying: «that the ideal time for digital consumption is 1 hour 19 minutes per day. She specifies that we start to see negative effects from two hours. Finally, a time that becomes problematic, that is to say a time when parents notice changes in behavior related to emotion regulation or sociability, for digital consumption, is beyond five hours. In other words, five hours of social media, for young girls, is far too much.[12]

Screens in general, and social media in particular, make people depressed simply because their inventors designed them for that purpose. Neuroscience provides evidence that regular and frequent exposure to certain content has an impact on a person's personality. Without further ado, you may recall this brainwashing technique practiced by some states by forcing prisoners to watch pre-planned images, the purpose of which was to arouse an emotion of either hatred or simply to break their spirit for future manipulation. And this technique has been adopted by fundamentalists in some nations to radicalize their supporters.

It is common knowledge with the example of TikTok, that the content served to other nations is more geared towards entertainment and gaming, while for the nation of the designer, it is a huge learning tool. It is one of the three most scrutinized social networks and has made a turnover of more than 8.7 billion US dollars in global revenue [13], while it is part of the latest findings of the social media system.

3. Challenges of Congolese youth[14]

Africa, the continent that is lagging behind and still boasts nations that are paradoxically rich in natural resources, but with the poorest populations, sometimes living on less than a dollar a day. And it is lagging behind in industrialization compared to other continents. The DRC, located in the very heart of this Africa, is ranked 180th out of 193 countries and territories in 2023/2024 with a score of 0.481 according to the UNDP Human Development Index .

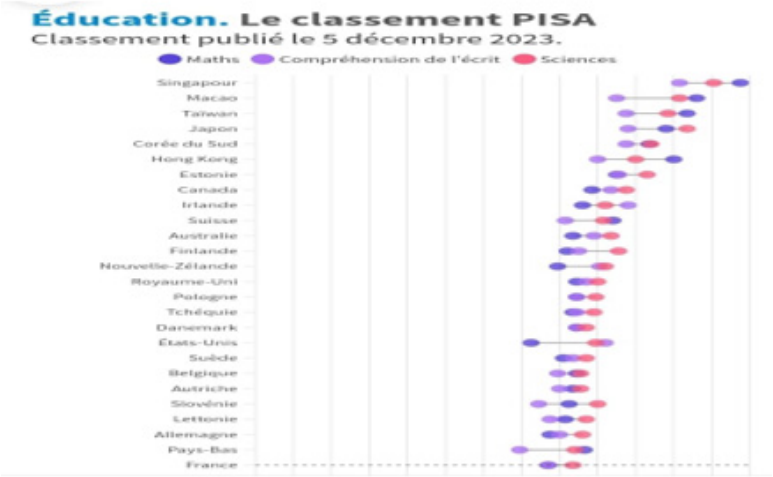
[11] http://www.midilibre.fr ; consulted on 09.09.2024 at 7:37 p.m.

[12] http//: www.francetvinfo.fr/replay-radio/le-vrai-du-faux-junior/lien-entre-reseaux-sociaux-et-la-depression-publicites-anti-ivg-sur-les-reseaux-sociaux-le-vrai-ou-faux-junior_6284772.html ; consulted on 09.09.2024 at 7:40 p.m.

[13] http://www.frstatista.com/statistiques/1350340/chiffre-affaires-mondial-bytedance-par-application/ ; consulted on 09.09.2024 at 8:14 p.m.

[14] We highly recommend consulting "African Youth Facing the Challenges of the Era" published in INNOVA, Russia in August 2023 for more supporting material and areas that will not be covered in this article.

In the field of teaching both traditional and technological (artificial intelligence) fields, the DRC is lagging far behind and is slow to take the necessary measures. According to the PISA ranking, compared to the DRC, France is in 23rd position , and in view of the consequences of social networks, the latter is readjusting in order to prevent this loss of quality in education as well as this observed addiction, but the DRC, which does not appear in this image, is dragging its feet and continues to evolve only through conferences, workshops and general meetings which only result in recommendations and often do not take into account the real issues and challenges of education, and this whole jungle of social media.



While the QS World University Ranking places France in 6th [place] in the Top 10 Universities in the world, South Africa comes in 30th [place] and the DRC is still one of the big absentees from this ranking of Universities by one of the three most reputable rankings. This should normally lead to a deep and structural reform for better results in the face of the stupefaction (imbecilization) of young people by social networks, thus making this youth competitive on the global job market and also developing their creativity absorbed by entertainment. Making France according to startupBlink the 08th [country] where professionals are advised to create their business, despite the strong potential of the DRC to be a pillar of the development of the continent of nourishment of a part of the world.

The President of Zaire, in rejecting the concept of poor countries at the podium of the United Nations General Assembly, said that African nations are less industrialized than other continents, something that should also push the DRC, formerly Zaire, to embark on the industrialization of its society and its economy, but the

tars of yesterday seem to remain. This nation should therefore not be interested in social networks like industrializing nations, to acquire skills, develop and transfer technology from its partners to its territory. Build an educational system that produces the intelligentsia with a professional outlet with the capacity to absorb this workforce. Because, any gap between the two areas would only be a loss of earnings for the country, because the workforce will expatriate and in the other direction, it is education that will produce brains eager to move the country forward and operate this cutting-edge technology at its disposal.

This revolution can be achieved through strategic cooperation agreements that correspond to the realities and expectations on the ground, and not through the copy-paste of a process that would have worked in any country on the globe. Pragmatism would require that a corresponding solution be found to a difficulty that is its corollary, by involving the local population.

This youth, who devote themselves to dancing, drinking at bars all week long, playing music, and gambling, with no hope of a better future other than through expatriation, immoral practices, and political office, should wake up and stop scrolling without a clear intention of improving themselves in order to achieve fulfillment. Because all change must be intentional and cannot be accidental.

4. Conclusion

It is undoubtedly necessary to recognize the delay accumulated by the DRC in its transformation, it which was at the same level as certain countries of Asia and Europe at the proclamation of independence and today has a delay of half a century to make up.

Youth should free themselves from this lethargy in which they find themselves to train themselves through the same networks that have zombified them and reduced their cognitive abilities. The brain is an organ that deteriorates when it is not used and loses its power, but which can be rebuilt through training in reflection, because it is a muscle that is strengthened by habit and exercise. It is therefore imperative for this youth to change their perception of intellectual warfare and strategic intelligence to turn towards the accumulation (increase) of practical and technical knowledge in new technologies.

There's a war for attention being waged by various social media platforms to see a large number of users who are actually the products marketed by these tech giants spread across the globe. This is thanks to the process of neurolinguistic reprogramming and a reduction in screen time and social media in particular.

Less time devoted to these networks to train and develop new skills and to think differently about the future of the DRC through its youth is more than a necessity to speak of a State. The less students will resort to AI to design their studies for use in promising sectors such as the economy, agriculture, and health. Because youth in a nation building its fundamentals do not have the right to indulge in

frivolities like the youth of developed nations. Social networks have distilled this culture of packaging through surgery at all costs, disregarding the risks and using vulgar language, a bed of ignorance and lack of education, sometimes held up as a model by young people and causing discomfort and provoking a refusal to accept oneself with a physique different from that promoted on the networks.

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13. *http//: www.frstatista.com/statistiques/1350340/chiffre-affaires-mondial-bytedance-par-application/ ;*

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维护和加强俄罗斯国家主权的现代教育的价值目标指导方针。戈尔洛夫卡（顿涅茨克）的经验

VALUE-OBJECTIVE GUIDELINES FOR MODERN PEDAGOGICAL EDUCATION TO PRESERVE AND STRENGTHEN RUSSIA'S NATIONAL SOVEREIGNTY. GORLOVKA'S (DONETSK) EXPERIENCE

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注释。本文介绍了顿涅茨克国立师范大学（维克托•沙塔洛夫，戈尔洛夫卡）在各级教育中，特别是师范大学以及培养未来教师的综合学校的心理学和教育学专业课程中，在现代俄罗斯师范教育价值目标指导方针的形成和培养方面的经验。本文阐述了价值目标要求的特征、以教育学为基础的公民教育指导方针的具体实施方法、在长期危机情况下如何培养个人的公民爱国主义认同，以及如何在创造性活动中维护国家主权。

关键词：师范教育、价值目标指导方针、国家主权、公民认同、爱国主义、教育、系统性、未来教师。

Annotation. *The article presents the experience of educational work at the Donetsk State Pedagogical University named after Viktor Shatalov (Gorlovka) on the formation and cultivation of value-target guidelines of modern Russian pedagogical education at all educational levels, primarily at the pedagogical university and in specialized psychological and pedagogical classes of comprehensive schools where potential future teachers are trained. The article describes the characteristic features of value and target requests, the technology of practical implementation of pedagogically substantiated guidelines for the education of a citizen, the formation of a civic-patriotic identity of an individual in a long-term crisis situation and aimed at creative activity to form the national sovereignty of the country.*

Keywords: *pedagogical education, value-target guidelines, national sovereignty, civil identity, patriotism, education, systematicity, future teachers.*

In the Russian education system, axiological problems of upbringing and socialization of the individual are considered today as a fundamental basis and strategic factor in preserving and strengthening the national sovereignty of Russia. Crystallization of value orientations is carried out in society thanks to a well-thought-out state policy that takes into account the events of modern history: the entry of historical regions into the Russian Federation, the protection of national interests on the fronts of the Special Military Operation and in the rear - on the economic front [6].

The Decree became the regulator for the development of the value system President of the Russian Federation No. 809 "On Approval of the Fundamentals of State Policy for the Preservation and Strengthening of Traditional Russian Spiritual and Moral Values" [9], according to which the designated value constants must also be considered as target settings. Thus, at the current stage of development of Russian society during the period of consolidation of efforts to ensuring national sovereignty, the formation and preservation of spiritual and moral well-being, traditional values, and the protection of territorial integrity, the complex of axiological (value) and, at the same time, teleological (target) guidelines becomes obvious and clear, in particular, for students of pedagogical educational organizations of higher education and students of psychological and pedagogical classes of general education classes, as potential future young teachers.

Today, at the forefront of the educational process is the case patriotic education of youth determines all aspects of the work of teachers. The development of political events in the 1990s and 2000s in Ukraine led to the fact that not all mature people with considerable life experience were able to clearly define their civic position. Therefore, the future of our society as a whole depends on how young people behave, whether they will think only about themselves and their own benefits, or will take on a historically shaping role.

It is also certain that the system of pedagogical education as a whole should be oriented towards developing in future teachers the qualities necessary for raising patriots, citizens with an active life position and national self-awareness. It is important to emphasize that we consider both students of the pedagogical university and pupils of specialized psychological and pedagogical classes of the comprehensive school as future teachers, since already at an early stage of professional determination in teenagers the value and target guidelines of their practical life activity should be formed.

And if in the first years of the tragic events it was important for the residents of Donbass (of any age) to declare and demonstrate their belonging to the Russian world, Russian history and culture, then after joining the Russian Federation - today - the emphasis has shifted somewhat towards the desire for self-identification of a resident of Donbass as a representative of a distinctive region of Russia, the

path of development of which is closely connected with the historical destiny and cultural code of the Fatherland. It is especially important for our youth to identify themselves as citizens of their Republic, which is part of a large country. At the same time, the traditions, social norms, and rules adopted in a given region become especially important, which distinguish our youth as residents of Donbass.

Donbass is by no means a "new territory" of modern Russia. It is a unique, specific, but nevertheless an integral part of the Russian world, territorially and spiritually a primordially Russian land. Today, the Russian Federation is a sovereign state whose people are multinational and multicultural, but united in their commitment to the Motherland, traditional spiritual and moral values and common historical roots. In this regard, Donbass is not only an important part of Russia's historical past, but also a characteristic dominant feature of the modern development of our state.

Everyone knows that the specificity of this region is connected with its natural resources, with the subsoil, first of all – with coal. However, the main wealth of Donbass is people. People who are courageous and selfless, striving for justice, searching for the truth and ready to defend it.

Therefore, in the circumstances of a tough choice of lifestyle, value orientations and target settings, the teaching staff Donetsk State Pedagogical University named after Viktor Shatalov (Gorlovka) found ourselves face to face with the problem of determining the trajectory of the educational and upbringing process. It seemed important to us to be aware of our truth, to be confident in the correctness of our actions, to determine our civic position, to find solid ground under our feet, to find a common denominator. And this denominator became the common cause of protecting our Motherland. This is our value and goal.

Guided by daily experience, teachers decided and began to intensively introduce into the youth collective the idea that the protection of everything native can have different manifestations: values can be protected with weapons in hand, qualitatively fulfilling their professional duties, and conscientious study is also a form of struggle for their values. The idea that everyone (a soldier, a teacher, a doctor, a baker, a student and a schoolchild) should make their personal contribution to the protection of values in their place, formed a common cause, which consists of a whole spectrum of accompanying meanings, which in total can be defined as service to the Fatherland [2], [4], [5]. In fact, all the values included in the Decree of the President of Russia [9], are important state-forming meanings.

Experience of Donetsk State Pedagogical University named after Viktor Shatalov shows that, unfortunately, ideal conditions, as a rule, due to many circumstances, including geopolitical ones, may not develop, and the spiritual and moral gap between generations is fraught with negative consequences. But it is important to understand that it can only be overcome with systematic daily educational

and explanatory work with students. The need to cultivate value-target attitudes in the education of young people is especially acute during times of trials and challenges, when the fundamental problem is the issue of physical and spiritual-moral survival of a multinational country.

Experience of working in crisis conditions in higher education shows that it is the teacher, and in school - the teacher, who becomes the person whom teenagers and young people will look up to. Ideally, a tandem of efforts between the teacher and parents should be formed, and, as a result, a certain educational environment should be formed as a whole. It is in the conditions of a protracted social crisis that has lasted since 2014 that we are witnessing the birth of the authority of the teacher not only as a professional, but also as a person who can be looked up to in making important life decisions in extreme socio-economic conditions.

The tragic events experienced by the university students over the course of 11 years taught them to think, live and plan their future in a completely new way. The grown-up generation of our region's youth has learned to live in the present, without thinking about the distant future and trying not to remember the disturbing past. This is confirmed by the results of scientific research conducted at the university [1], [8], including the creation of special questionnaires, questionnaires, monitoring changes in attitudes towards life in the city of Gorlovka, which has been on the front line for a long time. The teaching staff conducts such research among students of the pedagogical university and students of psychological and pedagogical classes in comprehensive schools of the city.

For the youth of the region, their family, native land, native home, all its components (down to the smallest details, household items, personal belongings, i.e., everything that is in the house), friends who were with them in moments of danger, surrounding people who are always ready to come to the rescue have become value guidelines in life. Probably, these are those important life guidelines that become significant in emergency and crisis situations.

When faced with mortal danger, when faced with the choice of being or not being, when, at times, all that is left in one's hands is an anxious bag with documents and things, objects that did not perish during the shelling, a person realizes that he still has a whole treasure left – his life.

Then there is a reassessment of values and an understanding that if this time fate gave you a chance to be, then the next, logical question is "What to be?" [7]. And then goals are formed and guidelines are strengthened through the readiness to resist both real military aggression and informational aggression. Brands and trends, the fussy and false, unimportant for life, fade into the background. Values are realized personally and become a goal. One of the main thoughts of the region's residents and young people, in particular, has become: "What will happen here if everyone leaves?" The thought that it is impossible to defend a devastated

land gives rise to a feeling of special responsibility for the fate of one's region. Such an understanding of one's purpose - mission - gives rise to a common cause that unites very different people.

At the same time, in direct pedagogical activity it is important to take into account that there are a number of very important factors that can contribute to the formation of the necessary value-target guidelines:

- a conscious sense of responsibility for the future of the land on which you live and the entire country as a whole, since there can be no room for indifference here;
- conscious acceptance that it is today that determines the future;
- understanding that the thoughts of each citizen and his actions (volunteer activities, mutual assistance and support) are a guarantee of the integrity of the country;
- developed critical thinking;
- a personal example of a teacher with a clear civic and life position.

Another extremely relevant value-target setting should be selectivity in relation to incoming information. Schoolchildren and students live in conditions of a total information war, fake dominance, substitution and distortion of concepts and values. Most teenagers and young people clearly understand the enormous danger of ill-considered belief in unverified information, the possibility of underestimating this or that warning. This happens because the danger is always near them and the main task is not to aggravate the situation. Hence the high level of anxiety, stress, depressive states, since it is impossible to relax for a moment. Research conducted by university staff shows that young people and teenagers from specialized psychological and pedagogical classes draw the main information about civic-patriotic education, first of all, from the educational environment.

Thus, it is obvious that the experience of the Donetsk State Pedagogical University named after Viktor Shatalov in the conditions of a long-term crisis state of people under stress shows that much can be experienced and overcome if the work is structured ideologically thoughtfully - clearly voicing values, goals and civic position, if targeting young people to choose and demonstrate their civic position without embarrassment of looking pompous, if problems are dealt with systematically, comprehensively and efficiently.

The study was conducted at the Donetsk State Pedagogical University named after V. Shatalov within the framework of the State assignment of the Ministry of Education of the Russian Federation (No. 1024122500032-0-5.3.2) on the topic "Regional system of support and support for pedagogically gifted children and youth in specialized psychological and pedagogical classes."

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冲突教学法作为教育领域的一种新方法
PEDAGOGY OF CONFLICTNESS AS A NEW APPROACH IN THE FIELD OF EDUCATION

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摘要：本文论证了无冲突教学法作为教育领域一种新型跨学科方法的相关性和原则，其基础在于将冲突理解为个人文化发展的生产性基础。创造良好学习环境的重要条件之一是教育过程参与者获得冲突学能力。

关键词：无冲突教学法、建设性冲突、冲突学能力、有教养的人、教育。

Abstract. *The article substantiates the relevance and principles of conflict-free pedagogy as a new interdisciplinary approach in the field of education, the basis of which is the understanding of conflict as a productive basis for the cultural development of the individual. An important condition for creating a favorable learning environment is the acquisition of conflictological competence by participants in the educational process.*

Keywords: *conflict-free pedagogy, constructive conflict, conflictological competence, cultured person, education.*

Human society cannot exist without conflicts. At present, psychologists and teachers increasingly speak about the need to develop conflictological competence in subjects of the educational process (a term introduced into scientific circulation by Doctor of Philological Sciences, Professor B. I. Hasan) as a basic characteristic of effective educational activity.

Methods of resolving conflicts that constantly arise in human society and are an inevitable condition of its existence have been considered for many years in various sciences: sociology, psychology, pedagogy. However, both approaches to defining the concept of "conflict" and its content in their understanding differ.

Conflictology as a special branch of scientific knowledge has been developed the main theoretical and practical issues of the psychological component of con-

flict, technologies for its identification, principles of research and special methods for its resolution. It is based on the entire volume of information accumulated in the field of humanities.

Conflictologists point out that "The initiative in resolving the conflict should belong to the teacher, as the more professionally trained one. In any variant of the conflict development, his task is to transform the opposition of the parties into interaction, a destructive conflict into a constructive one" [2, p. 164]. Obviously, for this it is necessary to have the necessary conflictological competence, which is formed either as life experience accumulates, or when studying the mechanisms for developing dispute resolution.

Having systematized and generalized the causes of conflicts, we can identify several groups: economic and social, cultural, physiological (age) and psychological (personality type). As a rule, conflicts are multi-causal, i.e. they are either caused by both objective and subjective factors, or by a combination of subjective factors.

The nature of conflict is ambivalent. It can perform both negative and positive functions, can be both destructive and constructive. In conflict-free pedagogy, all participants in the educational process must understand the nature of conflict and possess conflictological competence to create a favorable environment.

Constructive conflict promotes the development of critical thinking, forms the experience of socialization, flexibility of behavior, the ability to cooperate, and emotional stability. The positive aspects of conflict include the fact that it is a productive basis for cultural development, especially in childhood and school age.

Understanding all the reasons for the emergence of conflicts, including psychological, age-related, cultural, and social ones, is the path to developing a conflict-free communication style and effective communication among participants in the educational process.

Avoiding conflict means demonstrating the art of communication, the ability to build a dialogue, a necessary skill acquired in life situations or in game forms at the forecasting stage.

In psychology, constructive conflict is an opportunity for growth of individual and collective abilities. Understanding the nature of such conflict, mastering the art of constructive conflict, searching for common goals and interests on the basis of cooperation and compromise, working on oneself are the features that characterize constructive conflict and transform it from a source of stress into a source of personal development. Constructive conflict is always productive and has a positive result in the form of achieved common results in the team, or the experience gained by its participants.

At different times, the elements of this approach had different names: nature-based education by J. G. Pestalozzi, humanistic pedagogy by J. Korczak,

cosmic pedagogy of free education by K. N. Wentzel, pedagogy of freedom by L. N. Tolstoy, pedagogy of cooperation by E. N. Ilyin, S. N. Lysenkova, S. L. Soloveichik, V. A. Sukhomlinsky and V. F. Shatalov, personality-oriented pedagogy by Sh. A. Amonashvili and E. V. Bondarevskaya, dialogical pedagogy by R. Alexander and E. Matusov based on the philosophical ideas of M. M. Bakhtin, pedagogy of non-violence by A. G. Kozlova, V. G. Maralov, K. Rogers, V. A. Sitarov. Ideas close to the concept of conflict-free pedagogy were developed in the works of J. A. Komensky, J.-J. Rousseau, M. K. Gandhi and others. In foreign pedagogy, the ideas of non-violent interaction are the basis for peace pedagogy and education in its spirit, which originated in the works of M. Montessori (Nobel Prize 1948 in the fight for peace), as well as other supporters of free education (F. Ginsberg, L. Gurlitt, D. Dewey, E. Kay, A. Neil, F. Froebel, G. Scharrelman) and anti-pedagogy (E. von Braunmühl, M. Mannoni, H. Ostermeier, K. Rochefort, V. Hinte, H. von Schönebeck). The desire to understand, transform and liberate a person and society from negative moments is characteristic of critical (P. Freire) and transformative (J. Mezirow) pedagogy.

Much has been written about the role of education in conflict resolution. But only recently have works appeared that use the term "conflictological culture" [3].

The education of a cultured person presupposes the formation of a broad outlook and dialogue skills, and the ability to behave appropriately in different communities and control emotions, a developed sense of tact. In this case, culture should be understood in the broadest sense, including the concept of the culture of self-knowledge and self-regulation of the individual, aimed at forming the need for self-development and social interaction, as well as psychological culture. Thus, it increases in the importance of assessing a pre-conflict situation and preventing conflict by raising a cultured personality. A cultured personality is a person with a broad outlook, who has an idea of the value system of other peoples, religious groups, etc., who has the ability to build communication, avoiding conflict-generating words and using conflict-free phrases, using the capabilities of language and critical thinking, who is able to manage his own emotions and predict the behavior of a potential participant in a conflict, who perceives conflict as a necessary experience of communication and overcoming disagreements.

Mastering the necessary formulas for conducting a dialogue at the language level, together with an understanding of human psychology, is one of the steps towards organizing a conflict-free environment. R.A. Rogozhnikova and R.T. Ravilov share their experience of creating a favorable environment based on knowledge of the rules of behavior in society in their article: "Particular attention was paid to etiquette, which expressed both the moral and aesthetic aspects of behavior [Pankeev, 1999, p. 65]. Life in the detachment provided enormous opportunities for creating a positive emotional background for communication, when

a teenager, taking into account the need to consider the interests of the group, showed attention and courtesy to his comrades and elders. <…> By placing the child in the position of a subject, we tried to create a joyful, creative atmosphere in the detachment, where everyone felt comfortable. This contributed to the formation of humane relationships between children, which ensured the restructuring of the motivational-need sphere of the individual, contributed to the formation of moral consciousness, feelings and behavior of adolescents" [3, p. 110].

Since the subjects of the conflict are not just human individuals, but personalities, the problem of education comes to the forefront. In the modern educational process, it should be about not only the education of the student, but also the education of all its participants. The main role is still given to the teacher [1], but close attention should also be paid to parents. The experience of constructive conflict resolution in the family is the path to their successful resolution in the educational environment (kindergarten, school, higher education institutions). Every parent and teacher, in the unity of their efforts to educate, possessing experience in constructive conflict resolution, implements conflict-free pedagogy.

Thus, conflict-free pedagogy, using the entire volume of information, developments and practical experience of such sciences as psychology, conflictology, sociology, cultural studies, is an interdisciplinary discipline, the purpose of which is to create a favorable environment for all participants in the educational process based on the developed conflictological competence of all its participants (parents, teachers, children, students).

The study is being conducted at Donetsk State Pedagogical University named after V. Shatalov within the framework of the State assignment of the Ministry of Education of the Russian Federation (No. 1024122500038-4-5.3.1) on the topic "Theoretical and methodological foundations of conflict-free pedagogy".

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俄罗斯人民友谊大学女生一年级学习负担强度分析
ANALYSIS OF THE INTENSITY OF FEMALE STUDENTS' WORKLOADS DURING THE FIRST YEAR OF STUDY AT RUDN UNIVERSITY

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摘要：本文提供了学年期间按能量供应区划分的训练负荷分布数据。结果表明，在体育课中，相当一部分时间用于低强度负荷，这与女学生在一年级的体能状态相符。女生的代偿性REC区占31.91%。研究显示，在实际训练中，有氧能量供应区（EN1）- 62.35的训练类别涵盖了速度、速度-力量耐力以及（在更大程度上）身体生命支持系统的临界指标。

关键词：体育、学生、体育活动。

Abstract. *This paper presents data on the distribution of training loads during the academic year by energy supply zones. It has been established that during physical education classes, a significant portion of the time is devoted to low-intensity loads, which corresponds to the functional state of female students during their first year of study. In girls, the compensatory REC-zone accounts for 31.91%. It was revealed that in practical training sessions, training categories for*

developing speed, speed-strength endurance, and, to a greater extent, considering the borderline indicators of the body's life-supporting systems, were observed in the aerobic energy supply zone (EN1) - 62.35

Keywords: *physical education, students, physical activity.*

Introduction The reform of the educational system of higher education, the intensification of educational activities and the transition from the traditional organization of the educational process to innovative technologies significantly increase the requirements for the health of student youth (Krasichkov D.V., 2006)

At the same time, female students constitute a special social group of the population not only due to their age, specific conditions in the process of study, everyday life and leisure, but also because they belong to a high-risk group due to high and prolonged psycho-emotional stress (T.E. Batotsyrenova, 2007).

The time budget of students at higher education institutions shows that first-year bachelor's degree students have up to 8 hours of study time, taking into account self-study, while for students of the Faculty of Physics, Mathematics and Natural Sciences, the total study time is 9-12 hours a day.

The high demands placed on the physiological systems of the female students' bodies and their psyche dictate the need to use modern diagnostic tools in stressful situations associated with intense study (Kobyakov Y.P., 2003).

The relevance of the problem increases with high performance, which is inextricably linked with the improvement of the entire system of training highly qualified specialists, as well as with the intensification of the educational process.

The Federal Law "On Physical Culture and Sports in the Russian Federation" dictates the need to consider a number of problems of physical health of student youth from the standpoint of physiology in order to preserve their health and working capacity, extend their longevity and maintain the necessary level of health and quality of life during and after graduation. This primarily concerns first-year female students who are in a continuous learning process and experience increased psycho-emotional stress during the initial period of study in higher education.

In this regard, the study of the reserve capacity of the body of girls using various zones of intensity of physical activity in the initial period of study at the Faculty of Physics, Mathematics and Natural Sciences of RUDN University and, accordingly, is one of the important modern problems closely related to the health of student youth.

The period of study at a university at the present stage is a complex and lengthy process, requiring enormous expenditure of physical effort, emotional stability associated with the presence of long-term overloads in the first years of study. In human life, motor activity is of particular importance, which has a powerful protective effect in the case of sufficient volume in the daily routine or is a risk factor in its insufficiency

Rational organization of the motor environment, correctly justified distribution of physical loads across energy supply zones, increases the adaptive capabilities of the cardiovascular system, and in anaerobic zones – the body's resistance to loads with maximum intensity.

The aim of the work was the study of the intensity of physical activity during the learning process in higher education.

In accordance with this, the following tasks were defined:

1. To study the indicators of the intensity of physical activity of girls during physical education classes at the university.

2. To assess the functional state during physical activity during the educational process at the university.

3. To identify the prevalence of borderline indicators in the functional state of the body's life-supporting systems during health-improving activities.

To achieve this goal, energy supply zones encountered during physical education classes were calculated.

In accordance with the objectives of the study, a survey of first-year female students (17-19 years old) of the Faculty of Physics, Mathematics and Natural Sciences (41 people) was conducted. The study was conducted in 2 stages. Stage I - December; Stage II - May. The girls are engaged in GPP (general physical training) groups for 4 hours a week.

Evaluation and distribution of training loads during the academic year by energy supply zones allows us to predict the effectiveness of classes conducted according to the planned university program. In accordance with the adopted classification, we used international symbols of training categories: REC - training load with low intensity (heart rate - up to 120 cycles / min.). In practical classes, this category is used in large volumes: 1) training and work on the technique of the elements being trained without regulating the performance of speed exercises; 2) during warm-ups; 3) recovery periods of time after intense exercise. EN1 - work in the aerobic zone with minimal speed of movements. The intensity is fairly light with a heart rate of 120-140 cycles / min. EN2 - performing a given task at the speed of the anaerobic threshold. The intensity of the load is close to heavy with a pulse of 130-170 cycles / min. EN3 - the load in this category corresponds to heavy intensity, slightly above the anaerobic threshold and reaches a heart rate of 160–180 cycles/min.

In accordance with this, we analyzed the physical education classes of female students during the year. We measured the heart rate and calculated the number of exercises performed per unit of time in each part of it, where the load changed and the energy zones were determined.

A detailed analysis of health-improving activities during the educational process revealed that the motor regime was ensured by using three energy zones. In

the REC zone 31.4% (warm-up, recovery running for long and short distances, training in running technique). EN1 – 57.27% (the main part of the educational session, including jumping exercises and running, repeated by the repeated-serial and interval method). EN2 – 11.33% (special exercises for the development of speed qualities).

Thus, on average, a significant part of the time in physical education classes is devoted to low-intensity loads (REC - up to 120 bpm). For girls, the REC-compensatory zone is 31.91%. In practical training classes, training categories for speed development are practically not used and they train to a greater extent in the aerobic energy supply zone (EN1) - 62.35%.

The obtained data on the dynamics of one of the main indicators of the cardiovascular system complement modern ideas about the physiological mechanisms of adaptation processes of first-year students in conditions of increased psycho-emotional stress on the body as a whole. The informativeness of the indicator used with the analysis of energy supply zones of different power for maintaining and strengthening the health of student youth is substantiated.

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运用思维导图在英语课堂中培养中学生语言能力
DEVELOPMENT OF THE MIDDLE SCHOOL STUDENTS' LANGUAGE COMPETENCE BY MEANS OF MIND MAPS AT ENGLISH LESSONS

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摘要：本文阐述了中学生在英语课堂上使用思维导图的优势，有助于巩固、学习和记忆语法材料，并提升语言能力。此外，本文还探讨了思维导图在英语学习动机形成、自我发展和自我教育的准备、以及与同伴和成人沟通合作中交际能力的形成等方面的条件。

关键词：思维导图、英语语言、语言能力、语法材料、动机、自我教育。

Abstract. *The article describes the advantages of using mind maps by middle school students at English lessons for fixing, studying and memorizing the grammatical material; developing their language competence. The conditions of formation of motivation to learn a foreign language (English), readiness for*

self-development and self-education, formation of communicative competence in communication and cooperation with peers and adults are also given.

Keywords: *mind-map, English language, language competence, grammatical material, motivation, self-education.*

Modern schoolchildren are faced with a large flow of information every day, but not all of them are able to process it correctly, remember it in full in a short time and use it for their own purposes. Many sources (TV, radio, magazines, banners, advertising and the Internet) envelop the child's mind, and he is powerless before such a volume of information, since many do not know how to manage it and choose the most important.

The Federal State Educational Standards (FSES) raise the issue of including time-appropriate pedagogical technologies, combining local knowledge on each subject into a broad, holistic picture of the world. The practice of working in multi-level classes of a comprehensive school shows that the most common reasons for a decrease in academic performance and interest in a subject are a large volume of oral and written material, poor memory, inability to highlight the main thing and generalize, lack of situations of success and, as a result, a decrease in learning motivation.

The contradiction between the large volume of written grammar material in the English language course and the lack of motivation among students to study a foreign language, both within the school and independently, leads to the problem of poor grammar acquisition by children.

The teacher's goal is to motivate students to learn a foreign language, to master it independently, to help them gain knowledge and consolidate it in the learning process. The teacher also needs to give students information about various methods of learning a language and recording new information. Today, many techniques are known in teaching English that allow you to effectively master knowledge, among them is a universal tool - a mind map.

One of the main and significant tasks of the Federal State Educational Standard is to realize the developmental potential of general secondary education, in this regard, it is necessary to guarantee students general cultural, personal and cognitive development, to form a desire to learn, to be independent in obtaining knowledge, to be able to work in a team, and also to form in children the ability for self-change and self-development based on self-regulation and competent organization.

According to T. Buzan, a mind map is "an analytical tool that is used when it is necessary to find the most effective solution to a problem", and this technology also allows you to activate your entire intellectual and creative potential [2, p. 1].

In his book, the author of the concept compares traditional note-taking and the mind map method. Thus, the usual recording of material is characterized by

its linearity, monochromaticity, verbality, sequence, use of lists, limitations and lack of system - this method does not reflect the human thought process, does not reflect the structure of the material. The technology proposed by T. Buzan is multi-aspect, multi-color, multi-dimensional, analytical, including associations, combinations of words and images and giving free rein to the imagination [2, p. 7].

The effectiveness of using mind maps is discussed and proven in the works of many foreign and domestic researchers, for example, R. Kolenakova writes in her work that mind maps are able to bring logic to the process of studying new educational material, since they connect key information from the educational content with the process of memorizing it; therefore, the learning indicators at the level of students' actual knowledge are increased. Thus, the teacher in his work needs to pay attention to the combination of logical and graphic expression of educational material [6, p. 6].

As for the possibilities of using memory cards in lessons, a teacher can use them to:

- explain a new topic;
- systematize and structure information;
- carry out control;
- generalize knowledge;
- organize brainstorming at the stage of knowledge updating.

The student is able to:

- systematize knowledge;
- remember and learn material based on created diagrams and images;
- systematize and structure your knowledge [6, p. 5].

A mind map is an associative network that consists of images and words, and words are the basic unit of language, they are at the forefront of its study. In order to develop students' language competence, according to E.G. Azimov and A.N. Shchukin, "mastery of the system of information about the language being studied at its levels: phonemic, morphemic, lexical, syntactic"; according to N. Chomsky, "the ability to understand and produce an unlimited number of linguistically correct sentences with the help of learned linguistic signs and the rules for their combination", we propose using mind maps in teaching grammar. The advantages of this concept should also include the fact that mastery of the skill of creating mind maps facilitates the assimilation, translation, understanding and memorization of educational material, since pictures, images and associations are remembered more easily [1, p. 435].

By using mind maps in English lessons when studying grammar, a teacher can: 1) create motivation for learning a foreign language and mastering it as a means of communication; 2) organize different types of activities in the lesson: group or individual, independent, project-based; 3) develop students' creative abilities, their critical thinking, and memory [5, p. 84].

The cards must be used according to the following rules:

1. Hierarchy: movement from large to small, from the main idea (theme) to the other components.
2. Visualization: inclusion of colorful pictures, images, associations in the work, creation of students' own designations and codes.
3. Brevity and Conciseness: Expressing ideas with a minimum number of characters to fit more information.
4. A variety of shapes, colors, and structures for clarity and better memorization [3, p. 362].

According to the traditional form of education, grammar is usually taught in a linear format, that is, from a rule the teacher together with the students moves to an example, and then to practical work, exercises, but this approach to teaching grammar is increasingly causing difficulties for children who find it easier to perceive information visually, as well as those who have a divergent type of thinking. Mind maps solve this problem and allow schoolchildren to interpret the studied grammatical categories, tenses, exceptions and structures in the form of a system, including a central concept and branches that clearly demonstrate semantic connections among the material. Thus, children will be able to create an individual summary, express themselves and enjoy the lesson and, most importantly, learn the grammar material.

Considering the methodology of using mind maps in studying grammatical material and developing language competence in children in English lessons, we offer the following types of work as an example:

1. Presentation stage: the teacher explains the grammar topic to the children in the form of an already created mind map. For example, the lesson topic is "Present Simple Tense" – in the center, around the branch in accordance with the aspects: forms, usage, marker words, examples, exceptions and other features of time.
2. Collaborative mapping throughout the lesson: Students and the teacher create mind maps on the topic of the lesson, discussing all the elements and establishing connections and logical sequences between concepts.
3. Individual/pair work: children create their own maps in class (or as homework), using their own symbols and methods of encoding information to enhance memorization.
4. Repetition/reflection: at these stages, this technology can be used as a tool for preparing for tests.

Thus, mind maps in English lessons are an effective method for developing students' linguistic competence and actively teaching them grammar, since the use of the described technology can contribute to a better understanding of the material, as well as structuring and long-term memorization of information, increasing motivation in children and developing their critical thinking.

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基于“Stabilan 01-2”软硬件综合体对轻度智力障碍小学生姿势稳定性指标的分析

ANALYSIS OF POSTURAL STABILITY INDICATORS IN PRIMARY SCHOOL CHILDREN WITH MILD INTELLECTUAL DISABILITIES BASED ON THE USE OF THE HARDWARE AND SOFTWARE COMPLEX “STABILAN 01-2”

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摘要：本研究旨在评估轻度智力障碍小学生使用“Stabilan 01-2”软硬件系统进行Romberg测试时，其姿势稳定性指标。研究结果发现，与睁眼时相比，轻度智力障碍小学生闭眼时大多数姿势稳定性指标均有所下降，这表明在关闭视觉感知系统后，儿童的平衡质量功能有所下降。

关键词：小学年龄，轻度智力障碍，“Stabilan 01-2”软硬件系统，Romberg测试，平衡质量功能，姿势稳定性。

Abstract. *The aim of our study is to evaluate the indicators of postural stability according to the Romberg test of primary school children with mild intellectual disabilities based on the use of the hardware and software complex “Stabilan 01-2”. As a result of the study, a decrease in most indicators of postural stability of primary school children with mild intellectual disabilities with closed eyes was found compared to indicators with open eyes, which indicates a decrease in the function of the quality of balance of children after switching off the visual sensory system.*

Keywords: *primary school age, mild intellectual disability, hardware and software complex “Stabilan 01-2”, Romberg test, balance quality function, postural stability.*

Introduction

Currently, the number of children with mild intellectual disabilities in Russia is steadily increasing.

As of the end of 2022, the number of registered children with mental retardation in Russia was 5,275 [4].

The primary incidence rate of mental retardation in children (0-14 years old) in the Far Eastern Federal District for 2020-2022 increased by 30,8% (from 56,2 to 73,5 per 100 thousand population) [5].

This pathology, in addition to intellectual disability and reduced cognitive activity, entails a lag in the level of development of motor abilities of children, which negatively affects the socialization of such children and their quality of life in general [3].

Doctor of Pedagogical Sciences Mozgovoy V.M. (1993) in the article "Characteristics of motor disorders..." identifies disorders of the basic movements and motor abilities in primary school children with intellectual disabilities:

- violation of motor-coordination abilities - precision of movements in space; coordination of movements; rhythm of movements; differentiation of muscle efforts; spatial orientation; precision of movements in time; balance;

- lag behind healthy peers in the development of physical qualities; The author also points to the lack of dexterity and smoothness of movements; excessive stiffness and tension; limitation of the amplitude of movements in walking, running, jumping, throwing [2].

The development of coordination abilities in children with mental retardation is, of course, a significant component of the unified process of their physical and intellectual development and is considered as the basis that forms a fund of new motor skills and abilities, as a prerequisite and basis for the successful development of other physical abilities and social adaptation in general.

Due to the existing organic damage to individual structures of the brain and the uncoordinated interaction of the regulatory and executive organs, a teenager with mental retardation cannot control all characteristics at the same time.

Coordination abilities are controlled by those biological and mental functions that have a defective basis in children with intellectual disabilities (the more severe the disorder, the more serious the errors in coordination) [3].

Physical education of children with intellectual disabilities generally has a beneficial effect on the health of children, and also helps to cultivate important personality traits and prepare children for a successful independent life in society. It is important to pay special attention to coordination abilities. Modern ideas about the rational construction of the physical education system convince us that the control of one's movements and mastery of one's body depend on the development of the motor analyzer.

Therefore, a modern approach to their development requires the use of a whole range of methods and techniques within the framework of the general educational and upbringing process.

Currently, the use of hardware and software systems not only for diagnostics, but also for the development of coordination abilities is of interest. One of them is the stabilometric platform “Stabilan 01-2”, which includes not only the diagnostics of the balance quality function, but also the selection of stabilographic training games built on the principle of biological feedback (BFB) for more effective formation of coordination abilities.

Based on this, the purpose of our study is to evaluate the indicators of postural stability according to the Romberg test of primary school children with mild intellectual disabilities based on the use of the hardware and software complex “Stabilan 01-2”.

1. The experimental part

In accordance with the stated objective of this study, in March 2025, in the morning hours, in the premises of the Physical Condition Monitoring Laboratory of the Far Eastern State Academy of Physical Education, the postural stability of primary school children (9-12 years old) with mild intellectual disabilities was assessed using the hardware and software complex stabilometric platform “Stabilan 01-2”. The number of children examined was 14 people, including 4 girls and 10 boys, students of boarding school No. 4 in Khabarovsk.

The stabilometric platform “Stabilan 01-2” was used to assess the functional state of the systems for maintaining vertical posture at rest (the static component of the statokinetic function) [6].

The subjects performed the Romberg stabilographic test (test with open and closed eyes) on the stabilographic platform, which allows assessing the state of the systems for maintaining vertical posture in various variants of the functioning of sensory systems [6].

To analyze postural stability, the most informative stabilographic indices of the pressure center oscillation were selected: EllS, mm^2 – area of the confidence ellipse; VSR, mm/sec – average speed of the pressure center movement; KFR, % – quality of the balance function; Q_X, mm – spread along the frontal plane; Q_Y, mm – spread along the sagittal plane and R, mm – average spread.

The area of the confidence ellipse (EllS) is the main part of the area occupied by the statokinesigram, which characterizes the working surface of the human support area. An increase in the area indicates a deterioration in stability, and a decrease indicates an improvement.

The average speed of movement of the center of pressure (VSR) determines the average amplitude value of the speed of movement of the patient’s center of pressure during the examination. High speed indicates active processes of maintaining a vertical posture associated with a violation of the balance of one or more body systems.

The quality of the balance function (QEF) - the obtained coefficient is expressed as a percentage. The choice of this parameter is not accidental, since it

is the most stable indicator. Normally, the value of this indicator should be in the range of 100-250. If the indicator is less than 100, this indicates a negative impact of vision on the process of maintaining a vertical posture, vision worsens the balance function. If its value exceeds 250, this indicates that the patient performs the balance function mainly due to vision, and when it is turned off, the balance function deteriorates sharply. In this case, it can be assumed that the subject has vestibular or proprioceptive disorders that impair balance function. [6].

Frontal plane spread (Q_X, mm) is the average spread of oscillations of the center of pressure (CP) in one frontal plane (left-right). An increase in its value indicates a decrease in the patient's stability in this plane. Sagittal plane spread (Q_Y, mm) is the average spread of oscillations of the center of pressure (CP) in one sagittal plane (forward-backward). An increase in its value indicates a decrease in the patient's stability in this plane [1].

Average spread (R, mm) is the average radius of deviation of the center of pressure (CP). The indicator determines the average total spread of oscillations of the CP; an increase in its values indicates a decrease in the patient's stability in both planes [6].

2. Results

As a result of the conducted study, the analysis of the postural stability indicators of primary school children with mild intellectual disabilities according to the Romberg test showed that almost all indicators with open eyes significantly worsened compared to the indicators with closed eyes, which indicates a decrease in the control of maintaining balance in children after switching off the visual sensory system.

Thus, the spread along the frontal plane (Q_X) with open eyes on average had a reliable deterioration compared to this indicator with closed eyes by 0,9 mm (the percentage increase was 24,3%) ($p < 0,05$) (Table 1). On average, this indicator with open and closed eyes was normal in the examined children, but in three boys with open eyes it was conditionally normal and in one boy with closed eyes this indicator increased from 8,6 to 20,2 mm and became abnormal.

The spread in the sagittal plane (Q_Y) with open eyes in the examined children, although it tended to deteriorate compared to the indicator with closed eyes by 0,5 mm, did not have a reliable difference. On average, this indicator in children with open and closed eyes was conditionally normal, and in four boys this indicator with open eyes was not normal and the highest indicator was 17,2 mm and in 4 boys it was not normal with closed eyes and the highest indicator was 10,7 mm.

Table 1

Indicators of postural stability in primary school children with mild intellectual disabilities

Indicators Romberg test	March 2025	
	Children of primary school age with mild intellectual disabilities	
	Open eyes	Closed eyes
Q_X (mm)	3,7±0,5	4,6±1,5
Oy (mm)	5,3±0,2	5,8±0,6
R (mm)	5,5±0,8	6,45±1
V cp (mm/sec)	14±2,6	17,65±2,8
S_{EllE} (mm^2)	366,2±163,5	438±172,3
CFR (%)	127,5±9,3	

The average radius of deviation of the center of pressure (CP) or average spread (R) with open eyes in the examined children on average had a reliable deterioration compared to this indicator with closed eyes by 0, 95 mm (the percentage increase was 17,3%), which indicates a decrease in the stability of children in both planes. On average, this indicator in children with open eyes and closed eyes was conditionally normal, but in five boys this indicator with open eyes was not normal and the highest indicator was 12,9 mm and with closed eyes in five boys it was not normal and the highest indicator was 10,3 mm and only in five children, of which three girls and two boys this indicator was normal.

Another indicator, such as the average speed of movement of the center of pressure (VSR) with closed eyes also significantly worsened by 3,65 mm / sec compared to the indicator with open eyes (the percentage increase was 26%), which indicates an increase in the active processes of maintaining a vertical posture due to the shutdown of the visual sensory system. So, on average, this indicator was normal for most children with open eyes, but not normal for two boys and the highest indicator was 38 mm / sec and for two boys it was conditionally normal and an average of 17,3 mm / sec, and with closed eyes this indicator was conditionally normal for most on average, but not normal for three boys and the highest indicator was 43,6 mm / sec and only for two boys and girls this indicator was normal.

The area of the confidence ellipse (EllS) with closed eyes significantly increased by 71,8 mm^2 compared to the indicator with open eyes (the percentage increase was 19,6%), which indicates a deterioration in stability when control is switched off from the visual sensory system, and on average this indicator in the examined children with open and closed eyes indicates an increase in the area of support on the stabiloplatform to maintain and preserve balance, but in three boys this indicator is not normal and in one it is on average 549,85 mm^2, and in

two it increases from 486,9 to 841,18 mm^2 and from 2130,4 to 2241,3 mm^2 and in one boy this indicator is quite low and on average is 66,75 mm^2, which indicates a better ability to maintain balance with a decrease in the area of support on the stabiloplatform.

And finally, the indicator of the quality of the balance function (QFB) in children is on average quite good – 127,5%, but it is mainly achieved by increasing the average speed of movement of the center of pressure (VSR) and the working surface of the area of support of a person on the stabiloplatform, and for two boys it was 185 and 203%, and for one girl (86%) and a boy (88%) this indicator is less than 100%, which indicates a negative impact of vision on the process of maintaining a vertical posture.

3. Conclusion

Thus, the conducted study showed a decrease in most indicators of postural stability of primary school children with mild intellectual disabilities with closed eyes compared to indicators with open eyes, which indicates a decrease in the balance quality function after switching off the visual sensory system. Of the six indicators, the sagittal plane scatter indicator (QY), the average scatter (R) with open and closed eyes were conditionally normal, the average speed of movement of the center of pressure (VSR) with closed eyes was conditionally normal, and an increase in the support area on the stabiloplatform while maintaining balance in the examined children indicates a decrease in the balance quality function.

All this indicates the need to develop a method for improving the vestibular stability of primary school children with mild intellectual disabilities to develop their coordination abilities with the inclusion of special training games on the hardware and software complex “Stabilan 01-2” to correct the balance quality function.

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学习外语时的错误。纠错的概念及其在继续教育学生外语教学中的作用

MISTAKES IN LEARNING A FOREIGN LANGUAGE. THE CONCEPT OF ERROR CORRECTION AND ITS ROLE IN TEACHING A FOREIGN LANGUAGE TO STUDENTS OF ADDITIONAL EDUCATION

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注释：本文致力于研究小学生在外语学习过程中犯错这一积极现象。本文概述了错误、错误类型、错误分析以及处理错误的现代方法、错误原因和纠正方法。此外，本文还探讨了监控的概念及其在学生错误分析中的有效应用。本文介绍了现代错误术语“error”（错误），并提出了一种理论，认为错误在外语学习中应被视为积极因素而非不利因素。作者强调了犯错作为学习和提高语言水平的积极动力，以及正确发音比语法结构更重要。错误的概念被视为与语言互动及其在口语（包括书面语和口语）中的运用的指标——它是在学习过程中通过尝试、实验和风险走出舒适区的一种方式。本文以俄语为例，阐述了从弱错误、强错误到中介语错误的各种错误类型，以及母语对外语学习的影响。本文探讨了母语对外语学习的影响之间的联系，以及错误监控的策略和方法。此外，本文还介绍了关于外语学习自我控制和提升以及克服学习过程中错误的信息资源和教育平台。

关键词：外语言语活动、错误分析、监控、中介语错误、听力语言学方法、教育平台。

Annotation. *The article is devoted to the study of the problem of making mistakes among schoolchildren in the process of learning a foreign language as a positive phenomenon. The article presents a general description of errors, types of errors, their analysis and modern methods of dealing with errors, their causes and ways of correction. The concept of monitoring and an effective way of its application in the analysis of errors among students are considered. The article presents the modern error term “error” and the theory according to which mistakes should be considered as a positive aspect in learning a foreign language, and not as a disadvantage. The authors highlight the positive dynamics of making mistakes as a means of learning and improving the level of language, as well as the importance of correct pronunciation over grammatical structures.*

The concept of error is considered as an indicator of interaction with language and its use in speech, both in writing and orally — it is a kind of way out of the comfort zone in learning, through trial, experimentation, and risks throughout the educational path. The types of errors from the term weak and strong errors to interlanguage errors and the influence of the native language on learning a foreign language are described using the example of the Russian language. The links between the influence of the native language on learning a foreign language, as well as strategies and approaches for error monitoring, have been established. Information resources and educational platforms on self-control and improvement in learning a foreign language and overcoming mistakes in the learning process are presented.

Keywords: *foreign language speech activity, error analysis, monitoring, interlanguage errors, audio linguistic methods, educational platforms.*

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The process of learning English is long-term, interesting, and requires cognitive, physical effort, and patience. The key role of mistakes made by students should not be underestimated. It is a natural phenomenon and using the right productive and positive approaches will make learning effective and stress—free. The main concept is error analysis, not the dominant role of the teacher , not as a supervisor , but as an assistant for the student.An approach using game and training techniques and exercises, various forms of joint error analysis, their analysis and traditional error correction are the components of the so-called positive approach mistakes analyses.

For the first time, the term error in the modern language “error” was introduced by Professor of Applied linguistics S.P.Corder.His theory is that mistakes are seen as a positive aspect in learning English, not as a disadvantage .(“Error Analysis and Interlanguage”1981).

The problem of errors is widely discussed in the works of Russian and foreign scientists such as L.V.Shcherba, Z.M.Tsvetkova, S.N.Zeitlin, R.P.Milrud, I.A.Zimnaya, V.D.Arakin, G.A.Kitaygorodskaya. S.P. Corder.,K.Lochtman, and others.Based on the article by I.A.Oskolkova, common lexical, grammatical and phonetic errors include the so-called hidden errors, semantically or stylistically incorrectly formed language forms.”Global errors” are severe errors that lead to a complete distortion of meaning , which leads to a misunderstanding of information, for example, when pronouncing English homonyms - “hour” , which means hour , and our , which means “our” in English.Weak errors (local errors), incor-

rect use of grammatical or lexical language structure. Another equally important factor is interlingual errors and intralingual errors.Interlanguage errors occur as a result of the influence of the native language.For example, the absence of irregular verbs in Russian, or grammatical forms such as Future in the past, Present Perfect, etc. Intra-linguistic errors relate to the process of specific acquisition of a foreign language.

Cognitive difficulties such as learning and memorizing rules are one of the obstacles to learning English, but well-chosen exercises and methods help make this process less difficult and even exciting.The method of repeated repetition in the lesson, the use of oral anticipation, and the creative approach of the teacher make it easier for students to learn the material using the example of the English language.

It is believed that mistakes are an indicator of interaction with language and its use in oral and written speech and getting out of the linguistic comfort zone through trials, experiments and risks throughout the educational process.It is precisely this kind of language application that is key to mastering and improving the English language. The second important factor in making mistakes is the development of language skills among students, the correct correction of mistakes by both the teacher and the use of such a method as monitoring.

First of all, mistakes are an indicator of interaction with language and its use in speech, both written and oral. This is a kind of way out of the comfort zone in learning by trial, experiment, and risk throughout the educational process. Such active participation in language acquisition is key to achieving progress in both improving and raising the level of the language. The second important factor in making mistakes is the development of language skills such as feedback and correct correction of mistakes by the teacher.-monitoring. and the discussion of mistakes in both group and individual approaches. The etymology of monitoring is based on such long-known words as monitoring, a multi-valued concept that originally meant to instruct, advise, warn, exhort, and monitor, Latin for reminiscent, overseer, which has a closer modern meaning - tracking some objects and phenomena.

An important method widely known, very effective, but, unfortunately, little used in teaching foreign languages is the oral advance method. The use of this method in the author's methodology has shown its effectiveness. Familiarization with grammatical structures in oral speech long before studying them, using them in speech and writing, gives excellent results. Consider the study of irregular verbs - everyone knows that this is a long and complex process.But if you start studying them 2-3 months before the start of this topic - using rhymes and songs with irregular verbs -without focusing on their significance, but rote memorization and in three forms at once, then by the time the study of the past tense begins, students will already own them. This method is a kind of breakthrough in grammar.

In the learning process, the role of the teacher as a leader in teaching a foreign language is to correct the learning process and provide linguistic and psychological support to students. Especially in the process of correcting errors and working through them. A clear understanding of what has been corrected precludes the possibility of their repetition.

I would like to note that language and culture are a single component in the learning process. Language and culture are an integral part of the language learning process and are inextricably linked. By learning a language, the student immerses himself in the culture of the country of the language being studied and opens up a new world. Kaisyn Kuliyev: "Every eye is a whole world."

Immersion in the language, and therefore in the culture of the language being studied, traditions, customs and nuances. These cultural aspects are necessary for effective communication in the context of the culture of the language being studied.

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19世纪末至20世纪初俄罗斯P.F.莱斯加夫特体育教育体系的形成

FORMATION OF THE SYSTEM OF PHYSICAL EDUCATION OF P.F. LESGAFT IN RUSSIA IN THE LATE 19TH - EARLY 20TH CENTURIES

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摘要：本文致力于研究19世纪末20世纪初俄国P.F.莱斯加夫特（P.F. Lesgaft）所创立的体育教育体系的形成。P.F.莱斯加夫特指出：“正确的体育教育不仅能提高和改善人的身体素质和能力，而且有助于形成人的心理素质。”

关键词：体育史、体育教育、体育教育。

Abstract. *The article is devoted to the study of the formation of the physical education system formulated by P.F. Lesgaft in Russia in the late 19th – early 20th centuries. P.F. Lesgaft noted that “correct physical education not only increases and improves the physical qualities and abilities of a person, but also contributes to the formation of mental abilities of people.”*

Keywords: *history of physical education, physical education, physical education.*

In the history of Russian pedagogical science, the name of P.F. Lesgaft is associated with medical, pedagogical, and social activities. He is known as an innovator of progressive ideas and creative developments in the field of physical education, anthropology, medicine, and family education. His scientific and pedagogical activities had a significant impact on the development and formation of Russian education as a whole [10].

In the second half of the 19th century, the idea of personal improvement “was formed as a way for society to emerge from its spiritual and moral crisis, as a way to solve the problems of the physical health of the population (in particular, the high mortality rate among children and adolescents), as a search for ways to reform the education system, social relations, and the formation of a new person combining physical, spiritual, and moral qualities” [3, p. 104].

Since 1872, while working as a consulting physician in the private medical and gymnastic institution of Dr. A.G. Berglind, P.F. Lesgaft first became interested

in the development of the theory and practice of physical education, the relationship between physical and moral improvement, and the comprehensive study of individual human characteristics, publishing the article “Fundamentals of Natural Gymnastics” (1874).

“The task of gymnastics…,” writes P.F. Lesgaft in this work, “is: 1) to promote the correct development of our body; 2) to increase the physical strength of the body; 3) to promote the correct functioning of individual organs of our body, for example, the respiratory, digestive, etc.” [5, 6].

In addition, according to P.F. Lesgaft, “gymnastics should also promote the correct development of the body shape and thereby satisfy the aesthetic sense” [9], which corresponds to the idea of personal improvement, which increasingly occupies the scientist-teacher.

Since December 1874, the scientist applied his experience of using the hidden reserves of gymnastics, which are most useful, especially for children and adolescents, to the students of the Second Petersburg Military Gymnasium. Pyotr Frantsevich began to develop his own method of rational gymnastics, which, as he believed, could allow achieving a greater effect and was free from a number of erroneous provisions of the Swedish, German and other gymnastics systems.

He was also attracted by the desire and opportunity to place the teaching of gymnastics on a scientific basis, the foundation of which should be anatomy and physiology. Lesgaft wrote that “only knowledge of the needs and capabilities of the human body, only a scientific approach to conducting any type of gymnastics can make it a great tool in improving a person, both physically and morally” [12, p. 67].

During 1875-1876, from the end of March to the end of October, Pyotr Frantsevich worked abroad “for detailed familiarization with pedagogical gymnastics and with institutions for the special training of teachers of this art.” In the remaining months, Lesgaft P.F. continued his special classes with individual groups of students of the Second Petersburg Military Gymnasium according to the German and Swedish systems, as well as according to the system proposed by himself.

Over the course of two years, P. F. Lesgaft traveled to 13 European countries, visited 26 cities, and visited all institutions of this profile. He attended classes, talked with heads of institutions, teachers, and medical workers, studied the structure of gymnastic equipment used during classes, and even gave his recommendations for improving their design. As a result, Pyotr Frantsevich notes the inconsistency of foreign physical education systems, which, from his point of view, is primarily due to the poor training of teachers.

The general conclusion that Lesgaft comes to as a result of a critical study of various systems for training gymnastics teachers in Western European countries is expressed in the following position: “In general, when teaching gymnastics, they

are guided... in many countries only by apparent principles and conscious actions, but in reality, there is nothing else here except imitation and repetition of randomly collected exercises" [11].

According to P.F. Lesgaft, "correct physical education not only increases and improves a person's physical qualities and abilities, but also contributes to the development of people's mental abilities" [1, p. 85].

In his article "Physical Development in Schools," he regretfully notes the fact that in matters of education, the physical development of the young generation is, as a rule, left aside from its mental development. But "both mental and physical development should equally occupy us and should proceed from completely identical foundations; only in this case can we hope to achieve a more harmonious whole, and along with this, greater stability and consistency in the manifestations of the person being educated <…> The physiological law, positively established for the development of human physical strength, also has its full application in relation to the development of his mental strength" [8, p. 241].

Later, P.F. Lesgaft substantiates his idea of the relationship between mental and physical education in his classic work, "Guide to the Physical Education of School-Age Children" (the first part was published in 1888, and the second in 1901), which is fundamental in the development of the science of physical education and training. "It is precisely the absence of physical education in schools that indicates that there is no clearly established goal, no ideals," the scientist notes, referring to the system of physical education in ancient times, "in school they have completely forgotten what physical education is, which at one time was the only mandatory task in school" [7, p. 339].

In his work "Physical Development in Schools", P.F. Lesgaft points out that "in the school issue, both mental and physical development should occupy us equally and should proceed from completely identical foundations; only in this case can we hope to achieve a more harmonious whole, and along with this, greater stability and consistency in the manifestations of the person being educated" [8, p. 241], and further notes that even "in the gymnasiums of ancient Greece they tried ... to educate citizens familiar with life, strong both morally and physically" [8, p. 243].

In matters of education and training, Lesgaft attached great importance to the environment in which a person lives and develops: "The task of education ... is great! It can be fully accomplished only when a child is brought up in an appropriate environment from an early age" [4, p. 265]. He pays special attention to the school environment: "In order for a young person to develop firm and reasonable convictions and make truth the basis of his actions, he must first of all consciously control himself. It is at school that we must teach a young person to control and manage himself both mentally and physically" [4, p. 266].

As S.V. Yananis notes, "Lesgaft was the first scientist, biologist and teacher, who singled out the very idea of physical education from the general tasks of

physical culture, thereby emphasizing that the purpose of physical exercise is by no means limited to physical development.

According to Lesgaft himself, the task of physical education is "to limit the arbitrariness of a young person's actions, so that in complete harmony with mental development, he is taught to consciously relate to his actions and to perform his work with the least possible expenditure of material and effort." In this formulation by Lesgaft, the main idea of physical education is striking - the development of self-control and economy in work. In practice, the solution of these problems was achieved, according to the ideas of his students, by somewhat peculiar and original methods: performing physical exercises according to the word and developing in students the skills of submission and strict adherence to the rules of the game" [13, p. 118].

Grantin K.K. points out that "Lesgaft P.F. assigns an important role in the implementation of physical education to the children themselves, considering their independent activity, self-education and self-development to be extremely important" [2, p. 87].

To sum up the above, it can be noted that the doctrine of the unity of physical and spiritual development of the individual is the basis of the pedagogical system of P.F. Lesgaft.

Pyotr Frantsevich shared views on the need to reform education and upbringing, which corresponded to the aspirations of many progressive thinkers fighting for social change and improving living conditions.

He emphasized the importance of physical education as a means of forming an active and responsible personality. In this context, his ideas about the harmonious development of man, the combination of mental and physical education, echoed democratic ideals that emphasized the importance of education for all strata of society.

Lesgaft P.F. advocated for the accessibility of education, an individual approach to students, and the development of critical thinking. His approach to physical education included not only teaching skills, but also cultivating such qualities as discipline, responsibility, and civic engagement, which also corresponded to the spirit of democratic changes of that time.

Anatomist, biologist-teacher, and scientist Lesgaft integrated the ideas of natural science into his teaching practice, emphasizing the importance of a scientific approach to teaching and upbringing, as well as the need for harmonious development of the individual through physical education. He considered physical exercises as a means of not only physical, but also intellectual, moral, and aesthetic development of a person. He also believed that physical education should be based on scientific knowledge about a person, his physiology, and psychology, which contributed to the formation of a holistic education system. This is probably why

the physical education system created by P.F. Lesgaft at the turn of the 19th and 20th centuries is relevant in the modern world.

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斯拉夫浪漫主义背景下的《白俄罗斯方言词典》，I. I. 诺索维奇著（1870年）
«DICTIONARY OF THE BELARUSIAN DIALECT» BY I. I. NOSOVICH (1870) IN THE CONTEXT OF SLAVIC ROMANTICISM

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摘要：伊•伊•诺索维奇试图通过词典对白俄罗斯语词汇和短语的归纳整理，将所谓的“白俄罗斯方言”呈现为一种独立的语言，同时将其纳入斯拉夫语境。这一愿望源于普遍的历史趋势，也反映了当时的文化和社会需求。

关键词：民族词典学，白俄罗斯语，斯拉夫浪漫主义，民族意识。

Abstract. *I.I. Nosovich, using dictionary fixation of the vocabulary and phraseology of the Belarusian language, sought to present the so-called “Belarusian dialect” as an independent language and at the same time include it in the Slavic context. This desire was caused by general historical trends and reflected the cultural and social demands of the time.*

Keywords: *national lexicography, Belarusian language, Slavic romanticism, ethnic consciousness.*

A native of Belarus, Ivan Ivanovich Nosovich (1788-1877) is known in Belarusian science as a folklorist, ethnographer, and also the compiler of the first Belarusian dictionary of national scale - “Dictionary of the Belarusian Dialect” (St. Petersburg, 1870). The purpose of the article is to describe the nation-forming components of I. I. Nosovich’s dictionary in a cultural and historical context.

I. I. Nosovich’s dictionary has a nation-forming character, since it includes in its register material such lexical units that indicate the psychological and cultural unity of native speakers at different stages of the historical development of the nation and express their ethnic self-awareness - proverbs, sayings, ethnostereotypes, information about customs and rituals.

It is necessary to point out the pan-European socio-historical context within which the dictionary was created, as well as works of this level and significance in general. The second half of the 18th and the beginning of the 19th centuries are

the Age of Enlightenment in Southern and Eastern Europe (in France, England and Western Europe as a whole - this is the middle and second half of the 18th century) [The Age of Enlightenment in Belarus 2003, p. 3]. The following social tendencies are characteristic of this era: idealistic ideas about the role of consciousness in the development of society, the desire to explain social shortcomings by the lack of education of people, the desire to reorganize society, politics, morals, and everyday life by spreading scientific knowledge, ideas of kindness and justice, which led to the creation of unified education systems, the spread of science and art [The Age of Enlightenment in Belarus 2003, pp. 3-4]. The second half of the 19th – early 20th centuries still chronologically belong to the Enlightenment, but it was then that the concepts of I. Herder and W. von Humboldt arose, which are often classified as romanticism, since both philosophers began to talk about the "spirit" of individual peoples. The sphere of language and speech moved to a priority position among the humanitarian studies of that time, and W. von Humboldt proposed the idea that language plays a much greater role than just a system of signs for the mechanical transmission of information. Languages are national and different from each other, so we need to talk about the unique specificity of national characters, which are expressed in history and products of spiritual life [Perlov 2007, p. 59].

The wave of Slavic romanticism approached the Eastern Slavic peoples. This was especially evident in the 1840s and late 1860s during preparations for the First Slavic Congress in Russia, when the idea of a common Slavic language was revived, which meant, in addition to the old bookish speech, also modern speech, something common to many living Slavic languages, something that each Slavic language carried through the Middle Ages. Slavic ties were not only a form of scientific contacts, but also a form of assistance to the national liberation movement of the 1860s. The St. Petersburg Academy of Sciences and Russian Slavists in general supported the steps of Slavic scholars. An example of such, in modern language, ethnic discourse, popular in those years, can be considered the statement of I. I. Sreznevsky (1842): *"We, whoever we are, Russians or Poles, we must love and respect other Slavs as our brothers. We must love Slavism in all its scope, because we are Slavs; without this we cannot have true love, true respect for ourselves; this is a moral duty, our direct human duty, the duty of love of relative for relative, brother for brother"* [cit. from: Domestic lexicographers of the 18th – 19th centuries. 2000, p. 143].

In the first half of the 19th century, heightened national feelings in the South Slavic lands caused a genuine explosion of public interest in folklore. A special feature of the attitude of Slavic figures to folklore was that they had in their field of vision not only domestic, but also all Slavic folklore. This was due to the widespread dissemination at that time of the idea of Slavic reciprocity. In a conserva-

tive environment, folklore was perceived and used as evidence of feudal antiquity, confirmation of its inviolability, as material for mystical views. With the formation of national cultures, the nature of the interaction between professional creativity and folklore changed. The connections between them not only expanded, but the appeal of cultural figures to folk art became conscious and purposeful.

The interest of scientists in national culture, "initially associated with the ideas of romanticism and deepened along with the development of ethnography, dialectology and folklore and other related sciences" [Plotnikova 2000, p. 10], determined the ethnolinguistic content of a number of national-scale dictionaries. Each of these dictionaries reflected pictures of the material life and spiritual culture of its people, but one should also take into account the differences in these works, conditioned by the "philosophy and style of the era in which the process of creating a nation took place, the specifics of the social structure of the society of this nation, the uniqueness of the education system at different stages of historical development" [Germanova 2000, p. 26], in other words, the peculiarities of the historical and cultural process in the country. Speaking about the ethnic discourse in relation to Belarus, it should be recalled that after the partitions of the Polish-Lithuanian Commonwealth, the Belarusian lands, along with the Polish and Ukrainian ones, ended up in the Russian Empire. Thus, Russians and Belarusians were artificially united in one state, and the Belarusian lands automatically fell under the propagandized study of Slavism. I would like, however, to note a certain one-sidedness and incompleteness of the study of the Belarusian lands by Russian scientists. Even the work in the so-called "Western Russian region" of the expedition of the 1860s of the Geographical Society, which was supposed to describe "the tribal and everyday differences of the peoples of the western region, their numerical relations, distribution by religion and levels of culture, and finally, economic life and level of material well-being" [Pypin 2005, p. 213], also did not contribute to the final establishment of the independence of the Belarusian language and Belarusian culture in general: *"The figures of the 1860s in the western region talked so much about "unification," "Russification," etc., so zealously insisted on removing everything local that resembled "Polish" influence, so zealously considered everything that was not similar to Moscow to be Polish, that local life began to hide in a shell, and learned researchers (especially those previously alien to the region) would have to search for its manifestations with difficulty, instead of seeing it immediately with their own eyes without the office screens"* [Pypin 2005, p. 215]. Moreover, the attitude of official Russia towards the population of the Belarusian lands was imbued with confidence in their indifference and underdevelopment. According to the Governor-General of Vilno V.I. Nazimov, *"...if Russian [i.e. "If the predominantly Belarusian] population in the Western provinces cannot yet be called moribund, then we will not be mistaken when we say that the*

vital force has not yet awakened in it; moreover, the feelings of national identity are in such a joyless lethargic slumber that, following the coming awakening, it [the people] will follow with equal readiness both Russian-Orthodox and Polish-Catholic propaganda" [cit. from: Dolbilov 2005, p. 139].

In this aspect, the "Dictionary of the Belarusian Dialect" by I. I. Nosovich can be considered. Not only the lexical material of this source is important, but also the chronology of its publication. In particular, both in the first and second half of the 19th century there was no unity in the views on the Belarusian language: some researchers (S. B. Linde, M. Maksimovich) considered it an independent Slavic language, others (I. Sreznevsky, A. Sobolevsky) considered it a dialect of either Russian or Polish. Despite this, the ethnographic study of Belarus revealed a rich ancient written heritage of the Belarusian people, which needed analysis and lexicographic systematization.

Dictionary of I. I. Nosovich, planned by the Imperial Academy of Sciences as the second part of the "Attempt at a Dictionary of Regional Dialects", was published in St. Petersburg in 1870 as an independent work. I. Nosovich was commissioned to compile a dictionary that would systematize the vocabulary of the living folk dialect and would simultaneously be a source for linguistic research of the Belarusian language and a guide to reading ancient written monuments "in view of the conscious need to have a dictionary of this dialect [the Belarusian language - I.K.] at hand, including for understanding important and interesting historical acts written in it" [Nasovich 1983, introduction by K. Veselovsky]. The main sources for the dictionary were I.I. Nosovich's own notes, as well as materials from the "Alphabetical Index of Old Belarusian Words" that he had previously compiled. In addition, many words were from old Belarusian written sources and the few folklore and ethnographic publications of that time. However, as a result of working on the vocabulary of the so-called "dialect", I. I. Nosovich achieved a much greater goal: the collected verbal material recorded not just a "dialect", but an independent language capable of producing units suitable for various communicative tasks. "The Dictionary of the Belarusian Dialect" laid the foundation for the normalization (codification) of the vocabulary of the Belarusian literary language and is the first Belarusian national dictionary. It was the most complete collection of vocabulary and phraseology of the living Belarusian language at that time, which covered more than 30 thousand words of Belarusian speech of the 19th century, recorded in the Mogilev, Vitebsk and Minsk provinces and providing extensive information about the material and spiritual culture, life, confessional and social structure of the population of the Belarusian lands [Savitskaya 2020, pp. 199-208]. In his dictionary, I. Nosovich included words and phrases that express mythological views and ethnographic characteristics of the Belarusian people as register units and components of illustrative material. This dictionary reflects var-

ious groups of vocabulary that characterize the life of the Belarusian people in the 50-60s of the 19th century, including the vocabulary of folk crafts - fishing, beekeeping, cooperage, iron processing, etc. The distinctiveness of the Belarusian language was emphasized not only by historical and regional commentary, which gave the dictionary a certain historical and cultural value, but also by linguistic analysis of many register units, according to which the lexemes either showed themselves to be different in comparison with other languages, or acquired Belarusian phonetic or grammatical specificity when borrowed.

The preface to I. I. Nosovich's dictionary lists the following sources of lexical material: a) monuments of oral folk literature: songs, proverbs, sayings, fairy tales, etc.; b) collections of words collected by him during his travels through the Mogilev, Minsk and Grodno provinces and some outskirts of the provinces of the Vistula region bordering on the above-mentioned provinces; c) an alphabetical index of old Belarusian words from the Acts of Western Russia, which Nosovich compiled on behalf of the Department of Russian Language and Literature of the Imperial Academy of Sciences; d) the experience of a regional dictionary of the Great Russian dialect, which included several small collections of words of the Belarusian dialect; d) a few materials on Belarusian literature published in the Izvestiya Imperial Academy of Sciences in the Department of Russian Language and Literature, in the Works of the Moscow Society of Literature Lovers, in the Ethnographic Collection of the Imperial Russian Geographical Society, in collections of Belarusian folklorists and ethnographers Ya. Chechot and R. Zenkevich [Nasovich 1983, preface].

The extensive system of author's notes, I.I. Nosovich's attention to the stylistic differentiation of words testify to the emergence of the Belarusian lexicographic tradition in its modern understanding and to the scientific, philological analysis of common vocabulary. This gives grounds to assert that the Dictionary of the Belarusian Dialect laid the foundation for the normalization (codification) of the vocabulary of the Belarusian literary language and is the first Belarusian national dictionary. The dictionary of I.I. Nosovich was started as "An attempt at a dictionary of regional dialects" (italics ours - I.K.), but in the process of compilation it turned into a "Dictionary of the Belarusian dialect". I.I. Nosovich, having placed the names of mythological and ethnographic realities in the dictionary, which was published as a strictly scientific work, thus "legitimized" the folklore and spiritual authenticity of the Belarusians among the peoples of the Russian Empire. The folklore basis of the register, the desire to show the ethnic originality of the nation, the compiler's interest in national culture, initially associated with romantic tendencies, deepened along with the development of ethnography, dialectology and other border sciences, which gave rise to the ethnolinguistic content of the work. The desire of I.I. Nosovich to distinguish his language from other languages, to

include it in the general Slavic context and at the same time – the urgent need to stand out from the borders of "West Russianism" were caused by the general educational-romantic wave of studying the spiritual heritage of the people and the historical tendency towards consolidation of the nation.

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使用基于人工智能的教育工具的伦理影响
ETHICAL IMPLICATIONS OF USING ARTIFICIAL INTELLIGENCE-BASED EDUCATIONAL TOOLS

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注释：本文简要分析了将人工智能引入教育过程所面临的关键伦理挑战，即：1）学术欺诈；2）版权问题；3）评估形式化；4）学习者自主性降低；5）隐私和数据保护；6）算法偏见问题；7）人工智能价值中立问题。未来，人工智能将成为教育体系的关键要素，彻底改变学习方式。然而，为了成功整合人工智能，必须认真思考实施策略，并制定监管体系，以最大程度地减少可能产生的负面影响。

关键词：人工智能（AI）、人工智能在教育中的应用、教育工具、教育体系、教育理念、伦理问题、负责任地使用人工智能在教育中的应用。

Annotation. *The article presents a brief analysis of the key ethical challenges that arise when introducing AI into the educational process, namely: 1) academic fraud; 2) the problem of copyright; 3) formalization of assessment; 4) reduction of learners' independence; 5) privacy and data protection; 6) the problem of algorithmic bias; 7) the problem of AI value neutrality. In the future, artificial intelligence (AI) will become a key element of the educational system, transforming approaches to learning. However, for successful integration of AI, it is necessary to carefully consider the implementation strategy and develop a regulatory system to minimize possible negative consequences.*

Keywords: *artificial intelligence (AI), use of AI in education, educational tools, education system, philosophy of education, ethical issues, responsible use of AI in education.*

Relevance. Currently, AI technologies are actively penetrating various areas, including healthcare, industry, economics and, of course, education. In recent

years, special attention has been paid to the use of AI in the educational process, since digital transformation opens up many technological and didactic opportunities for higher education, such as neural networks, chatbots, virtual assistants, virtual and augmented reality, big data analysis, etc. [3]. Thanks to digital technologies, students and teachers master innovative methods of searching and processing information, organizing the educational process, monitoring learning outcomes, automating learning tasks, individualizing and personalizing learning. However, along with these advantages, serious ethical issues arise that require careful consideration [2].

Research methods. The basic method is the method of philosophical analysis, which allows us to identify and structure the main ethical dilemmas.

Discussion of the problem. Let us consider the main ethical issues associated with the use of AI in the Russian education system.

1. Academic fraud. Bermus A.G. [1] describes various manifestations of illegal actions: plagiarism (appropriation of someone else's authorship); manipulation of text to bypass uniqueness checks; "copy-paste" (unauthorized use of excerpts from other sources); ghostwriting (custom-made works presented as one's own); falsification of data in scientific research, i.e., distortion or inclusion of knowingly false information in the author's texts; creation of pseudoscientific texts, etc. Such practices destroy the foundations of education. When a student simply copies a text created by artificial intelligence or purchases a ready-made work, he or she is deprived of the opportunity to gain valuable knowledge and hone the necessary skills. In turn, if the work is not the result of the student's personal efforts and understanding, the diploma received loses its value. This not only devalues education, but also creates unfair competition for conscientious students.

2. The issue of copyright. The active implementation of AI in the educational process raises important questions regarding copyright and intellectual property rights. On the one hand, AI can be considered a tool similar to an artist's brush or a writer's pen. In this case, the author should be considered a person who sets the parameters and directs the creation process. On the other hand, AI is capable of independently generating content using huge amounts of information, including copyrighted materials. If AI develops teaching aids or helps students with assignments, who owns the rights to these works? Existing legislation does not provide clear answers to this question. It is necessary to develop clear rules defining the rights and responsibilities of all parties involved in the process of creating and using AI-based educational content.

3. Formalization of assessment. Automation of assessment and feedback using AI can significantly save teachers' time. However, excessive reliance on algorithms when assessing work can lead to bias and suppression of creativity. It is important to preserve the role of the teacher as an expert who is able to assess

work comprehensively and take into account the context, because feedback should be constructive, personalized and guide the student towards further development. There is also an increased risk of replacing personal communication with virtual communication, which can lead to a decrease in the level of development of social skills and a loss of emotional connection in the learning process [5].

4. Reduced learner autonomy. There is a serious danger that students will develop an excessive attachment to neural networks, which will negatively affect the development of critical thinking and independent learning skills. Students who are accustomed to instant answers to questions provided by artificial intelligence risk losing the ability to independently search, analyze, and evaluate information. Instead of deeply studying the material and comprehending complex ideas, they may be satisfied with a superficial understanding based on ready-made answers from AI. This is especially risky when AI provides inaccurate or biased information, which can lead to the formation of false ideas and beliefs. The ability to critically evaluate information, distinguish facts from subjective opinions, and identify logical errors becomes less important when students rely on algorithms without thinking about the process of acquiring knowledge.

5. Confidentiality and data protection. In the educational process, AI actively uses students' personal data, including their academic achievements, behavioral characteristics, and even emotional reactions during learning. The collection and processing of this data is intended to adapt the educational process to the individual needs of each student. However, there are issues related to privacy and security. Insufficient protection of this data can lead to its leakage or use for commercial purposes, which violates students' rights to privacy [8]. Long-term storage of data also creates a risk, as it increases the likelihood of its compromise.

6. The problem of algorithm bias. Artificial intelligence develops its skills by analyzing certain sets of data, and if the data is biased, the algorithm only exacerbates the existing shortcomings. Bias can come from subjective assessments in historical data, unrepresentative samples, personal beliefs of developers, and incorrect assessment criteria. This phenomenon can lead to discrimination against certain groups of students when assessing their potential or in the process of providing educational services, manifesting itself, for example, in biased assessment of students' work or ignoring the individual educational needs of different categories of students [7]. Such bias can form a distorted perception of students' own abilities and capabilities.

7. The problem of value neutrality of AI. More serious ethical questions concern the value neutrality of AI. There is a possibility that intelligent systems will implement or acquire, as a result of deep learning, values that were not intended by their creators, which calls into question the idea of the value neutrality of technical systems [6]. Scientists are developing various concepts of the "axiology of

technology", for example, the integration of artificial intelligence into a complex system of value interaction between people to achieve human-dimensionality of complex technical systems. Human-dimensionality in this context is understood as the correspondence of the system to the values of man and society [4].

Conclusions. The ethical aspects of implementing AI in the educational process are complex and require comprehensive analysis. Implementing artificial intelligence in education is not just a plan for the future, but an ongoing practice. Therefore, it is important now for teachers, software developers, government officials, and students to work together to develop uniform rules for the use of AI in education that take into account the principles of responsibility and fairness.

Only cooperation will allow us to successfully solve this problem and preserve the importance of traditional education in the era of AI. It is necessary to guarantee the clarity of algorithms, the security of personal data, and the preservation of the role of humans in education. Only in this case will AI become a reliable assistant in learning, an effective tool for improving the education system and training qualified and thinking people.

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团体训练干预对降低大学一年级学生学业适应期焦虑的有效性
THE EFFECTIVENESS OF GROUP TRAINING INTERVENTIONS IN REDUCING ANXIETY AMONG FIRST-YEAR UNIVERSITY STUDENTS DURING ACADEMIC ADAPTATION PERIOD

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摘要：本研究探讨了团体训练对降低大学新生在学习适应期焦虑水平的有效性。理论分析表明，焦虑会对学业成绩、社会融入和心理健康产生负面影响。一项涉及34名学生的实证研究表明，与对照组相比，团体训练显著降低了焦虑水平，并改善了适应指标。研究结果证实了假设，并强调了在高等教育机构开展此类项目的重要性。

关键词：焦虑、学习适应、新生、团体训练、心理支持。

Abstract. *This study examines the effectiveness of group training in reducing anxiety among first-year university students during academic adaptation period. Theoretical analysis revealed that anxiety negatively impacts academic performance, social integration, and psychological well-being. An empirical study involving 34 students demonstrated that group training significantly reduced anxiety levels and improved adaptation indicators compared to the control group. The results confirm the hypothesis and highlight the importance of implementing such programs in higher education institutions.*

Keywords: *anxiety, academic adaptation, first-year students, group training, psychological support.*

Introduction

The transition from school to university is a critical period accompanied by significant academic, social, and psychological challenges. First-year students often experience heightened anxiety due to increased academic workload, unfamiliar environments, and the need to establish new social connections [29]. This anxiety can hinder successful adaptation, leading to decreased academic performance, emotional exhaustion, and social isolation [33].

Theoretical studies emphasize the dual nature of anxiety: as a situational reaction to stressors and as a stable personality trait [34]. While moderate anxiety

can mobilize resources, excessive levels disrupt cognitive functions and adaptive behaviors [16]. Given these findings, developing effective interventions to reduce anxiety among first-year students is essential.

This study aims to theoretically justify and empirically test a group training program designed to reduce anxiety and enhance adaptation among first-year students. The hypothesis posits that such training will significantly decrease anxiety levels and improve psychological adaptation.

Theoretical Framework

Anxiety and Academic Adaptation

Anxiety in first-year students manifests as emotional tension, fear of failure, and social discomfort [29]. According to Beck's cognitive model, anxiety arises from distorted perceptions of academic demands and self-efficacy [4]. Situational anxiety is triggered by specific stressors (e.g., exams), while trait anxiety reflects a predisposition to negative emotional reactions [35].

Academic adaptation involves integrating into the university environment, mastering new learning strategies, and building social networks [7]. Research indicates that high anxiety correlates with poor adaptation, including low academic motivation and social withdrawal [33]. Conversely, successful adaptation is associated with problem-solving skills, emotional regulation, and social support [17].

Methods for Reducing Anxiety

Effective interventions for reducing student anxiety include:

1. Cognitive-behavioral techniques: Restructuring negative thoughts and exposure therapy [4].

2. Relaxation methods: Diaphragmatic breathing and progressive muscle relaxation [10].

3. Group training: Combines social support, skill development, and emotional regulation [13].

Group training is particularly effective as it addresses both individual and social aspects of anxiety [22]. It provides a safe space for students to share experiences, practice coping strategies, and receive feedback [6].

Methodology

Participants

The study involved 34 first-year students from Peter the Great St. Petersburg Polytechnic University, divided into experimental (n=17) and control (n=17) groups. The sample included 4 females and 13 males in each group, aged 17–19 years.

Research Design

The study followed a quasi-experimental design with pre- and post-test measurements. The experimental group participated in a 6-session group training program, while the control group received no intervention.

Measures

1. Spielberger's State-Trait Anxiety Inventory (STAI): Assessed personal anxiety levels [35].

2. Rogers-Diamond Social-Psychological Adaptation Test: Measured adaptation indicators [31].

3. Luscher Color Test: Evaluated emotional states before and after each session [30].

Procedure

1. Pre-test: Both groups completed STAI and adaptation tests.

2. Intervention: The experimental group attended weekly 60-minute training sessions focusing on anxiety reduction, social skills, and self-regulation.

3. Post-test: Both groups were re-evaluated using the same instruments.

Data analysis employed Student's t-test to compare group differences, with significance set at $p \leq 0.05$.

Results

Comparative Analysis

1. Pre-test: No significant differences were found between groups in anxiety ($p > 0.05$) or adaptation levels ($p > 0.05$).

2. Post-test:

- The experimental group showed a significant decrease in anxiety (from 43.53 to 29.47, $p \leq 0.01$) and improved adaptation (from 57.53 to 78.88, $p \leq 0.05$).

- The control group exhibited increased anxiety (from 41.59 to 54.29, $p \leq 0.05$) and worsened adaptation (from 67.94 to 51.77, $p \leq 0.05$).

Training Effectiveness

The Luscher Color Test revealed consistent reductions in anxiety levels after each session, confirming the training's immediate and cumulative benefits.

Discussion

The results support the hypothesis that group training effectively reduces anxiety and enhances adaptation among first-year students. The findings align with previous research on the benefits of cognitive-behavioral and relaxation techniques [4, 10]. The control group's deterioration underscores the necessity of targeted interventions during the adaptation period.

Practical Implications

1. For universities: Implement group training programs to support student mental health.

2. For psychologists: Use a combination of diagnostic tools (STAI, Luscher Test) to monitor progress.

3. For educators: Foster a supportive environment to mitigate academic stress [22].

Limitations and Future Research

The study's small sample size and homogeneity limit generalizability. Future research should include larger, diverse samples and longitudinal designs to assess long-term effects.

Conclusion

This study demonstrates that group training significantly reduces anxiety and improves adaptation in first-year students. The program's success highlights the importance of integrating psychological support into university curricula to facilitate student well-being and academic success.

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为大学生设计“心理支持”网站，制定综合性焦虑缓解建议框架
DEVELOPMENT OF A COMPREHENSIVE RECOMMENDATION FRAMEWORK FOR ANXIETY REDUCTION IN DESIGNING A «PSYCHOLOGICAL SUPPORT» WEB SECTION FOR UNIVERSITY STUDENTS

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摘要：本文提出了在大学网站上开发“心理支持”板块的实用建议。该板块将作为额外的资源，帮助学生调节焦虑水平。基于对认知行为疗法 (CBT)、放松技巧和数字心理健康工具的当代研究的分析，我们提出了一些可在线实施的具体策略。我们特别强调所提方法的可访问性、可用性和循证有效性。

关键词：焦虑、学生、心理支持、认知行为疗法、放松技巧、在线资源。

Abstract. *This article presents practical recommendations for developing a «Psychological Support» section for university websites. The proposed section will serve as an additional resource to help students regulate their anxiety levels. Based on an analysis of contemporary research in cognitive behavioral therapy (CBT), relaxation techniques, and digital mental health tools, we offer specific strategies implementable in online formats. Particular emphasis is placed on accessibility, usability, and evidence-based efficacy of the proposed methods.*

Keywords: *anxiety, students, psychological support, cognitive behavioral therapy, relaxation techniques, online resources.*

Introduction

Anxiety represents a prevalent issue among university students, adversely affecting academic performance, social adaptation, and overall psychological well-being [1]. Research indicates that up to 40% of university students experience elevated anxiety levels due to academic workload, examinations, and social interactions [2].

In the context of digitalized education, university websites have become crucial platforms for psychological support. However, existing «Psychological Support» sections often provide only general information without practical recom-

mendations. Our proposed framework aims to develop scientifically grounded and practical anxiety-reduction strategies adapted for online implementation.

Theoretical Foundations of Anxiety and Its Management

Anxiety is defined as an emotional state characterized by feelings of uncertainty, tension, and worry [3]. Among students, it manifests as:

- Academic anxiety (fear of exams, poor grades)
- Social anxiety (apprehension in peer and faculty interactions)
- Generalized anxiety (chronic worry without specific cause) [4]

Contemporary anxiety management approaches include cognitive behavioral therapy (CBT), mindfulness practices, breathing exercises, and physical activity [5]. Meta-analyses confirm these methods' efficacy, making them suitable for university mental health programs [6].

Comprehensive Recommendation Framework for Anxiety Reduction in University Website Psychological Support Sections

The proposed comprehensive framework incorporates several core support modules. The first module, designated as the «Cognitive Restructuring Toolkit», features an interactive thought journal with automated prompts for cognitive reframing, examples of prevalent cognitive distortions in academic contexts, and a dedicated «Anxiety Myth Debunking» section targeting irrational beliefs.

The second module, termed the «Behavioral Activation System», comprises a personalized activity planning instrument with functionality for academic task decomposition and social connection facilitation prompts.

The third module, identified as the «Mindfulness Training Complex», integrates a 21-day mindfulness development program, discipline-specific meditation guides (including pre-examination concentration exercises), and body scan techniques for addressing physiological anxiety manifestations.

For enhanced psychological support through the university web platform, an «Examination Preparation Module» has been incorporated, containing protocols for managing pre-examination anxiety, algorithms for stress-reducing behavioral strategy planning, and visualization tools for self-observation outcomes. The technological implementation proposes an adaptive learning system with AI-driven content personalization, progress monitoring capabilities, and seamless integration with the university's distance learning infrastructure. Mobile optimization strategies encompass push notifications, offline accessibility, and interoperability with wearable devices.

Implementation priorities emphasize three critical dimensions: engagement strategies incorporating gamification elements (badges, progress trackers), mentorship programming, and faculty involvement in promoting section utilization; evaluation mechanisms utilizing the Spielberger State-Trait Anxiety Inventory (STAI) coupled with usage analytics from feedback channels; and ethical con-

siderations encompassing data protection measures, crisis intervention protocols, and cultural adaptation of content. The framework's architecture ensures systematic attention to both technological functionality and psychological efficacy while maintaining rigorous adherence to evidence-based practice standards in digital mental health interventions.

Discussion

The proposed model of the «Psychological Support» section for university websites addresses critical gaps in existing student mental health support systems. Its digital format ensures scalability while maintaining rigorous scientific standards, and the academically-oriented content offers distinct advantages over generic mental health resources by providing tailored interventions that address specific student needs.

Current limitations include technological accessibility barriers for certain student populations and the necessity for regular content updates to maintain intervention effectiveness. Future research should focus on longitudinal outcome evaluations and comparative analyses between online and offline support formats to better understand their relative efficacy across different student demographics and institutional contexts.

The model's adaptive architecture facilitates continuous improvement through data-driven refinements while preserving core evidence-based components that have demonstrated effectiveness in academic settings. This approach represents a significant advancement in digital mental health support for higher education, combining scientific rigor with practical implementation to meet the evolving needs of university students.

Conclusion

The formulated structure of recommendations for anxiety reduction in developing the «Psychological Support» section of university websites represents a comprehensive evidence-based approach to organizing student psychological support in digital format. The integration of cognitive-behavioral techniques (CBT), relaxation methods, digital tools, and organizational measures enables addressing all aspects of student anxiety. It should be emphasized that CBT demonstrates 30-50% reduction in anxiety levels, relaxation techniques improve concentration, while digital solutions enhance the accessibility of support services.

The flexible architecture of the developed model allows for its adaptation to various needs, including modules for managing pre-examination stress and standardized structural templates for university website implementation. The concurrent integration of digital tools enhances user engagement through gamification elements, personalized content delivery, and offline accessibility options.

Successful implementation and sustainable operation of the proposed section requires ensuring data confidentiality, developing crisis intervention protocols,

and accounting for cultural specificities. A phased implementation approach is recommended, beginning with pilot testing followed by gradual expansion of website section capabilities based on systematic user feedback analysis.

The proposed comprehensive recommendation framework for anxiety reduction in university psychological support sections combines scientific rigor with practical applicability, offering a cost-effective solution for enhancing student psychological well-being. By leveraging familiar digital platforms, this model bridges the gap between traditional and contemporary student support formats while establishing an educational environment conducive to professional competency development that aligns with the requirements of higher education. The implemented framework creates an optimal ecosystem that addresses both immediate mental health needs and long-term academic development goals through its multilayered, evidence-informed intervention structure.

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卢甘斯克市天才儿童寄宿学校营养组织的回顾性分析
RETROSPECTIVE ANALYSIS OF THE ORGANIZATION OF NUTRITION IN BOARDING SCHOOLS FOR GIFTED CHILDREN IN THE CITY OF LUGANSK

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摘要：本文回顾性分析了卢甘斯克人民共和国卢甘斯克市天才儿童寄宿学校的营养安排。基于学校食堂的原始记录数据，评估了学校膳食的种类、营养成分、营养价值和能量值：2020–2021学年秋冬季的每周和每日菜单。

关键词：天才儿童和青少年、寄宿学校、学校膳食、营养方案。

Abstract. *The paper presents a retrospective analysis of the organization of nutrition in boarding schools for gifted children in the city of Lugansk, Lugansk People's Republic. Assessment of the range, nutrient composition, nutritional and energy value of school meals based on data from primary documentation of school canteens: weekly and daily menus for the autumn-winter period of the 2020-2021 academic year.*

Keywords: *gifted children and teenagers, boarding schools, school meals, nutrition regime.*

The organization of nutrition in boarding schools for gifted children includes several features related to taking into account the needs of a growing organism and compliance with sanitary and epidemiological standards.

These educational institutions cultivate an atmosphere of intellectual pursuit through innovative academic programs and highly qualified teaching staff. For talented students from small towns and villages, such boarding lyceums provide access to quality education that would otherwise be unavailable. Beyond academ-

ics, these schools emphasize character education while developing students' independent living skills and nurturing their creative talents.

During the period of study at the lyceum (14-17 years), serious, significant changes occur in the body's reactions to various environmental factors, body weight increases, significant tissue growth occurs, body systems mature, and puberty occurs. Students also experience increased mental and physical stress, which contributes to an increase in energy expenditure and consumption of nutrients. Properly organized rational nutrition helps relieve this stress.

Eating disorders at this age, as at any other, can lead to disorders of the body's vital functions, stress, and chronic diseases. In this regard, for proper harmonious development and health maintenance, it is necessary to follow the rules of rational, wholesome nutrition that help meet the age-related physiological needs of the developing organism.

The purpose of the study: to study the features of the organization of nutrition for students of boarding schools in Lugansk.

To achieve the set goal, it is necessary to solve the following tasks: 1. To study the assortment list and daily caloric content of students' food rations. 2. To evaluate the diet, biological and nutritional value of dishes.

Materials and methods. The study was based on the following boarding-type educational institutions for gifted children in Lugansk: State Educational Institution of the Lugansk People's Republic "Lugansk Medical and Biological Boarding School"; State Educational Institution of the Lugansk People's Republic "Lugansk Humanitarian and Economic Boarding School"; State Educational Institution of the Lugansk People's Republic "Lugansk Economic and Legal Boarding School named after the Heroes of the Young Guard"; State Educational Institution of the Lugansk People's Republic "Republican Cossack Cadet Corps named after Marshal of Aviation Alexander Efimov"; State Educational Institution of Secondary Vocational Education of the Lugansk People's Republic "Lugansk Higher School of Physical Education" (sports boarding school).

The assessment of the range, nutrient composition, nutritional and energy value of school meals was carried out on the basis of primary documentation of school canteens: weekly and daily menus for the autumn-winter period of the 2020-2021 academic year.

We used a quantitative research method: collection and analysis of copies of primary documentation (118 menus).

To determine the nutritional value and caloric content of food, the menu layout calculation method was chosen.

The obtained data were compared with physiological norms of daily requirements for nutrients and energy for children aged 14-17 years [1-7]

Results and their discussion. One of the main criteria for assessing the quality of nutrition of children in organized groups is compliance with nutrition standards.

According to regulatory documents [1, 2, 5, 6], the daily caloric intake standard for adolescents aged 14-17 is 2925-2995 kcal.

Our study has established that the daily caloric intake in the medical and biological lyceum corresponds to the standard values. In other lyceums, the caloric intake is increased: in the Cossack Cadet Corps - by 5.2%, in the economics and law lyceum - by 11.5%, in the humanitarian and economic lyceum - by 13.8%, in the sports boarding school - by 26.3%.

In the case of a sports boarding school, it is worth noting that, depending on the physical activity of athletes, in accordance with Appendix 4 to the Resolution of the Council of Ministers of the Lugansk People's Republic dated 15.12.2015 No. 02-04/382/15 [5], 5 nutrition groups are distinguished based on energy consumption depending on the type of sport (2300-6000 kcal).

When determining the caloric content of the diet due to the percentage of the main macronutrients (proteins, fats, carbohydrates), it can be noted that in the medical and biological lyceum this indicator corresponds to the standard, while athletes and cadets have an increase in the percentage of proteins and fats due to increased physical activity.

It is worth dwelling in detail on the characteristics of the Diet for each boarding school. Assessing the distribution of daily caloric intake by meals:

- in the medical and biological lyceum, minor changes are observed in comparison with the norms, on average – by 2%;

- in the economics and law lyceum – an increase in caloric content during breakfast and dinner – by 2% and 4.5%, respectively; at the same time – a decrease in caloric content during lunch – by 6%;

- a similar picture is observed among cadets: an increase in caloric content during the 2nd breakfast and dinner - by 1.3% and 1.7%, respectively; during lunch, a decrease in caloric content of almost 4% is observed;

- in the Humanities and Economics Lyceum – an increase in caloric content due to breakfast (by almost 6%) and dinner (by almost 3%), as well as a decrease in caloric content during lunch (by 6.5%) and afternoon tea (by 2.3%);

- athletes have 5 meals a day, with reduced caloric content due to breakfast (1.8%), second breakfast (2.1%), lunch (3.4%), afternoon snack (1%), however, during dinner, an increase in caloric content by 8% is noted.

As a result of studying and assessing the state of the food system in boarding schools of Lugansk, the following conclusions can be made:

1. In the medical and biological lyceum, the daily caloric content of the diet corresponds to the standard values, as for the other boarding lyceums, the daily caloric content of the diet is increased by an average of 11-13%.

2. The content of the main macronutrients generally corresponds to the standard; however, athletes and cadets have an increase in the percentage of proteins

and fats due to increased physical activity. There is also a shift in the diet towards carbohydrates, which is due to the replenishment of the energy value of the diets through pasta and cereals.

3. When assessing the diet, it should be noted that each boarding school has its own diet, but not less than 4 times a day.

4. When assessing the distribution of daily caloric intake by meals in the medical and biological lyceum, economics and law lyceum, Cossack cadet corps, and humanitarian and economics lyceum, a change in indicators by an average of 2-5% is noted: an increase in caloric intake during breakfast and dinner, a decrease during lunch.

5. Athletes eat 5 meals a day, with reduced caloric content due to breakfast (1.8%), 2nd breakfast (2.1%), lunch (3.4%), afternoon snack (1%), however, during dinner, an increase in caloric content by 8% is noted.

6. When evaluating the menu layout, an improvement in children's nutrition is noted not only in quantity but also in quality. Compared to the period 2015-2019, canned products have been replaced by natural products such as chicken meat, liver, fish, milk, and cottage cheese.

7. As a result of the analysis, an improvement in the quality and quantity of nutrition of lyceum students was revealed due to increased funding and an increase in the proportion of natural products in the diet, which helps to maintain and strengthen the health of lyceum students.

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父母暴露于辐射和化学物质的第一代雄性大鼠血液的突变、氧化和细胞因子状态
MUTATIONAL, OXIDATIVE, AND CYTOKINE STATUS OF THE BLOOD OF FIRST-GENERATION MALE RATS WHOSE PARENTS WERE EXPOSED TO RADIATION AND CHEMICAL EXPOSURE

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摘要。背景：随机效应目前主要与电离辐射暴露或电离辐射与其他化学、物理、生物制剂的组合有关，并以各种突变的形式表现出来。方法：在研究的第一阶段，将两种性别的大鼠分成 3 组。第一组为对照组，第二组动物接受 0.2 Gy 剂量的 γ 射线照射。第三组在照射前一个月和铬摄入结束后一天，通过饮用水摄入 180 mg/l 的六价铬，接受 0.2 Gy 剂量的全 γ 射线照射。实验的第二阶段。3 天后，将雄性与雌性交配。对获得的后代进行过氧化、细胞因子谱和细胞核微核的研究。结果：本研究表明，父母同时暴露于铬和γ射线的5月龄子代表现出基因组遗传不稳定性，抗氧化酶活性和巯基血型降低，脂质过氧化水平升高。在抗炎细胞因子（IL-10）降低的背景下，血浆中炎症标志物（IL-6和TNF）水平升高。结论：六价铬和电离辐射的联合作用可导致肿瘤发生。

关键词：六价铬，电离辐射，第一代，氧化应激，细胞因子。

Abstract. Background: *Stochastic effects, which are currently largely associated with exposure to ionizing radiation or a combination of ionizing radiation with other chemical, physical, biological agents, are expressed in the form of various mutations.* ***Methods:*** *At the first stage of the study, rats of both sexes were divided into 3 groups. 1st - control group, animals of the 2nd group were exposed to gamma radiation at a dose of 0.2 Gy. The third group received hexavalent chromium in a dose of 180 mg/ l with drinking water for a month before irradiation and a day after the end of chromium consumption were subjected to total gamma irradiation at a dose of 0.2 Gy. The second stage of the experiment. After 3 days, the males were mated with the females. The obtained offspring were studied for peroxidation, cytokine profile and micronucleus in the*

nuclei. ***Results:*** *This study shows that 5-month-old offspring whose parents were exposed to combined exposure to chromium and γ-irradiation exhibit hereditary instability of the genome, decreased activity of antioxidant enzymes and sulfhydryl blood groups, and increased levels of lipid peroxidation. There is also an increase in the level of inflammatory markers (IL-6 and TNF) in the blood plasma against the background of a decrease in anti-inflammatory cytokine (IL-10).* ***Conclusion:*** *Thus, the combined effect of hexavalent chromium and ionizing radiation can lead to the development of an oncological process.*

Keywords: *hexavalent chromium, ionizing radiation, first generation, oxidative stress, cytokines.*

Introduction. Numerous studies have shown the carcinogenic effect of radiation treatment and alkylating agents, which increased the risk of secondary neoplasia by 1.4-2.2 times [1,2]. Stochastic effects, which are currently more associated with exposure to ionizing radiation or ionizing radiation with other chemical, physical, and biological agents, are expressed in the form of various mutations. They increase the likelihood of spontaneous mutations occurring in natural conditions, have hidden damage to the genome, which manifests itself in oncological or genetic pathology [3]. As a result of exposure to ionizing radiation (IR), cell damage occurs: direct in the form of direct DNA damage, and indirect through reactive oxygen species (ROS). They lead to the formation of chromosomal and genomic mutations. Single- and double-strand breaks and violations of their repair can lead to cell death, chromosomal instability, mutation and/or carcinogenesis [4]. Radiation exposure weakens endogenous antioxidant enzymes, disrupting the balance between ROS production and antioxidant defense mechanisms, which leads to oxidative stress [5,6]. Oxidative stress and inflammation are two mutually and closely related mechanisms, one of which is induced and involved by the other [7]. IR directly damages DNA and rapidly increases ROS levels [8], disrupting cellular homeostasis and causing activation of pro-inflammatory cytokinin [9], genome instability, cell death, apoptosis, necrosis, mitotic catastrophic death and autophagy [10]. Experimental studies have proved that genomic instability caused by ionizing radiation or chemical carcinogens is inherited and leads to increased sensitivity to carcinogens in animal offspring [11,12]. The consequence of radiation-induced instability of the cell genome, both in irradiated organisms and in their descendants, is the following: at the tissue level, morphological and functional inferiority of tissue elements, and at the organizational level [13-17]. Several scientists claim that exposure to various mutagens causes epimutations, which can occur in mammals after several generations [18]. Thus, in modern radiobiology and radiation medicine, when studying the effects of direct radiation, a significant place is given to the study of the dynamics of free radical oxidation of

lipids, their role in the developing picture of "genome instability". At the cytogenetic level, transmission chromosomal instability is transmitted through the germ cells of parents to the somatic cells of their descendants [6,15]. As a result of damage, not only genetic, but also epigenetic changes can occur. It is plausible that the occurrence of specific mutational alterations and damage to genetic material is increasing due to the growing anthropogenic pollution of the biosphere. [19,20]. This determines the relevance of the issues of theoretical and experimental protection of the population living in technogenic regional biogeochemical provinces. One of these is a stable anthropogenic chrome biogeochemical province located in the Aktobe region (Republic of Kazakhstan) [21,22]. The exogenous factor, including IR, affects humans and animals, not in isolation, but in combination with other (chemical and biological) agents. There is a maximum probability of synergism and/or potentiation of effects with the combined action of various stress factors and low doses of radiation, contributing to a decrease in the overall reactivity of the body, increased sensitivity and the ability to chronicle the process [23]. Considering the small number of studies devoted to the study of the combined effect of radiation and chromium compounds on the processes of carcinogenesis (mutagenesis, oxidative stress, inflammation) in the descendants of parents who were exposed to the combined effects of gamma radiation and hexavalent chromium, determined the relevance of this study.

The purpose of the study. To assess the state of mutagenesis, oxidative stress and cytokine profile of blood in male rats of the first generation of offspring, whose parents were exposed to combined gamma radiation and hexavalent chromium.

Materials and methods. The study was carried out on white rats weighing 180-220 g. To achieve the set goals, the experiment was conducted in two stages. At the first stage of the study, rats of both sexes were used, which were divided into 3 groups. The first group was a control group; the animals of the 2nd group were exposed to gamma radiation at a dose of 0.2g. The third group received hexavalent chromium in a dose of 180 mg/l (potassium bichromate) with drinking water for a month before irradiation and a day after the end of chromium consumption were subjected to total gamma irradiation at a dose of 0.2g. (the combined effect of hexavalent chromium and gamma irradiation). Gamma irradiation of rats was carried out with total gamma rays of C^o60 at a dose of 0.2g on a radiotherapy unit *Teragam* (Czech Republic).

The second stage of the experiment. After 3 days, males of all experimental groups were mated with females of experimental groups (3 groups) in a ratio of 1:1 to obtain the first generation of offspring. After 25-30 days, they received offspring whose parents were exposed to separate gamma radiation and combined exposure to hexavalent chromium and irradiation. Euthanasia of animals in all groups at the age of 5 months was performed at the end of the experimental period

by instant decapitation under light ether anesthesia to avoid stress. The blood was collected in test tubes and centrifuged at 2200g for 10 minutes. The blood plasma samples collected were stored at -20C before analysis. Genomic instability was studied at cellular and chromosomal levels. Animal bone marrow was used for the study. The mutagenic effect at the cellular level was evaluated using a micronucleus test. Micronucleus in the bone marrow: preparation of preparations for the test was carried out by the standard method [24]. A smear was made from a suspension of cytogenetic preparations prepared on a slide table, dried in air, stained by the Pappenheim method using a May-Grunwald fixative, Giemsa staining [25]. The mutagenic effect of the factors studied in the first generation (F1) at the cytogenetic level was assessed using the obtained metaphase plates from bone marrow cells [26]. The content of the final product of lipid oxidation products – malondialdehyde was determined using a modified method by L.I.Andreeva et al. [27]. The SH/ Malondialdehyde ratio, an integral indicator of the balance of peroxide homeostasis, was calculated. The content of sulfhydryl groups in blood plasma was determined using the Ellman reagent [28]. The catalase content was determined by the methods of S.Chevari et al. [29]. The interleukin IL–10 tract and tumor necrosis factor alpha (TNF-α) in blood plasma were determined using an immune analysis kit (ELISA kits, Cloud-Clone Corp., USA), and interleukin IL-6 using an Elisa kit (Fine test. “Wuhan fine biotest Co. LTD”. China). Statistical analysis. Statistical processing was performed using the “Statistica 10” software package from Stat Soft, Inc. USA.

The results of the study. To study the genotoxic effect in 5-month-old offspring of rats whose parents were exposed to gamma radiation or potassium bichromate and gamma radiation, we investigated cytogenetic changes at the chromosomal and cellular levels in the bone marrow. Cytogenetic analysis of chromosomal aberrations in bone marrow cells revealed a pronounced mutagenic effect only in 5-month-old offspring of rats whose parents were exposed to combined chromium and radiation. Thus, the offspring from the parents of the third group (Cr^{+6} + γ irradiation) had significant differences both in the total number of aberrations (2.77±0.537%, p≤0.001) and in the number of chromosomal aberrations (0.7±0.117%, p≤0.001) and chromatid (2.07±0.61%, p≤0.002) of the type. In the 5-month-old offspring of the second group, there was an increase in these indicators of chromosomal aberrations in the range of 14-15% (p= 0.05). The results of the study of chromosomal aberrations make it possible to establish the genetic risk of combined exposure to hexavalent chromium and gamma radiation as a physic-chemical factor destabilizing the genome. It should be noted that in 5-month-old offspring, parents from the Cr^{+6}+γ group, in comparison with the indicators of chromosomal aberration in 5-month-old offspring of irradiated, a significant (p≤0.05) increase in the number of both total chromosomal aberration (by 34%)

and the number of chromosomal aberration (by 23%) was found and chromatid (38%) type.

The data show that in the 5-month-old offspring of irradiated parents, the activity of SOD increases significantly by 19% ($p \leq 0.002$), significantly ($p \leq 0.05$) of SH groups, and unreliably by 12% catalase activity ($p \geq 0.05$). The integral indicator of the SH/Malondialdehyde balance remains within control. Perhaps this is a compensatory adaptive reaction of the antioxidant system aimed at curbing the peroxidation of blood lipids. Malondialdehyde remains within the control group, despite a tendency to increase by 14% ($p \geq 0.05$). However, in 5-month-old offspring ($Cr^{+6}+\gamma$ group), all studied indicators of the antioxidant system (SH-groups, SOD, CAT) significantly decreased (by 14, 17 and 19%, respectively) against the background of an increase in the level of Malondialdehyde by 33% compared with the control, by 16% compared with an indicator of the offspring of the irradiated. The integral indicator of the balance of peroxide homeostasis SH/Malondialdehyde significantly decreases by 34% compared with the control, and by 33% compared with the offspring of the irradiated.

On the cytokinin profile of 5-month-old offspring, experimental groups. Thus, in the 5-month-old offspring of irradiated parents, there was a significant increase in the content of IL-6 by 27% ($p<0.01$), TNF-α by 16% ($p<0.05$) compared with the control data. The concentration of the anti-inflammatory cytokine IL-10 remains at the level of the control indicators. Whereas, in the 5-month-old offspring of group #3 ($Cr^{+6}+\gamma$) the change in the cytokinin profile was pronounced: the level of IL-6 increased by 43% ($p \leq 0.001$), TNF-α - by 40% ($p \leq 0.001$), against the background of a sharp decrease in the content of IL-10 by 21% ($p \leq 0.002$) compared to the control group. Compared with the data of the 5-month-old offspring of irradiated parents, respectively, they increased by 13, 21% and decreased by 26%. The data obtained indicates a high sensitivity of the cytokinin profile of the offspring of the first generation of experimental groups (γ and $Cr^{+6}+\gamma$ group) and "apparently" reflect compensatory adaptive reactions.

Discussion. According to some scientists [11], the basis of physiological inferiority and reduced viability in apparently normal descendants of irradiated parents are "small" mutations that phenotypically may not manifest themselves in any way until an additional load, disease or provoking factor affects the body. In the present study, such a factor is potassium bichromate, that is, the combined effect of gamma radiation with chromium. In this work, an increase in the number of bone marrow cells with micronuclei was found both when exposed to gamma radiation ($p \geq 0.05$) and when combined with gamma radiation and chromium ($p \leq 0.05$). At the same time, the predominance of chromatid-type lesions was established; in comparison with the control group, the number of chromosomal aberrations increased by 59% ($p \leq 0.05$). These results make it possible for the first time to

establish the genetic risk of exposure to gamma radiation and Cr^{+6} as an environmental factor destabilizing the genome. It is possible that the destabilization of the genome, the development of the phenomenon of induced genome instability is a consequence of inaccurate repair of damaged genome structures [30], which occurs due to an increase in free radical damage to biomacromolecules. The absence of a significant pronounced change in the instability of the genome, the development of changes in the genome protection system, that is, the restructuring of the macromolecule and cell protection system is taking place [31]. In one of our previous studies [32], using the method of accounting for dominant lethal mutations (DLM), it was found that potassium bichromate enhances mutations in the germ cells of male rats and is the result of aberration in germ cells. In this study, it was established for the first time that offspring whose parents were exposed to combined effects of chromium and gamma radiation activate oxidative stress. So, if in the offspring of rats whose parents were exposed only to gamma radiation, the Malondialdehyde level tended to increase (by 14% $p \geq 0.05$), the activity of the antioxidant enzyme SOD ($p \leq 0.05$) increased, and the concentration of SH blood groups, which reflects a compensatory strengthening of the genome protection system [33]. This is evidenced by the integral indicator of the balance of peroxide homeostasis SH/Malondialdehyde, which remains at the control level.

Conclusion. The present results indicate that in 5-month-old offspring whose parents were exposed to combined chromium and γ irradiation, hereditary genome instability, overproduction of ROS, decreased activity of antioxidant enzymes and sulfhydryl blood groups, increased lipid peroxidation. This led to a decrease in the integral index of the balance of peroxide homeostasis, reflecting an imbalance in the regulation of Lipid oxidation products - Antioxidant protection, the development of oxidative stress, as well as an increase in the level of inflammatory markers (IL-6 and TNF) in blood plasma against the background of a decrease in anti-inflammatory cytokinin (IL-10). Whereas, in 5-month-old intact descendants of irradiated parents, compensatory protective reactions are observed: the integral indicator of Lipid oxidation products - Antioxidant protection balance remains at the control level, an increase ($p \leq 0.01$) in SOD activity, a significant increase in the level of sulfhydryl groups and unreliable catalase activity, reflecting the balance of the Lipid oxidation products - Antioxidant protection system. An unreliable increase in the number of micronuclei and the frequency of chromosomal aberrations of bone marrow cells, the level of IL-10 and TNF-α against the background of an increase ($p \leq 0.05$) of proinflammatory IL-6.

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动脉高血压：问题的创新解决方案
ARTERIAL HYPERTENSION: AN INNOVATIVE SOLUTION TO THE PROBLEM

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摘要：本文提出了一种基于个体化全身血流动力学校正的动脉高血压管理新技术。该技术提出将抗高血压药物的选择与药物对个体化全身血流动力学的影响关联起来。本文还开发了一个专家系统，该系统可在诊室外监测模式下选择最佳药物治疗方案。

关键词：动脉高血压，全身血流动力学，容积压缩振荡法，抗高血压药物。

Abstract. *A new technology for managing arterial hypertension is presented, based on personalized correction of systemic hemodynamics. The choice of antihypertensive drugs is proposed to be correlated with the effect of drugs on the personal profile of systemic hemodynamics. An expert system has been developed that allows for the selection of the most optimal pharmacotherapy in the out-of-office monitoring mode.*

Keywords: *arterial hypertension, systemic hemodynamics, volumetric compression oscillometry, antihypertensive drugs.*

There is an obvious stagnation in the established approaches to the management of arterial hypertension (AH). Updated European clinical guidelines for arterial hypertension[15] (ECG), which are usually full of fresh ideas, except for the details of previously proposed positions and "cosmetic" advice on treatment, have not undergone significant changes compared to the previous version. The scheme

[15] European clinical guidelines on hypertension, 2023.

for choosing antihypertensive drugs (AHP) has remained the same: drug combinations should include an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker in combination with a dihydropyridine calcium antagonist or a diuretic [1].

Analysis of negative treatment results shows that one of the main reasons for persistent increase in blood pressure (BP) is a change in the ratio of systemic hemodynamics (SHD). In domestic clinical guidelines (CG), SHD telemonitoring is presented as a necessary element for increasing the effectiveness of hypertension treatment; however, there is no regulation of the choice of AGP based on the state of SHD in the CG.

The need to study the SBP in hypertensive patients seems quite reasonable, given that hypertension is usually accompanied by various types of hemodynamic disorders: spasm or dilation of blood vessels, cardiac dysfunction. According to the basic law of hemodynamics, systemic arterial pressure (SAP), which approximately corresponds to the blood pressure in the proximal aorta, is a derivative of the minute heart rate (HR), total vascular resistance (TPR) and stroke volume (SV):

SAP = HR X TPRR X SV

By influencing the SBP, it is possible to regulate the blood pressure level, both upward and downward. The effect of antihypertensive drugs (AHD) on SBP has been studied quite well; this information is directly available, including in official drug annotations (Table 1).

Table 1

Effect of AHP on SBP*

Group	САД	ДАД	ЧСС	ОПСС	УО
BB	↓↓	↓	↓	↑↓	↓
CA	↓	↓	↓↑	↓	—
TD	↓	↓	—	↓	↓—
ACEi	↓	↓	—	↓	↑—
ARB	↓↓	↓	—	↓	↑—

*CCB – calcium antagonists, BB – beta-blockers, TD – thiazide and thiazide-like diuretics, ACEi – ACE inhibitors, ARB – angiotensin receptor blockers; ↑ – increase, ↓ – decrease, «—» – no effect.

This approach allows for a targeted effect on SBP regardless of the stage of hypertension. Moreover, for each SBP profile, it is possible to select the most effective drug or combination of drugs. This technology has not found wide application due to the lack of an acceptable method for determining the SBP profile. Until recently, the «gold standard» for SBP research was the Swan-Ganz pulmonary

artery catheterization method, which is based on the insertion of a special catheter into one of the central branches of the pulmonary trunk. This procedure is unsafe; in 2-3% of cases it is complicated by serious rhythm and conduction disturbances, which prevents the widespread use of the method even in hospital settings [2].

At present, this obstacle has been eliminated; accessible and, most importantly, non-invasive methods for studying the SRS have appeared, which open up broad prospects for its use in practice [3].

The problem of simultaneously measuring the main indicators of the SRS by a non-invasive method was solved within the framework of domestic space medicine, to ensure monitoring of the health of astronauts during long-term stays in space. The equipment developed for this purpose by specialists from the Institute of Medical and Biological Problems and the Institute of Aviation and Space Medicine was based on the ideas and methods of N.N. Savitsky [4]. The research method used was compression oscillometry (device KAP CG osm - "GLOBUS" - manufacturer OOO Globus; registration certificate dated 15.12.2017 No. RZN2017/6582; certificate of approval of the measurement type OS.S.39.001. No. 40747 - hereinafter referred to as the Device), which allows for non-invasive measurements to determine 22 indicators of the SGD, including systolic blood pressure (SB), diastolic blood pressure (DB), HR, SV and TPR.

The assessment of the SHD indicators can be carried out at home or in outpatient settings by applying a cuff to measure blood pressure, which is connected to a portable device that allows for assessing the pulse oscillations of the wall of the brachial artery under conditions of increasing pressure in the pneumatic cuff. We studied the SHD profile in 1618 patients aged 16 to 93 years (mean age 38.5 years), including 880 (54.4%) men and 738 (45.6%) women.

The subjects had various combinations of HR, SI, and UPSS indicators; we combined them into 15 SHD profiles. Each BP level corresponded to a certain ratio of SHD profiles (Table 2).

Table 2

Ratio of SHD profiles for each BP level

Profile of the SRS* (HR/SPR/SI)	**All**	**AP<120**	**AP120-130**	**AP >140**	**AP>160**	**AP>170**	**DBP>90**
112	10.9	3.9	4.8	17.6	3.6	0	23.2
113	3.1	9.1	0	5.2	0	0	4.7
121	0.3	0	0	0.7	4.5	2	0.2
122	9.4	11.7	9.6	15.3	0	0	2.7
123	0.7	0	1.2	1.1	0	0	0
211	8.5	0	3.6	11.8	12.5	10.4	18.4

212	19.5	14.3	25.3	4.5	32.1	37.6	24.3
213	1.3	10.4	0	0	0	0	0.9
221	16.4	6.5	19.3	18.1	14.3	8.3	4.8
222	14.3	39	22.9	7	0	0	0.9
223	0.1	1.2	0	0	0	0	0
231	0.4	0	0	0.2	0	0	0
311	4.7	0	7.3	7.1	18.7	22.9	13.9
321	10.1	1.3	6	11.4	14.3	18.8	6
322	0.3	2.6	0	0	0	0	0
Totally:	100	100	100	100	100	100	100

*The SHD profile is the HR/SPR/SI ratio, where 1 is an elevated value of the indicator; 2 is a normal value of the indicator; 3 is a reduced value of the indicator.

SHD profiles: 111, 131, 132, 133, 232, 233, 312, 313, 323, 331, 332, 333 were not detected in any case. In patients with elevated SBP and DBP, SHD profiles: 213, 223, 322 were not registered; in hypotensive patients, SHD profiles: 123 and 211 were not recorded. Only in 16.4% of patients, the HR, SI and SPR(SGD profile 222) indicators fully complied with the normative values. Data on the impact of individual AGPs on the SRS (Table 3) allow us to assign each of them a corresponding combination of numbers in the form of a three-digit code.

Table 3

Impact of AGPs on the SRS indicators

Preparation	HR	STR 1	STR 2	SV
Atenolol	decreases	increases	decreases	decreases
Bisoprolol	decreases	increases	decreases	decreases
Betaxolol	decreases	decreases	decreases	decreases
Nebivolol	decreases	decreases	decreases	decreases
Metoprolol	decreases	decreases	decreases	decreases
Amlodipine	does not change	decreases	decreases	does not change
Diltiazem	decreases	decreases	decreases	does not change
Nifedipine	increases	decreases	decreases	does not change
Nitrendipine	increases	decreases	decreases	does not change
Moxonidine	does not change	decreases	decreases	does not change
Captopril	does not change	decreases	decreases	does not change
Quinapril	does not change	decreases	decreases	does not change
Lisinopril	does not change	decreases	decreases	does not change
Perindopril	does not change	decreases	decreases	increases
Ramipril	does not change	decreases	decreases	does not change
Fosinopril	does not change	decreases	decreases	does not change

Enalapril	does not change	decreases	decreases	increases
Candesartan	does not change	decreases	decreases	does not change
Eprosartan	does not change	decreases	decreases	does not change
Irbesartan	does not change	decreases	decreases	does not change
Losartan	decreases	decreases	decreases	increases
Telmisartan	does not change	decreases	decreases	does not change
Valsartan	does not change	decreases	decreases	does not change
Indapamide	does not change	decreases	decreases	does not change

“HR” - heart rate; “TVR1” - total vascular resistance in the first month from the start of treatment; “TVR2” - total vascular resistance after one month from the start of treatment; “SV” - stroke volume.

The first component of the code contains information on the effect of AG on HR (1 - decreases, 2 - does not affect, 3 - increases the value); the second - on TVR (1 - decreases, 2 - does not affect, 3 - increases the value, 4 - increases in the first month, decreases after a month and further); the third - on SV (1 - decreases, 2 - does not affect, 3 - increases the value) (Table 4).

Table 4

The effect of AG on the SHD profile

AGP group	AGP	Impact of AGP on SHD (Code)
Calcium antagonists	Nitrendipine	312
	Nifedipine	313
	Diltiazem	112
	Amlodipine	212
ACE inhibitors	Perindopril, enalapril	213
	Zofenopril, captopril, quinopril, lisinopril, ramipril, fosinopril	212
Beta-blockers	Betaxolol	111
	Nebivolol	112
	Atenolol, bisoprolool, metoprolol	141
Angiotensin receptor blockers	Losartan	113
	Valsartan, candesartan, eprosartan, irbesartan, telmisartan	212
Selective imidazoline receptor agonists	Moxonidine	212
Diuretics	Dichlorothiazide, indapamide	212

The method of pharmacotherapy of hypertension that we propose is based on establishing a correspondence between the personal profile of the SHD, which

is determined by the level of heart rate, total peripheral vascular resistance and stroke volume of the patient, and the effect of the antihypertensive drug on the SHD, i.e. its code. The first line of drug therapy is formed by antihypertensive drug with a modeling effect on the changed (increased or decreased) SHR indicators and not affecting the indicators that are within the normal values. The order of subsequent selection is presented in Table 5.

Table 5

Priority of the choice of antihypertensive drug

The order (priority) of choosing the AGP	Characteristic
1	Normalizes altered (increased or decreased) indicators; does not affect normal indicators
2	Normalizes increased indicators, decreases the normal indicator
3	Normalizes increased indicators, does not affect the decreased indicator
4	Normalizes decreased indicators, does not affect the normal indicator
5	Normalizes decreased indicators, decreases the normal indicator
6	Normalizes one indicator, does not affect the other two
7	Normalizes one indicator, does not affect another and decreases the normal value of another indicator
8	Normalizes one indicator, does not affect another and increases the normal value of another indicator

Taking into account the presented requirements, the rating of the AGP corresponding to the personal profile of the SHD looks as follows (Table 6).

Table 6

Rating list of AGP corresponding to individual profiles of the SHD

Profile of SHD* HR/STR/SI	Code and rating procedure for the appointment of AGP**
112	112, 111, 141, 212, 113
113	113, 112, 213, 212
121	111, 141, 212, 112
122	112, 141, 111, 212, 113, 213
123	113, 112, 213, 212
211	111, 212, 112
212	212, 112, 111, 141, 213
221	111, 212, 112
222	212, 112, 111, 141, 213, 312

311	212, 312
321	312, 212

*The SHD profile is the HR/STR/SI ratio, where 1 is an increased value of the indicator; 2 is a normal value of the indicator; 3 is a decreased value of the indicator.

** The AGP code is the effect of the AGP on the HR/STR/SI, where 1 is a decrease in the indicator; 2 is not a decrease in the indicator; 3 is a decrease in the indicator.

The telemetric mode of the Device allows collecting, processing and analyzing the main SHD indicators via cellular communication or home Internet, and if they are not available, they can be transmitted to the attending physician via USB flash memory for further processing and comprehensive analysis. The format of daily out-of-office monitoring allows for precise selection of the AGP dosage; if necessary, the daily rhythm of prescriptions or their frequency is changed. In case of negative trend values, the AGP is replaced.

The experience of testing the proposed approach shows a more than 2-fold increase in the effectiveness of AG treatment.

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提高聚合物砂混合物与工程废料在加热混合装置中的混合质量
IMPROVING THE QUALITY OF MIXING A POLYMER-SAND COMPOSITION WITH ENGINEERING WASTE IN A HEATING AND MIXING DEVICE

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摘要：本文介绍了聚合物砂组合物的原材料，并论证了使用基于改性二次聚合物材料、利用工程废料生产该组合物的混合加热装置的合理性。结果表明，当工程废料的含量增加到15%时，通过将砂粒（直径<3毫米）与金属部件（直径<1毫米）压实，可以提高聚合物砂组合物的质量；环氧粉末的存在可以增强聚合物与填料的机械粘附性，增强其与模具废料的熔合能力，提高机械强度并减少孔隙率。

关键词：聚合物砂组合物、混合加热装置、聚合物、机械工程模具废料。

Abstract. *The article provides a description of the raw materials used in the polymer-sand composition, and justifies the use of a mixing and heating device for its production based on modified secondary polymer materials using engineering waste. It has been established that an increase in the amount of engineering waste to 15% improves the quality of the polymer-sand composition by compacting the sand particles (d<3 mm) with a metal component (d<1 mm), the presence of epoxy powder increases the mechanical adhesion of the polymer to the filler, enhances the ability to fuse with tooling waste, and improves mechanical strength and reduces the number of voids.*

Keywords: *polymer-sand composition, mixing and heating device, polymers, mechanical engineering tool waste.*

Currently, there is an increase in unprocessed polymer waste worldwide. In the last 5 years alone, their number has increased by 220 million tons, therefore, there is a need for the recycling of this type of raw material. Some of the applications of polymer components are:

- floor coverings, manufacture of facade panels and other.;
- anti-corrosion protection of metal and reinforced concrete structures;

- production of glass and basalt plastic pipes, reinforcement and flexible connections in three-layer exterior wall structures, connecting fittings (couplings, fittings and so on.);

- manufacture of pipelines and lattice structures.

At chemical enterprises, recycling, mechanical engineering, in the metallurgical industry, floor coverings fail after 2-3 years of use due to the aggressive effects of raw materials. Replacing traditional materials with raw materials, containing a recycled polymer component, significantly reduces the cost of repair work [1].

Another area for the use of polymer-sand compositions is the production of facing coatings for buildings and structures. Such compositions are used in the decoration of facades. The most common are polymer solutions using epoxy adhesives with the addition of elastomers: polychloroprenes, polyurethanes, etc., which reduces water permeability, allowing them to be used in all weather conditions.

In the production of building materials, a small range of polymer materials is used in the form of granules and powders. These include thermoplastic and thermosetting polymers with amorphous and crystalline structures. [1, 2]. Thermoplastic polymers can be repeatedly heated and hardened after cooling, and reactive plastics do not allow the above operations to be performed repeatedly, however, the use of solvents does not produce any results in relation to them. Elastomers have the properties of both thermoplastics and thermosetting plastics, and they have both advantages and disadvantages.

As noted above, one of the components of the polymer-sand composition is epoxy resin powder (table. 1). It increases the mechanical adhesion of the polymer to the filler due to the presence of tooling waste, therefore, it can be used as an independent coating applied by welding to metal surfaces..

Table 1

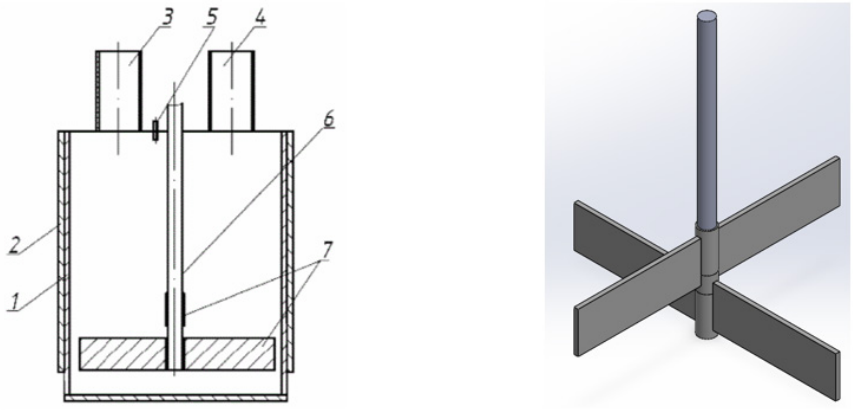
Main characteristics of the secondary polymer material

Naming of the indicator	Indicator values
Density, g/cm^3	1,5
Particle size, the residue on the sieve 40 mkm, %	48
Glass transition temperature, °C	98
Humidity, % by weight	0,4

An important component of a polymer-sand composition is the filler - it is most often sand with a particle size of 3 mm or less, it should not react chemically with other components of the mixture. Another component of the mixture that improves the properties of the final product is machine tool waste (a metal component), which is a powdered material with a particle size of less than 1 mm. The material is obtained through milling, turning, and other metalworking operations, which is inert and does not react with other components of the mixture.

A wide range of mixing equipment is used to prepare the polymer-sand composition, however, it is most efficient to use a universal unit for simultaneous heating and mixing of all components (fig. 1) [3].

The mixing and heating device contains a body 1 in the form of a vertical cylinder with a heater 2 and a working element 6, mounted vertically. It has 7 mixing elements at the bottom, located one above the other at a 90° angle to each other. A polymer dispenser 3 and a filler dispenser 4 are attached to the top of the body 1, and a thermocouple 5 is located between them. The device works as follows. The heating of housing 1 is activated by the heater 2. At the same time, polymer material, filler, and other mixture components are fed into dispensers 3 and 4. The working body 6 with mixing elements 7 rotates and mixes the polymer-sand composition. At the same time, the binder, mixing with the filler and melting, envelops the filler particles, providing mechanical adhesion of the composition components [3].



a) *b)*

Figure 1. *A mixing and heating device for producing a polymer composition: a – general view of the installation; b – working body*

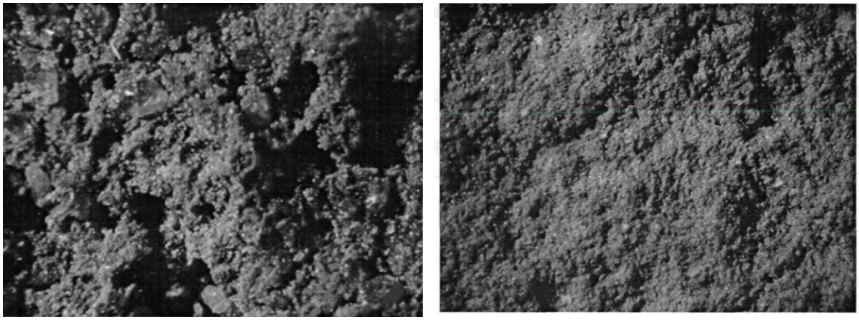
Mixing and heating for 5 minutes at t=130°C two formulations with a ratio of components to the total composition of the polymer composition (epoxy polymer – 20%, high-pressure polyethylene – 30%) were subjected to:

- the first sample contains - 40% quartz sand, 10% – engineering waste from tools (fig. 2, a);
- the second sample contains - 35% quartz sand, 15% – engineering waste from tools (fig. 2, b).

A dispersed-reinforced polymer-sand composition is a material consisting of solid particles distributed in a polymer matrix formed by mechanical adhesion.

The formation of a connection between these components depends significantly on the contact area between them — the actual and maximum (molecular) contact areas. The actual contact area is determined by the actual surface area of the two materials. It is smaller than the molecular contact area due to the presence of irregularities and defects on the surfaces of the contacting components. The polymer binder penetrates the pores and cracks of the filler particles. After hardening, the polymer forms strong mechanical bonds with the solid particles, creating a stable connection. This mechanism ensures high strength and stability of the composite under significant mechanical loads.

The analysis of the polymer composition structure showed (fig. 2, a), that there are voids, caused by the uneven distribution of mass during mixing and heating, as well as an insufficient amount of tool waste, amounting to 10% of the total amount, since they increase mechanical adhesion when combined with epoxy powder.



a) *b)*

Figure 2. *Photos of polymer-sand composition samples: a - first sample; b - second sample*

In the second sample (fig. 2, b) the content of tool waste has been increased to 15%, This significantly compacted the structure of the polymer-sand composition. This sample is characterized by a more uniform layout, since the polymer component is more evenly distributed around the filler particles due to the compacting of the sand particles (d<3 mm) with a metal component (d<1 mm), since the diameter of the voids between four adjacent sand particles is approximately equal to 0,33$d_{п}$ ($d_{п}$ – diameter of sand particles) [4], that is, a metal component is inserted into this space, which contributes to the formation of a polymer-sand composition with the required mechanical strength. At the same time, a small number of voids are observed, the size of which is slightly larger than the size of the individual components of the polymer-sand composition [5].

Conclusions.

1. The raw materials used to prepare the polymer-sand composition were analyzed, which showed, that polymers (thermoplastics and elastomers), mineral filler (sand), and engineering waste (metal shavings) are the most preferred.

2. A mixing and heating device for producing a polymer-sand composition and a working body were proposed and used, consisting of mixing elements located one above the other and at a 90° angle to each other, which allow for even distribution of the components.

3. Two samples with the same composition were studied, differing in the percentage of quartz sand and engineering waste with particle sizes less than 3 and 1 mm, respectively. The analysis showed that when the amount of engineering waste increased to 15%, the composition of the mixture became more homogeneous, since the polymer component is distributed around the filler particles by compacting the sand particles (d<3 mm) with a metal component (d<1 mm), since the diameter of the voids between four adjacent sand particles is approximately equal to $0{,}33d_{п}$ ($d_{п}$ – the diameter of the sand), In other words, a metal component is introduced into this space, which helps to form a polymer-sand composition with the required mechanical strength.

4. When epoxy resin powder is present in a polymer-sand composition, the mechanical adhesion of the polymer to the filler increases, including due to the presence of tooling waste, as the ability to fuse with epoxy resin increases, which increases the mechanical strength of the samples and reduces the number of voids.

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提高温石棉分选机中温石棉水泥搅拌装置的效率
IMPROVING THE EFFECTIVENESS OF THE CHRYSOTILE CEMENT MIXING MECHANISM IN THE CHRYSOTILE FRACTIONATING MACHINE

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摘要：本文探讨了温石棉作为建筑产品生产主要材料的情况，介绍了其主要产品种类，并重点介绍了其主要特性和优势。文中描述了温石棉与水泥混炼和混合的主要工艺流程。文中指出了转轮中辅助元件运行过程中存在的问题。此外，本文还探讨了使用更高效、更高效的搅拌系统替代温石棉混炼机中标准静态元件的可能性。

关键词：温石棉水泥原料、混炼机、转轮、搅拌系统、辅助元件和静态元件。

Abstract. *The article discusses chrysotile as the main material for the production of construction products, presents the main range of products made from it, and highlights their main characteristics and advantages. It describes the process of the main technological stage, which involves kneading and mixing chrysotile with cement. The article identifies problems associated with the operation of auxiliary elements in the runners. It also explores the possibility of replacing and using more efficient and productive mixing systems instead of the standard static elements in the chrysotile kneading machine.*

Keywords: *chrysotile-cement raw materials, kneading machine, runners, mixing systems, auxiliary elements, and static elements.*

The country's construction industry is characterized by the prevalence of pitched roofs in new buildings, and existing roof structures often require renovation. However, many imported solutions are unsuitable for Russia's extreme climate, where roofs are exposed to severe frosts down to -40°C in winter and intense heat up to +80°C in summer. In these conditions, chrysotile cement prod-

ucts have gained a strong foothold due to their economic attractiveness and durability. Chrysotile cement stands out as a highly reliable building material due to its unique properties. It has outstanding strength and can withstand extreme temperatures ranging from -70°C to +70°C, making it suitable for use in various climatic zones.

This material is resistant to fire (it belongs to the НГ class), moisture, frost, and corrosion or decay. In addition, it does not conduct electricity, does not interact with electromagnetic fields and radiation, and does not accumulate static charge. Moreover, chrysotile cement has low thermal conductivity and effectively absorbs sound, which significantly improves the comfort of living in rooms where it is used.

The service life of the material can reach up to fifty years, emphasizing its durability and economic benefits. Chrysotile cement building materials (Fig. 1) are easy to handle and affordable, making them a competitive choice compared to other alternatives. Additionally, their ability to be painted in various colors makes them suitable for creating aesthetically pleasing structures.

Chrysotile, also known as chrysotile asbestos, is widely used in the production of cement materials due to its reinforcing properties. This mineral, which belongs to the serpentine group, typically has a white or yellow-green hue and is characterized by its fibrous structure, with fibers ranging in length from a fraction of a millimeter to 16 centimeters. The production of chrysotile cement materials involves the use of Portland cement grades 400 and 500, which is the central step. Thus, chrysotile is an important component for increasing the strength of the brittle cement base in such materials [3, 4].

Chrysotile material stands out due to its outstanding physical and chemical characteristics. It is stronger than steel, with a tensile strength of over 3000 MPa. Additionally, it is an excellent insulator and does not conduct electricity, making it indispensable in various industrial applications. Chrysotile is also non-flammable, can withstand high temperatures up to 1500°C, and has excellent heat resistance.

a) b) c)

d) e) f)

Figure 1. *Products made from chrysotile cement raw materials: a - corrugated slate; b - facade boards; c - pipes; d - siding; e - electrical boards; f - asbestos fabric*

In addition, this material is insoluble in water and resistant to aggressive chemicals such as alkalis, as well as oxygen, ozone, and ultraviolet light. Another important advantage of chrysotile is its chemical inertness and the absence of harmful emissions into the environment in the form of gases or vapors.

Chrysotile, used in the construction industry, is present in numerous products, including facade boards and siding (Fig. 1, b, d), as well as in the production of both pressure and non-pressure pipes of various sizes with necessary connecting elements (Fig. 1, f). In addition, the material is used in the production of heat-resistant and electrical insulation products, such as cardboard, cords, fabrics, and components for friction and braking systems (Fig. 1, e). Electrical arc-resistant boards occupy a special place (Fig. 1, f). Chrysotile cement sheets of various shapes, from flat to wavy, are produced for roofing and wall structures, as well as special tiles (Fig. 1, a, b).

One of the most important stages in the production of products is the process of kneading chrysotile in the runners. The SMA-302 runners (Fig. 2) use a dry method of kneading, with a slight amount of moisture to simplify the process. They are designed for the preliminary kneading (fluffing) of asbestos in a moistened state and are a batch-type machine. The main components include an unloading mechanism, a moistening mechanism, a kneading mechanism, a mixing mechanism, an unloading mechanism, a base, a drive, and a frame. The asbestos mixture prepared in the preparation department is fed into the hopper of the loading device, and then into the hopper of the screw feeder in an amount of 127-132 kg.

At the same time, the asbestos is moistened by supplying a portion of water through the humidifier. The moistened asbestos is subjected to kneading by the kneading rollers. The asbestos is loosened, mixed, and fed in a uniform layer onto the rollers by the mixing scrapers. The asbestos processing cycle lasts for a certain amount of time, depending on the specified mode. At the end of the processing cy-

cle, the unloading mechanism opens, and the asbestos is intensively unloaded by the scrapers. The design of the machine, when compared to existing ones, allows for increased productivity by increasing the portion size and reducing processing time. The incorporation of the drive conical pair into the housing, as well as the reinforcement of several machine mechanisms, has significantly improved its reliability.

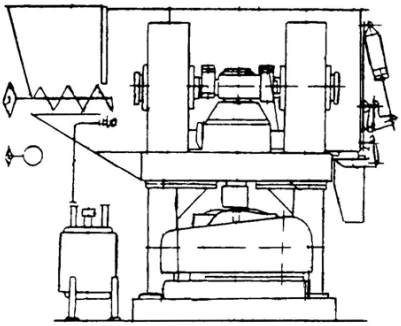

Figure 2. *General view of the SMA-302.01 machine*

An important component of this machine is the mixing unit, as it is where the most compression of the kneaded material occurs, resulting in the raw material not receiving the necessary kneading and the resulting mixture not achieving the desired characteristics. Insufficient kneading can lead to further problems with the machine's performance and the production of substandard products. There are several options for replacing the traditional mixing element with more efficient solutions (Fig. 3).

Forced-action mixers with vertically positioned mixing shafts are the most widely used type of mixer, both in terms of the number of units produced and the number of different sizes. According to their design, they are divided into mixers with eccentrically and concentrically arranged shafts relative to the central axis of the mixer (Fig. 3). Mixers with eccentrically arranged shafts are divided into straight-flow mixers with a fixed bowl (Fig. 3, b), counter-flow mixers with a fixed bowl (Fig. 3, c), and counter-flow mixers with a rotating bowl (Fig. 3, d) [1, 2].

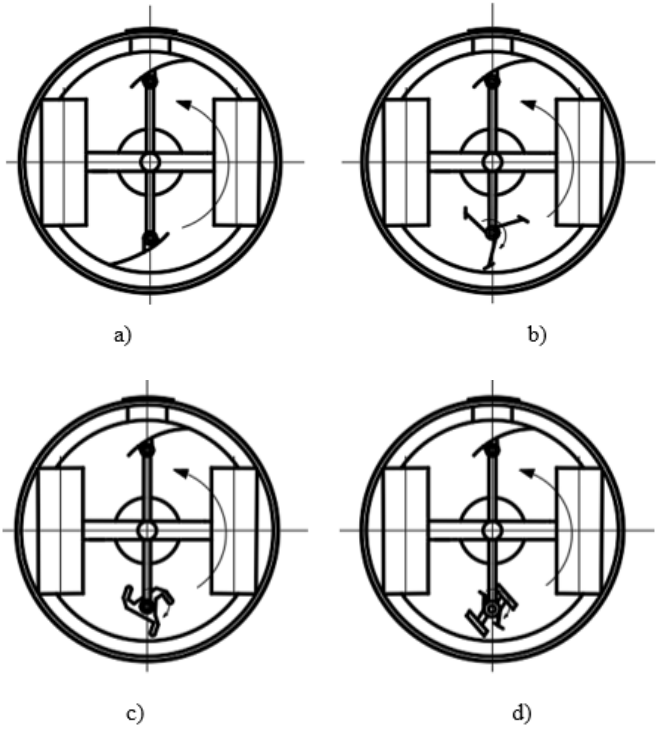

Figure 3. *Options for mixing devices:*
a – auxiliary and static elements; b – straight-flow with a vertically positioned shaft and a fixed bowl; c – counter-flow with a vertically positioned shaft and a fixed bowl; d – counter-flow with a vertically positioned shaft and a moving bowl

The mixing stars, which rotate around the vertical axis of the mixer, ensure mass transfer with minimal material movement, resulting in high-quality mixing and a high degree of material homogeneity, even in the production of complex mixtures. The mixer is driven from above by an electric motor and gearbox, which drives a rotor with a side scraper. The mixing stars are driven by a planetary gear system integrated into the rotor. Depending on the size of the mixer, one, two, or three mixing stars are used. The blades in planetary concrete mixers give the mixture particles a complex circular motion and collide with them in counter-flow. This solves the problem of "mixing" fine-grained components into the main volume of the mixture [5, 6].

Thus, the article provides a description of products made from chrysotile cement raw materials. It also discusses the process of using rollers to knead the

material. The article presents options for replacing the static mixing element with a more efficient design.

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乌沙科夫海军上将国立海事大学虚拟导游服务开发
DEVELOPMENT OF VIRTUAL GUIDE SERVICE AT ADMIRAL USHAKOV MARITIME STATE UNIVERSITY

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摘要：本文致力于为乌沙科夫海军上将国立海事大学开发一款虚拟导览应用，该应用充分利用了现代3D建模技术和人工智能技术。首先，使用优化的低多边形网格和烘焙法线贴图，在Blender 4.4中创建了该设施的详细3D模型；然后，将场景导出到虚幻引擎5.4.4，以便通过Nanite和Lumen进行高质量渲染，并配置交互元素、碰撞和兴趣点。本文特别强调构建一个互联的知识库——包含大学建筑和学术项目的英文信息——并通过其SDK将其集成到Convai对话系统中。该系统能够以最小的延迟生成连贯、语义准确的俄语文本和语音响应，从而实现交互式虚拟导览体验。本应用展示了一个统一的用户界面，其中包含信息卡、对话窗口、迷你地图和反馈系统，并演示了该应用的实际运行示例以及知识库的集成。所述方法可提供高度逼真的3D环境、广泛的设备兼容性，并满足当代数字教育服务的需求。

关键词：虚拟导览、3D建模、虚幻引擎5、Blender、Nanite、Lumen、Convai对话代理。

Abstract. *The article is devoted to the development of a virtual-guide application for Admiral FF Ushakov State Maritime University that leverages modern 3D-modeling technologies and artificial intelligence. A detailed 3D model of the facility was created in Blender 4.4 using an optimized low-poly mesh with baked normal maps; the scene was then exported to Unreal Engine 5.4.4 to enable high-quality rendering via Nanite and Lumen, and to configure interactive elements, collisions, and points of interest. Particular emphasis was placed on building an interconnected knowledge base—containing information (in English) about the university's buildings and academic programs—and integrating it into a*

Convai dialogue system via its SDK. This system generates coherent, semantically accurate Russian-language text and voice responses with minimal latency, enabling an interactive virtual-guide experience. The work presents a unified user interface featuring information cards, a dialogue window, mini-maps, and a feedback system, and it demonstrates examples of the application in action along with the knowledge-base integration. The described approach delivers highly realistic 3D environments, broad device compatibility, and meets contemporary requirements for digital educational services.

Keywords: *virtual guide, 3D modeling, Unreal Engine 5, Blender, Nanite, Lumen, Convai dialogue agent.*

Introduction

In the context of the rapid digital transformation of universities, there is a need for innovative services that increase the efficiency and accessibility of information. Virtual guides with 3D models and artificial intelligence allow users to quickly, clearly and interactively immerse themselves in the digital environment, making educational and cultural spaces more accessible and understandable to a wide range of people.

An analysis of scientific publications of recent years shows that the development of virtual guides is becoming increasingly popular in the educational environment [1-4]. Many articles note a significant increase in interest in the creation of interactive platforms based on modern 3D engines (Unreal Engine, Unity) [5] using artificial intelligence and natural language processing (NLP) technologies [6-8]. In this paper, a 3D model of the Marble Hall of the Admiral F.F. Ushakov State Medical University was built using Blender 4.4, followed by baking normal maps onto an optimized low-poly mesh and exporting the scene to Unreal Engine 5.4.4. Next, Nanite for rendering and Lumen for dynamic lighting were used, simplified collisions and points of interest were configured, the result of the work is presented in Figure 1.

Figure 1. *Application interface*

The work proposes an approach to creating a realistic model of a room, a knowledge base for artificial intelligence, and a dialogue system Convai that supports semantically related responses.

Materials and methods

User testing is a key stage in the creation of interactive applications, especially such complex ones as virtual guides using artificial intelligence. The purpose of this stage is to obtain an objective and comprehensive assessment of the quality of user interaction with the system, as well as to identify all possible shortcomings that may not be obvious at the development stages. During the implementation of the virtual guide project for the GMU campus, special user testing was conducted, during which university students had the opportunity to directly interact with the application in conditions as close as possible to real use.

A special environment was organized for testing, allowing participants to freely use the virtual guide and perform pre-defined standard tasks. Initially, participants received a short briefing, where the goals and objectives of the testing were briefly explained, after which users began to independently familiarize themselves with the virtual guide. An important feature of this testing was that users were not provided with additional tips on how to use the application - thus, the intuitiveness and naturalness of interaction with the system were checked.

One of the most important aspects that were tested during the testing was the effectiveness of the intelligent dialogue built on the Convai platform. The results of the virtual guide are presented in Figure 2. Participants were asked to ask free questions related to the university campus, the location of departments, classrooms and events. Monitoring user behavior and analyzing their interactions allowed us to objectively assess how successfully the virtual guide handles natural language processing and how relevant the answers are to users.

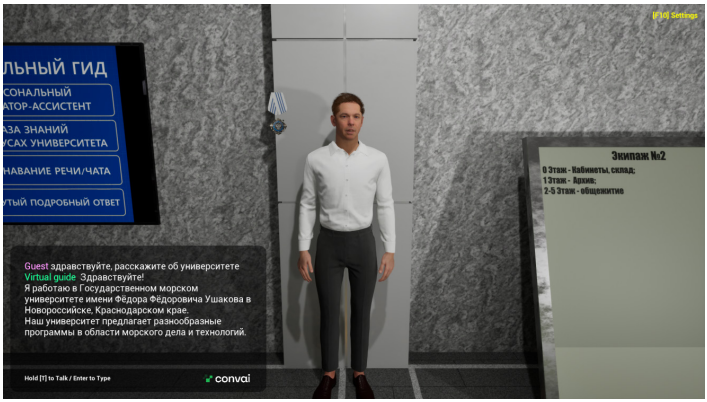

Figure 2. *Chat with a virtual guide*

An important result of the testing was the confirmation that most users do not experience difficulties when using the application interface. This concerns, first of all, navigation through the three-dimensional model of the campus and interaction with interactive information objects.

Results

The analysis of the obtained results also revealed that the visual elements of the interface are perceived by users as clear and logical. Participants noted that such elements significantly facilitate interaction and help navigate the virtual space faster. In addition, during the user testing, some points were identified that require further improvements. For example, some users encountered difficulties in formulating complex queries to the intelligent system. This was especially evident in cases where the queries were multi-stage or involved specifying several parameters simultaneously.

Such scenarios required the virtual guide to ask additional questions to the user to clarify the request, which was not always implemented optimally in terms of convenience and naturalness of interaction. Another aspect noted by the test participants is related to the filling of the virtual guide's knowledge base. Users expressed a desire to see more information, as well as a more detailed description of the educational and public areas that are presented in the virtual environment.

A unified user interface was created on UMG with information cards, a dialog box, mini-maps and a feedback system, resulting in a portable application that works stably on most working budget PCs and fully meets the requirements for modern digital university services.

Unlike existing solutions, it is proposed to use immersive and interactive approaches that provide deeper user interaction with the university infrastructure. This will create a unique user experience and increase the level of engagement.

The virtual guide is designed taking into account the specific features of the GMU infrastructure, which will ensure accurate and up-to-date information for users. This solution differs from universal platforms that do not take into account the individual needs of specific institutions.

The proposed system will include the ability to integrate with existing databases and information systems of the university, which will allow information to be quickly updated and maintained up-to-date.

Research and implementation of AI tools for creating and supporting the work of a virtual guide adds novelty, as it will automate processes and improve the quality of interaction.

The development of a 3D model of the marble hall of the Admiral F. F. Ushakov State Medical University will contribute to improving the visual perception and orientation of users, which is a new aspect in the field of virtual guides.

Development of virtual guides based on 3D modeling and artificial intelligence-one of the most promising and sought-after areas of modern digital technol-

ogies. These systems successfully combine convenience, information content and innovation, providing new opportunities for the educational environment, cultural institutions and business.

Note that more detailed multimedia materials would significantly increase the level of involvement and interest in using the application. An example of the illustrations is shown in Figure 3.

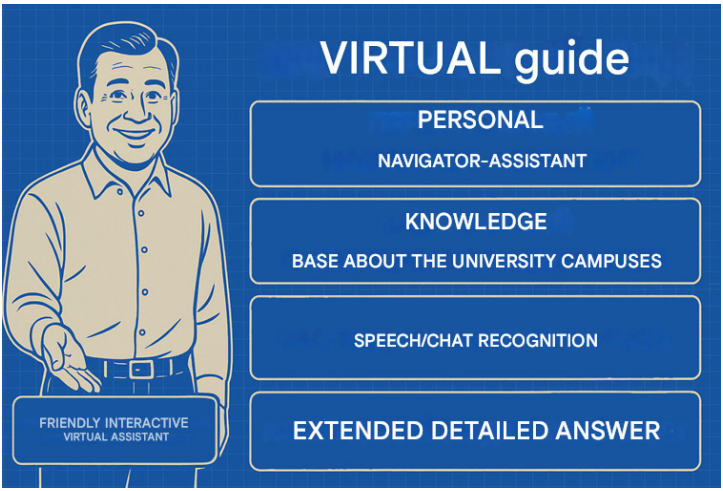

Figure 3. *One of the fragments of the instructions for using the virtual guide*

Based on the feedback collected, recommendations were formulated to improve the virtual guide. The most important recommendation was to continue refining the virtual guide's intellectual capabilities on the Convai platform by additionally training the model using examples of queries received from users during testing. This will further improve the quality of processing and understanding natural language, especially in complex dialogue scenarios. It was also proposed to significantly expand the volume and variety of information materials posted in the knowledge base. Such a measure will significantly increase the relevance and usefulness of the virtual guide for end users, which will have a positive impact on user perception and satisfaction.

Based on the user experience analysis, recommendations were developed to improve the structure and wording of interface messages presented to the user. Test participants noted that small changes in the texts of information cards and dialog messages can significantly improve the perception of information and reduce the likelihood of misunderstanding or misinterpretation of the virtual guide's responses.

Discussion

It is worth noting that conducting full-fledged user testing confirmed the need to include this stage in the overall development process of such complex applications as intelligent virtual guides. It is real feedback from the target audience that helps developers quickly detect and eliminate those shortcomings that could not have been identified at previous stages of design and implementation. The data obtained during testing indicate a high overall user satisfaction with the final product. Most participants confirmed that interaction with the virtual guide is natural and convenient, and the intelligent component significantly simplifies the search and receipt of necessary information on the university campus.

Thus, the conducted user testing allowed not only to confirm the effectiveness of the implementation of the virtual guide for the GMU campus, but also to identify specific areas for further improvement. The implementation of the proposed recommendations will significantly improve the quality of user interaction with the application, increase the degree of their involvement and satisfaction, and ensure maximum compliance of the product with the real needs and expectations of users.

It should be emphasized that it is precisely such stages of user testing that help ensure the success and demand for the digital products being created, especially such complex and innovative ones as intelligent virtual guides. In the future, it is recommended to conduct such tests regularly at all key stages of the development and scaling of a virtual guide to ensure a high level of user experience and quality of services provided.

The main advantage of the work is the creation of a knowledge base for integration into the Convai dialogue system, which ensures the formation of responses with a delay of no more than five seconds; an example of a demonstration is presented in Figure 4.

Figure 4. *Demonstration of the virtual guide's work*

An interconnected knowledge base has been developed, consisting of the files buildings (description of buildings, service and educational premises) and students (data on areas of training and student distribution), which in turn are filled in English, integrated into the project via Convai SDK and provide for the formation of Russian-language text and voice responses. A demonstration of the knowledge bases is shown in Figure 5.

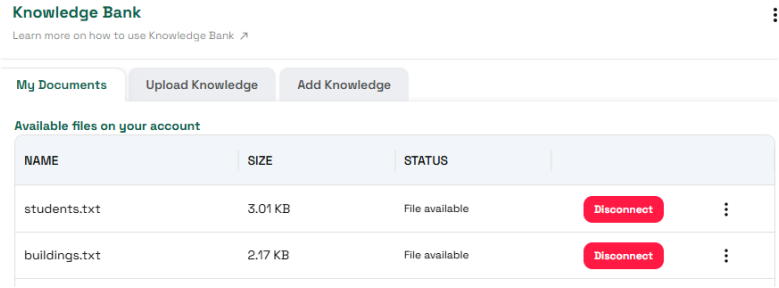

Figure 5. *Knowledge bases integrated into the virtual guide service*

Conclusion

The theoretical significance of the study lies in the development of dialog navigation systems that integrate immersive technologies such as 3D modeling of rooms and dialog interfaces with virtual guides.

The practical value of the work is confirmed by the possibility of scaling the proposed methodology to other educational and corporate campuses. Thus, this study represents a significant contribution to both the theoretical basis and the practical application of immersive technologies in educational contexts.

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基于NSGA-II的空冷汽轮发电机转子副槽管道形状优化
OPTIMISATION OF AIR-COOLED TURBOGENERATOR ROTOR SUB-SLOT DUCT SHAPE BY NSGA-II

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摘要：在对带径向通道的汽轮发电机转子绕组直接空冷通风系统进行数值计算的背景下，采用Pareto遗传算法NSGA-II来解决副槽通道几何形状的多准则优化问题。选取两个优化准则进行分析：总压降和单个通道内最大速度与通道平均速度之比。从Pareto前沿的解集中选择一个解，用于与副槽通道截面为常数的初始配置进行比较。

关键词：汽轮发电机，转子绕组通风系统，RANS仿真，FVM，多准则优化，NSGA-II。

Abstract. *In the context of numerical calculation of the ventilation system of direct air cooling of the turbogenerator rotor winding with radial ducts, the Pareto genetic algorithm NSGA-II is employed to address the problem of multi-criteria optimisation of the sub-slot duct geometry. Two optimisation criteria were selected for analysis: total pressure drop and the ratio of the maximum velocity in one of the ducts to the average velocity of the ducts. From the set of solutions of the Pareto front, one is selected for the purpose of comparison with the initial configuration at a constant cross-section of the sub slot duct.*

Keywords: *Turbogenerator, rotor winding ventilation system, RANS simulation, FVM, multi-criteria optimisation, NSGA-II.*

Introduction

The primary trend in the development of contemporary heavy electrical engineering is the augmentation of the unit capacity of turbogenerators. It is imperative

to acknowledge the pivotal role that rotor winding heating plays in constraining turbine generator capacity. The majority of the world's foremost generator manufacturers utilise gas cooling for machines with a capacity of up to 400-500 MW, and hydrogen cooling for machines with a capacity of up to 1300-1500 MW (with a two-pole design).

The issue of effective gas cooling of turbogenerator rotors has been a long-standing priority in the field of turbogenerator engineering, both domestically and on a global scale [1].

In the context of air cooling for high-power turbogenerators, the optimal cooling system is identified as the rotor self-ventilation configuration through the sub-slot duct. This system is gaining popularity in the field of hydrogen cooling of the field winding due to its high efficiency. The principle of operation is based on the distribution of gas flows through radial ducts in the field winding from an axial duct common for each slot, located below the bottom of the slot (see Figure 1).

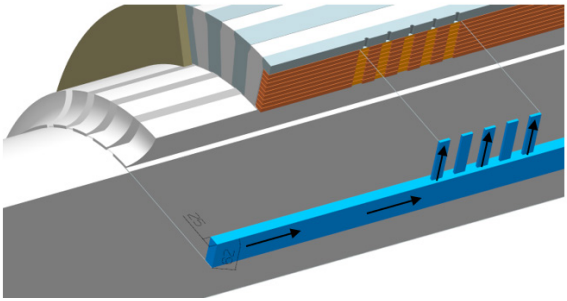

Figure 1. *Schematic of the air flow and calculation model (blue).*

It is evident that reliable tools for studying complex aerodynamic processes are well adapted to practical applications of computational fluid dynamics (e.g. ANSYS Fluent, ANSYS CFX, Star-CCM).

The paper presents a method of numerical aerodynamic calculation of a turbogenerator rotor with self-ventilation of the excitation winding from a sub-slot duct with both constant and stepped profile sections. The problem of multi-criteria optimisation of the sub-slot duct geometry is solved by employing the genetic algorithm of non-dominated Pareto sorting (NSGA-II) [2].

The authors [3, 4, 5] demonstrate the efficacy of the NSGA-II algorithm in optimising the design of electrical machines and distributed energy systems. This algorithm is considered to be a promising evolutionary method.

The NSGA-II algorithm functions with a population, defined as a set of individuals, where each individual constitutes a specific subpathway configuration. The initial parent population is constituted by a randomly generated vector of

solutions in the search space. The subsequent stage of the algorithm's operation involves the generation process:

- The creation of a new daughter population is achieved by the application of genetic operators (selection, crossover and mutation) to elements of the parent population. The daughter population is typically equivalent in size to the parent population;
- The amalgamation of the parent and daughter populations into a unified entity is the primary objective;
- The population is to be sorted according to target function values. Each individual is assigned a rank and a local crowding distance (sometimes termed crowding distance, preemptive distance, or distance in criterion space);
- The objective is to reduce the resulting population to the size of the parent population. This is achieved by evaluating individuals by rank and crowding distance;
- The utilisation of the reduced population as the parent population in the subsequent generation is to be recommended.

1. Numerical simulation and optimisation problem

The steady-state, isothermal, turbulent flow of air with constant density is considered. The calculation is based on the physical properties of air at a temperature of 40 ˚C.

Meshing and modelling are performed using Reynolds equations on the basis of a polyhedral mesh by the finite volume method in the ANSYS Workbench software package using the Fluent solver. Furthermore, there has been integration of the code with The MathWorks Matlab version 15.

The Reynolds stresses are determined using a realisable k–ε turbulence model in conjunction with a bilayer Wolfstein model. This model consists of two transport equations (the equations for the turbulent kinetic energy and dissipation) allowing describe turbulence in space and time. This model is semi-empirical and relies on a phenomenological approach and experimental results. The standard k–ε model uses the following transport equations for k and ε [6, 7]:

$$\frac{\partial(\rho k)}{\partial t} + \nabla \cdot \rho k \mathbf{U} = \frac{\mu_t}{\sigma_k} \Delta(k) + 2\mu_t S_{ij} \cdot S_{ij} - \rho\varepsilon,$$

$$\frac{\partial(\rho\varepsilon)}{\partial t} + \nabla \cdot \rho\varepsilon \mathbf{U} = \frac{\mu_t}{\sigma_\varepsilon} \Delta(k) + C_{1\varepsilon} \frac{\varepsilon}{k} 2\mu_t S_{ij} \cdot S_{ij} - C_{2\varepsilon}\rho \frac{\varepsilon^2}{k},$$

where

$\mu_t = \rho C_\mu \frac{k^2}{\varepsilon}$, is turbulent viscosity (in m^2/s);

S_{ij} are components of deformation rate (in m/s);

$C_\mu = 0.09, \sigma_k = 1.00, \sigma_\varepsilon = 1.30, C_{1\varepsilon} = 1.44, C_{2\varepsilon} = 1.92$ are adjustable constants for standard k–ε model.

The parameters of the dimensionless coefficient y+ that characterise the boundary wall flow for the model under consideration are less than 40.

The validation of the numerical calculation methodology with experimental data is reflected in the publication [8]. The geometry of a full-scale model of a turbogenerator rotor with self-ventilation from the sub-slot duct, along with the results of studies conducted by E.I. Gurevich and V.I. Gerasimov [9], are taken as a calculation model.

The design area is characterised by the following parameters:

- The length of the rotor is equivalent to half of the design area (1960 mm).
- The cross-section of the sub-slot duct is 25x62 mm^2.
- The cross-section of the radial duct is 6x123 mm^2.
- The rotation speed is 1000 rpm.
- The velocity at the inlet to the sub-slot duct is taken from the results of tests and is equal to 27 m/s.
- The condition of free exit is set at the exit from the radial ducts.

The geometrical characteristics of the radial ducts (pitch and shape of ducts, dimensions of cross-section, radial length of the duct in the winding) were assumed to be constant. It was found that the sub-slot duct profile was subject to variation at a given cross-sectional area of its entrance window.

The sub-slot duct geometry parameters were optimised using a heuristic search algorithm, namely the genetic algorithm NSGA-II.

In this study, two optimisation criteria have been selected for analysis. Firstly, the total pressure drop in the ventilation path (ΔP) is examined, as this is a key indicator of ventilation losses. Secondly, the ratio of the maximum velocity through the ducts to the mean velocity (v_{max}/v_{mean}) is investigated. This value indicates the degree of non-uniformity of the field winding cooling.

The genetic algorithm is a system that utilises a set of parameters to guide the process of optimisation. In this context, four variable parameters are selected, namely the length (L) and height (H) of each of the two stages (steps). The distance from the air inlet to the commencement of the initial radial duct in the present problem formulation remains constant and equivalent to 644 mm. The length of the first step is measured from this constant value. The issue has been resolved for a period of ten generations, with the population size being set at fifty individuals per generation. From the set of solutions of the Pareto front, a single solution is selected for comparison with the initial configuration at constant cross-section of the sub-slot. The selection of a single solution is a complex task that is not addressed in this paper.

2. Analysing the results

As illustrated in Figures 2 and 3, the Pareto set of the first and last generation are reflected. In contrast, the last generation exhibited a more pronounced delinea-

tion of the front, accompanied by the presence of a Pareto-optimal state. The selection of a solitary solution from the Pareto set is determined by the decision maker, who employs a subjective evaluation of quality criteria and their interrelation with each other [5, 10]. In this paper, the issue is not addressed, and an arbitrary configuration is selected by the authors.

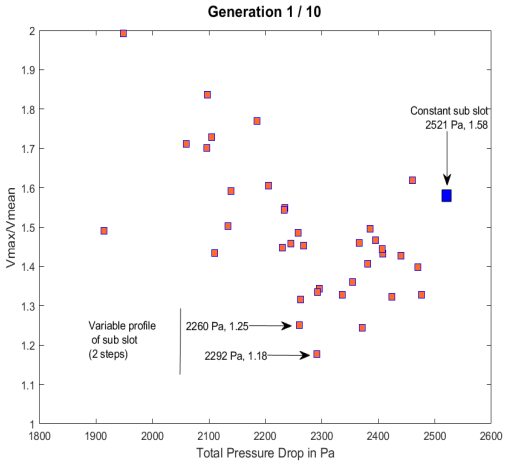

Figure 2. *Pareto set of the first generation.*

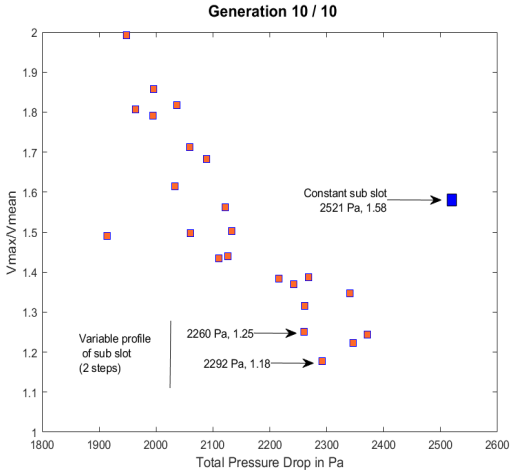

Figure 3. *Pareto set of the last generation.*

A comparison of the Pareto set and the baseline sub-slot duct with a constant cross-section reveals the potential for enhancement of the latter's shape. As illustrated in Figure 4, the velocity vector distributions in the longitudinal section of the model for the selected configuration from the Pareto set (H0 = 8.50 mm, L0 = 221.88 mm, H1 = 28.10 mm, L2 = 574.30 mm) are presented.

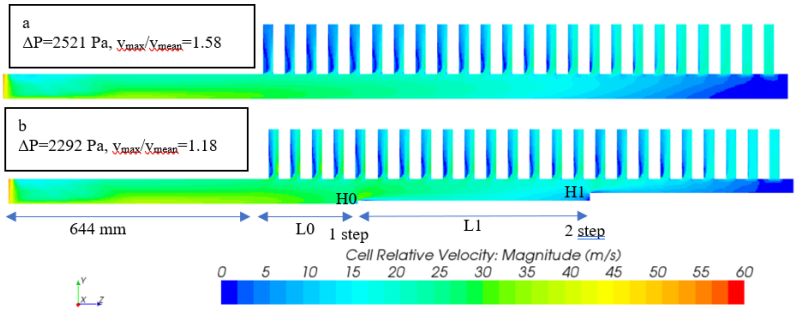

Figure 4. *Velocity vector distributions in the basic configuration with a constant sub-slot (a) and randomly selected configuration according to NSGA II (b).*

For instance, Figure 5 illustrates the air velocity distributions in the radial ducts along the rotor length for one of the configurations selected from the Pareto front with the baseline at constant sub-slot duct cross-section.

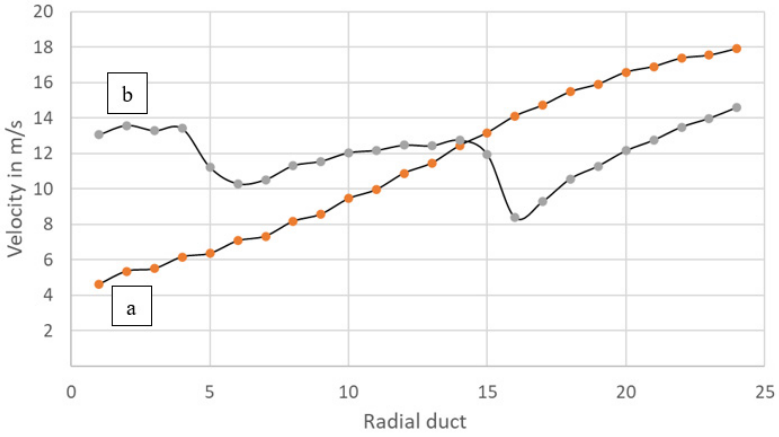

Figure 5. *Velocity distributions in the basic configuration with a constant sub-slot (a) and randomly selected configuration according to NSGA II (b).*

As demonstrated in the above comparison, the configuration determined by NSGA II exhibits a more uniform velocity distribution over the ducts (v_{max}/v_{mean} = 1.18) and reduced total pressure loss (ΔP = 2292 Pa).

It is important to note that the genetic algorithm independently generates a configuration that is widely used in the turbogenerators constructions without relative knowledge of the generator design itself, which is a unique ability of the algorithm. In the context of utilising the genetic algorithm in more intricate rotor cooling systems, a substantial enhancement in cooling parameters and a comprehensive optimisation of the design can be achieved.

Conclusion

It is evident that the optimisation performed, in conjunction with the randomly selected configuration from the Pareto set, has enabled a substantial reduction in the non-uniformity of air velocity distribution in the radial ducts along the rotor length. This outcome is particularly noteworthy given that only two stages in the sub-slot duct profile have been utilised.

The optimisation of the sub-slot duct, conducted in accordance with the NSGA-II method, has the potential to reveal new avenues for the reduction of local heating in the field winding. This can be achieved through the equalisation of the velocity vector distribution along the radial ducts or by implementing a specific law, with consideration for air heating along the sub-slot duct. This aspect assumes particular significance in the design of air-cooled turbogenerators of ultimate power.

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非线性多项式控制律系数集的计算
ON CALCULATING A SET OF COEFFICIENTS OF NONLINEAR POLYNOMIAL CONTROL LAWS

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摘要：本文研究了一种用于非线性控制系统优化问题的多项式控制律系数选取方法。文中给出了一些适用此方法的非线性控制对象示例。结果表明，多项式向量函数的数值系数由调整值确定，这些调整值应针对控制综合和优化问题进行求解。非线性镇定的品质是根据一组初始扰动和外部扰动所扰动的整个轨迹集合进行评估的。

关键词：非线性控制系统，优化，多项式控制律，轨迹集合，反馈控制，磁悬浮列车，实时反馈，镇定。

Abstract. *An approach to the selection of coefficients of polynomial control laws for optimization problems of nonlinear control systems is considered. Examples of nonlinear control objects for which this approach can be useful are presented. It is shown that the numerical coefficients of polynomial vector functions are determined as adjusted values which should be found for the control synthesis and optimization problem. The quality of nonlinear stabilization is estimated on the entire ensemble of trajectories perturbed by a set of initial and external disturbances.*

Keywords: *nonliner control system, optimization, polynomial control law, trajectories of ensemble, feedback control, MagLev, real-time feedback, stabilization.*

When synthesizing control systems for complex modern technical objects, it is often necessary to construct nonlinear control laws. Such control should be implemented in the controller, and the software should provide real-time feedback control [1].

The examples of tasks where nonlinear control laws are required are such tasks as magnetic levitation on high-speed maglev transport [2-4], plasma retention in tokamaks in real time [8], trajectory calculation and control in flight controllers of

multicopters [9]. The presented works show that these objects have highly nonlinear dynamics and are inherently unstable [5-7].

Well-known linear design methods for multidimensional vector controllers are based on a linearized representation of equations for control objects. Such linearization is performed in a multidimensional neighborhood of the equilibrium position or, as it is sometimes said, the required nominal operating mode of the system. But the difference in the behavior of the dynamics of linearized equations and a real object system functioning in real life increases very quickly, especially in the multidimensional vector space of regulation. Therefore, known linear approaches and algorithms for calculating optimal control are often difficult or impossible to extend and expand beyond the specified linearization neighborhood [9-15].

For example, among linear methods, methods based on solving matrix linear Riccati equations [11] are widely used, as well as, for example, optimization procedures based on metrics in spectral spaces [11-17] of Hardy. Again, we clarify that engineers often need to ensure and optimize the stability of a managed object in a much larger area of the state space than the above methods provide due to their limitations, in accordance with the requirements set by the customer.

This can be provided by nonlinear control laws designed on the real equations of dynamics of nonlinear devices. This has become very popular in modern technology [11-17]. To propose the form of the desired nonlinear control law, we define the requirements of smoothness and continuity of the vector functions of the control law so that the necessary mathematical background works for that, of the quality and speed of transient processes based on the penalty functions or an integral criterion, as well as the presence of initial and external disturbances that need to be worked out in accordance with engineering requirements [11].

Given these requirements, multidimensional polynomial control vector functions can be used. Then, the coefficients of the accepted polynomials are determined as the adjusted values during solving the synthesis and optimization problem in the controller. Now, these coefficients are the numerical values to be searched and adjusted as part of optimization. To calculate them, a variational approach can be applied in [18].

In this approach, numerical optimization of the searched parameters is performed based not on a single trajectory, but on a large set of nonlinear trajectories, defined as an ensemble of trajectories, and these simulated transient processes are distributed throughout the entire area of state space, of interest to engineers from the point of view of the requirements imposed on the system [18, 19].

This allows the engineer to estimate and obtain the desired quality of a nonlinear control system in presence of a given ensemble of initial and external disturbances in the desired area of the state space [20], as well as optimize the dynamics of the entire ensemble of nonlinear movements.

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氢氧化水的起源和产状
ORIGIN AND OCCURRENCE OF THE HYDROXIDE WATER

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1. Introduction.

Usually a water type is assigned while a share of any ion exceeds 20% of total equivalent mass of anions or cations [6]. This estimation originates from the concept of electrical neutrality of water and from the equality of chemical equivalents of cations and anions. If a relative concentration (percentage) of any ion exceeds 20% of a total equivalent mass of anions or cations (20 Eq%) such ion is called as the major and this major ion determines the water type. Piper [7] and Durov [2] diagrams are practically used to identify and graphically explicate water types.

Anions play the leading role for determination of the water type since their concentrations are more stable and informative about the formation and origin of the water. According to classical hydrochemical notions the three following anions, bicarbonate (HCO_3^-), sulfate (SO_4^{2-}) and chloride (Cl^-), usually define the type of water media. These three anions are proposed to be called the classical ones. Modern data convincingly confirm that under specific natural or technogenic geochemical conditions the anions of hydroxide (OH^-), nitrate (NO_3^-) and fluoride (F^-) also may become the major ones. These water types arise in peculiar geochemical conditions, therefore the three latter anions are proposed to be called specific.

Hydroxide water type is quite a rare specific hydrochemical phenomenon that was found in natural and technogenic water bodies. Its occurrence has a local character in natural and man-made springs, pools or aquifers. In such water bodies hydroxide ion dominates or it takes dominant place amongst another major anions. It is characterized by a strongly alkaline reaction with a pH of more than 10-11. Hydroxide water is mostly non-carbonate, therefore, does not belong to the carbonate system ($CO_3^{2-} – HCO_3^- – CO_2$).

2. The problem of hydroxide water detection

If the pH does not exceed 9, then values of hydroxide ion are negligible. Therefore, the existence of hydroxide water type is hardly possible in neutral or slightly alkaline water. But when the pH exceeds 10, OH^- concentrations become significant and even very high (fig. 1). In the water bodies near the earth's surface the concentration of hydroxide ions can be easily determined from pH:

$$pOH \approx 14 - pH; \quad (1)$$

$$[OH^-] = 10^3 \cdot 10^{-pOH}, \quad (2)$$

where $[OH^-]$ is the concentration of hydroxide in $mEq \cdot L^{-1}$.

The appearance of hydroxide water type is possible in water of high alkalinity where the pH exceeds 10-11. The water alkalinity is caused by many anions. It is generally accepted that in fresh waters with pH from 4 to 9, an alkalinity is mainly due to the ions carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-) because the concentration of the hydroxide ions is negligible. The titrimetric test method of water for carbonates and bicarbonates is very inaccurate. This method determines the actual pH, while the ions' concentrations are calculated according to the equilibrium of the carbonate system. Therefore, analysts often determine the composite alkalinity and register it of the carbonate ion only. But in highly alkaline water alkalinity is mainly due to hydroxide ions. Yet analysts sometimes define alkaline ions only as carbonates, even if there are no carbonate ions at all. Then hydrogeologists often incorrectly consider hydroxide waters to be carbonate.

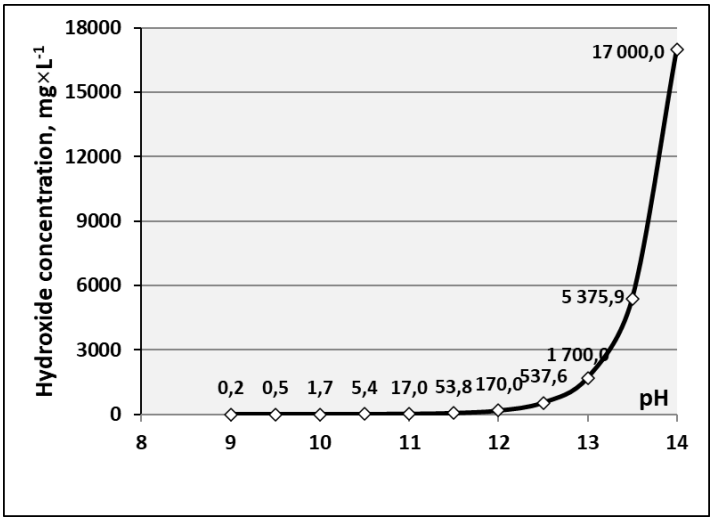

Figure 1. *Mass concentration of hydroxide ions as a function of pH*

This mistake causes a series of propagations. First, the TDS of water is wrongly calculated as the equivalent weight of the hydroxide ion is 1,7 times lighter than the carbonate ion has. Second, geochemical conditions of formation of the natural water composition are misunderstood. Subsequently, this error might negatively influence hydrochemical modeling.

On the other hand, some researchers consider pH only as a consequence of the carbonate system, interpreting its values as concentrations of carbonates (CO_3^{2-} – HCO_3^- – CO_2). Some hydrogeologists suppose pH to be an isolated index in no way related to the ionic composition of water.

Therefore, a hydroxide water type was ignored for two reasons. The first one is an imperfect analytical method in which [OH^-] can be confused with a carbonate ion [CO_3^{2-}]. The second reason is the subjective perception of pH as an isolated indicator and not as a combination of two ions: [OH^-] and [H^+].

3. Sources and occurrence of the hydroxide water

Hydroxide water is formed in water bodies as a result of different geochemical processes: dissolution of hydroxides minerals, hydrolysis of aluminosilicates, hydration of oxides, hydrolysis of carbonate salts, and also dissociation of water molecules.

1) The cases of dissolution of hydroxides minerals are described in Jordan [8]. For example Maqarin springs are known originated from sedimentary rocks that contain portlandite Ca(OH)2 (solubility – 1,7 g·kg-1). Portlandite dissolution causes the formation of hyperalkaline OH–Ca water type with pH from 12.1 up to 12.4:

$$\underset{Portlandite}{Ca(OH)_2} = Ca^{2+} + 2OH^-.$$

The hydroxide ion is the major in water of Maqarin springs. Although hydroxide has a low molar mass of (17 g·mole^{-1}) but it makes up almost 40% of the TDS taking the second place after calcium (table 1).

2) Hydrolysis of aluminosilicates in the absence of carbon dioxide (kaolinitization and serpentinization):

$$\underset{Anortite}{CaAl_2Si_2O_8} + 3H_2O = \underset{Kaolinite}{Al_2Si_2O_5(OH)_4} + Ca^{2+} + 2OH^-;$$

$$\underset{Forsterite}{2Mg_2SiO_4} + 3H_2O = \underset{Serpentine}{Mg_3Si_2O_5(OH)_4} + \underset{Brucite}{Mg(OH)_2}.$$

In the Northern Oman chloride-hydroxide sodium springs originated from the hydrolytic decomposition of ultramafic rocks (harzburgites) of the Semile ophiolite belt were studied [4]. The pH in these springs is about 12.5. Spring waters flow down in the wadi channels where hydroxide minerals (portlandite and brucite

$Mg(OH)_2$) are precipitated [4]. The origin of chlorides is due to the arid climate of this territory.

Table 1.

Chemical composition of the hydroxide water, mg·L^{-1}

Sampling Point	OH^-	CO_3^{2-}	SO42-	Cl^-	Ca^{2+}	Mg^{2+}	Na^+	K^+	TDS	Water type
Springs Maqarin, Jordan [8]										
Site M1	446	–	305	53	673	0,01	47	99	1623	OH–Ca
Site M2	274	–	273	136	429	0,01	51	15	1178	OH–Ca
Site M3	556	–	289	145	806	0,01	47	20	1862	SO_4-OH–Ca
Springs in ophiolite belt, Nothern Oman [4]										
Karku	102	–	5	343	76	0,3	265	11	801	OH-Cl–CaNa
Jebel-Awq	194	–	13	927	62	0,04	826	22	2043	OH-Cl–Na
Ash disposals of power plants *										
BGRES	576	8	170	48	554	5,4	71		1680	OH–Ca
NGRES	607	34	38	31	162	14,4	277		1180	OH–CaNa
TEC-1	477	80	32	28	291	0,01	20	11	935	OH–Ca
Nanticoke GS	193	36	950	28	450	0,1	67	16	1740	OH-SO_4–Ca
Drainage from slime disposal of alumina combine										
Sample 4-03	1661	5130	1113	233	44	7	5680	1800	16436	OH-CO_3 –Na
Sample 5-07	490	3390	973	396	31	5	4460	915	11530	CO_3 –Na

* Note: BGRES – Berezovskaya Power Plant, Russia; NGRES – Nazarovskaya Power Plant, ash aquifer, Russia; TEC-1 – Krasnoyarsk Heat and Power Plant, Russia [3]. Nanticoke GS – ash disposal of Nanticoke Generation Station, Canada [1]

3) Hydration of oxides. The hydration of calcium oxide occurs in technogenic conditions such as arising from the combustion of lignite, brown and bituminous coal with high calcium content in ash. When burning a fossil coal characterized by a high calcium content, free calcium oxide is formed in the ashes. While this ash is hydraulically removed to disposal, the water changes its type to hydroxide calcium with pH from 11 up to 12.5 [3]:

$$\underset{Calcium\ \ oxide}{CaO} + H_2O = Ca^{2+} + 2OH^-.$$

Groundwater being found in the man-made ash and slag aquifer of ash disposals has also OH–Ca type (table 1). The proportion of hydroxide ion is equal to

30-50% of the TDS in the ash disposals from brown coal while it has only 10% in ash disposals of bituminous coal.

4) Hydrolysis of carbonate salts forms hyperalkaline water bodies where hydroxide ions are simultaneously found with carbonates.

$$\underset{Soda}{Na_2CO_3} + H_2O = HCO_3^- + OH^- + 2Na^+.$$

$$HCO_3^- + H_2O = H_2CO_3(H_2O + CO_2 \uparrow) + OH^-.$$

Such water was discovered in soda comprising leakage from slime disposal of alumina combine (pH 12.5-13; TDS up to 25 $g \cdot L^{-1}$).

The leakage intrudes to the underlying alluvial aquifer where it forms water of OH–CO_3–Na type. The concentration of hydroxide ion in carbonate waters is lower than carbonate [5]. In strongly alkaline waters there are also extremely high concentrations of hydroxide ions. In this case the hydroxide concentrations were calculated from the pH value. The origin of the hydroxide in this water body is due to the hydrolysis of carbonate salts that are present in the slime waters. In carbonate waters a hydroxide takes a subordinate place, but at the same time, it is definitely the main ion. The mass share of hydroxide ions in the sludge waters is between 5 and 10%.

5) Dissociation of water molecules. It is generally accepted that the water dissociation is the main source of hydroxide ion:

$$H_2O = H^+ + OH^-.$$

However, we see that hydroxide ion has diverse sources of origin. When minerals of the hydroxide class are dissolved, [OH^-] ions enter to the water from the solid mineral substance. During the hydration of oxides and possibly the hydrolysis of aluminosilicates, [OH^-] ions are formed both from water and from solid mineral substance. In the case of hydrolysis of simple salts the source of [OH^-] ions can only be water.

4. Conclusion

The hydroxide water type actually exists as a show of a few data gleaned from some different places. We suppose some new water bodies with leading hydroxide ion will be discovered anywhere in the future. Hydroxide water are most likely to occur when a water has a low TDS and pH above 10-11.

In this water type the share of hydroxide ion exceeds 20% (Eq%) of the total mass of anions in $mEq \cdot L^{-1}$. In this case the hydroxide is a major ion that provides the electrical neutrality of water. Therefore, the concentration of hydroxide ion should be summed in the TDS along with all other ions.

The sources of the hydroxide ion in water can be minerals, water molecules or both of them. Usually hydroxide water does not contain carbonates and bicarbonates, therefore it does not belong to the carbonate system. The hydroxide ion may be the only dominant anion in water (70-93 Eq%) or it forms a combination with other anions: mainly sulfates and chlorides. The hydroxide ion may be predominant or take the second place, then OH–SO_4 or OH–Cl water types arise.

The content of hydroxide ion in water varies from 102 to 1661 $mg \cdot L^{-1}$, however the latter concentration is extremely high. The average and median contents of hydroxide are close to 500 $mg \cdot L^{-1}$. The proportion of hydroxide ion varies from 30 up to 50% of the TDS if the hydroxide ion is predominant. When the hydroxide ion takes the second or the third place amongst anions, its share in TDS is lower of 10-30%. The hydroxide ion is mainly connected with calcium or less often sodium. The concentration of magnesium in hydroxide water is very small since magnesium hydroxide is rather insoluble (0,012 $g \cdot L^{-1}$).

We are sure that hydroxide-type water will take its proper place among other hydrochemical types. So we recommend to hydrogeologists to pay their attention to water bodies of high pH. If a water has a very high pH, it is necessary to recalculate its logarithmic values to the natural concentration of the hydroxide ion in $mEq \cdot L^{-1}$ and then to check the water type.

Also the titrimetric method for the laboratory testing of carbonates and bicarbonates is not valid for highly alkaline water. In fact, this method tests pH: phenolphthalein endpoint alkalinity or composite alkalinity (pH > 8.3) and methyl orange endpoint alkalinity or total alkalinity (pH > 4.5). The contents of carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-) are calculated in this case, although these ions might be absent, and alkalinity is due only to hydroxide ions. Therefore, for highly alkaline waters a new carbonate analysis method for testing is necessary.

The existence of the hydroxide non-carbonate water type should be taken into account for hydrochemical modeling programs based on thermodynamic properties of carbonate system.

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