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SULLIVAN IN BEIJING: UKRAINE AS A DEAD END FOR ANGLO-SAXON GEOSTRATEGY

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Annotation. *The breakdown of agreements between the US and China once again raises questions about the start of a major war in Europe, the author analyzes this possibility and expresses thoughts on the current geopolitics between empires in the struggle for world leadership and the ability to achieve their goals.*

Keywords: *Asia-Pacific, SMO (Special Military Operation), polycentricity, multipolarity, military bloc, AUKUS, ANZUS, VREP, nuclear submarine (APL), Russia, USA, PRC (People's Republic of China), Japan, South Korea, North Korea, Industry 4.0, 7th technological order, MEA (Multilateral Environmental Agreements), MRT, AI (Artificial Intelligence), Big Data, decoupling, Ukraine, SMO, US elections, Democratic Party, Donald Trump, peace negotiations, Taiwan, neocons (neoconservatives), UN SDGs (Sustainable Development Goals).*

Jack Sullivan, as the US President's National Security Advisor, arrived in China for the first time in late August 2024 and asked the Chinese leadership to refuse to support Russia in Ukraine, offering to give its "salvation plan" to the most "unfavorable" situation in the Old World for the Democrats today. There was little faith in the victory of "American truth" in the Celestial Empire from the beginning, but the very fact of the desire to enter into dialogue and imprison the leaders of the two countries for a telephone call (and this is what they managed to agree on) was initially declared and constantly pushed through to both the Chairman of the CPC Xi Jinping himself, and the Head of the PRC Foreign Ministry Wang Yi, and the top leader of China's military machine, curator of space and strategic defense projects - Deputy Chairman of the Central Military Commission Zhang Youxiu from the standpoint of the expected normalization of relations between the countries and attempts to switch issues to Taiwan and trade wars and technological restrictions [1].

The Chinese were especially upset by the "Taiwan issue", which was posed in the context of Taipei's independence from mainland China, violating the integrity of the "two Chinas" policy, de facto turning into a prototype of an American military base, pumped up from the position of NATO's involvement in a potential conflict. No direct threats were made, but the American diplomat constantly maneuvered and found not the best forms of communication: between blackmail and hidden threats, hinting that only the Celestial Empire and the United States, as two superpowers, can decide the fate of the entire planet [2]. At the same time, Putin's autocracy in Russia was mentioned, but it sounded indistinct, more from the position of non-implementation of peace initiatives, and "playing red lines", which Moscow can afford after 2.5 years of conflict and the terrorist actions of the AFU in the Kursk region.

The communiqué about the "futility of the American efforts" was fatefully marked by the death of the first F-16 in Ukraine, which was shot down… as a result of the American Patriot system in operation… God truly marks the rogue…

Therefore, the attempt to have by September 1, the day of complete paralysis of the US President's power to launch any large-scale war (now this function will be in the hands of the two chambers of the US Congress), remained a marker of escalatory Sisyphean efforts that showed the weakness of the perception of the US as a superpower and its even greater dependence on China, which is squeezing out its rival both in dicapping and from the position of leadership in AI issues, including generative AI, which is already 40% imprinted in the form of intellectual property in Chinese patents [3].

The Russian Federation's Joint Military Operations in Ukraine, which has been conducted since February 2022, is against pro-Nazi regime, which wants to destroy the LPR and DPR, as states that have adopted a pro-Russian vector of development, has forever changed the balance of power between the Atlanticists and the Heartland, raising the question of national priorities and sovereignty of all countries trying to preserve their self-identity and independence from outside influence.

This agenda was proclaimed on December 15, 2021 by the President of Russia V.V. Putin from the position of revising the "red lines" of the North Atlantic Alliance, which in 5 waves of its expansion approached its infrastructure to the borders of the Russian Federation and made the further existence of the Russian people, exposed to direct and indirect external military threats and the total destruction of the Slavic ethnic group, very probable and expected.

At the same time, the line of creating a bloc demarcation of the world is moving from the European continent, the fading potential of the Old World, to the Asia-Pacific zone, the clarification of new theaters of military operations, previously formed by the United States under the guise of the Indo-Pacific strategy,

which risks, like shagreen leather, being reduced to the Asia-Pacific bloc zoning. [4]. Because the development since September 2021 from the standpoint of AUK-US has not become a cradle for the latent or gradually promised accession of Japan to the matrix platform of the Eastern NATO being created, puzzled by the phantom pains of the revival of the former imperial power and eager to be included in technological cooperation with the USA, Great Britain and Australia not only through the processes of producing new nuclear submarines for the most distant continent, but also through attempts at scientific and technological inclusion in the register of a single certification and guest certification of its technologies in the field of high-speed quantum computing and elements of a hypersonic software and element set of components in products in the military and military equipment of Anglo-Saxon arms manufacturers [5]. And it is not about the Constitution of Japan and the creeping militarization of its self-defense forces, encouraged in every possible way by the United States, and tying them to the point of bilateral infrastructural growth along the corresponding axes: Japan-South Korea-USA, Japan-India-USA and Japan-Australia-USA, which have long established themselves in the research, defense and ICT industries [6]. Further fueling China's dislike, Japan begins to maneuver towards North Korean politicians, guaranteeing them "normalization of relations" with the abandonment of missile and nuclear programs, which Japanese Prime Minister Hirokazu Matsuno is strengthening in his loyalty under the pressure of hysteria from American experts about Pyongyang's allegedly impending nuclear tests. And Kim Jong-un proudly reports in July 2022 about his readiness for war with the United States itself in the event of their threat to North Korea's national security [7]. The US itself is engaged in cleaning up and correcting on the ground its fading synergistic effects in the Indian quartet with Japan and Australia in the Quad format, which, as the Four-Party Security Dialogue, has taken on strategic significance in balancing the aggravated Chinese-American relations in the Asia-Pacific region, but has not grown to the size of a new military bloc due to the neutrality of South Korea, which has not decided on such an obvious polarization of its foreign policy and direct confrontation with the PRC under the star-spangled flag. At the same time, the July NATO summit on Sweden and Finland gave Seoul the opportunity to think about its membership in the ranks of the militant Atlanticists, about which the victorious pro-American government of the leading Asian tiger took time to consider its potential place in such an architecture and the risks of participation in a bloc structure with an Asian focus [8].

Following the provocative visit of the Speaker of the lower house of the US Congress Nancy Pelosse to Taiwan in early August 2022, which had no analogues since 1997, all Asia-Pacific countries understood the categorical desire of the United States to press the anti-Chinese strategy in the region as the only correct one and dominant over other thoughts about a calmer and more polycentric world,

so often discussed at the APEC or ASEAN summits, in anticipation of confirmation of its neutrality and non-involvement in the upcoming showdown between the superpowers in the waters of the two oceans. And the search of the United States on the basis of AUCUS and within the Asia-Pacific region for allies to expand the zones of presence of the nuclear triad of the SNF (nuclear deterrence forces) and new members of the nuclear club (otherwise, why would Australia need nuclear submarines capable of carrying nuclear charges without these charges?) as a formation of preferences for the theater of military operations in the zone of Uncle Sam's growing strategic ambitions [9]. At the same time, the status of "non-alignment" for the states of the region is becoming an unattainable luxury, because the Soviet-American "cold war" ended in August 1991, and its new format 2.0, declared by Joe Biden, and his likely successor Kamala Harris, does not imply a "third option" of non-participation, otherwise the resources of each of the participants can be expropriated or mobilized through colonial ties to certain tasks of the expanding blocs of the past, such as ANZUS, for example, or can be attracted to trade and investment spheres gravitating either to the United States or to China, centers of future competencies and scientific laboratories of all-consuming digital transformation [10]. This means that geoeconomics will determine both the choice of real sources of financing and the protection of protectionist-created clusters from bioresources to electronic component microcircuits and chips, guaranteeing their sovereign place to everyone in the MRI and in the MEO of Industry 4.0, tied geographically both to the sales markets for these products and to the transfer of investment flows and technologies of the new stages of the Marshall and MacArthur plans of the post-war world order of the Asian industrial world. And stagnation in these processes, or the impact of sanctions on any high-tech industry on each individual state of this region, will result in a fatal lag and growing unemployment of the inflationary and industrial types, as hostages of the unfolding post-covid translogistics production chains of TNCs of corporatocratic global governance. And the power of banksters and netocrats in these processes is difficult to overestimate, because the ideology of the evolutionary further growth of the most dynamic region of the planet will be determined not only by young and excess labor resources and the wandering business practices of Western-Eastern cooperative conglomerates, but will also ultimately come down to who won in the confrontation between China and the United States? And the losers will pay their price, even if it is not an affordable one, because the winner, as we know, takes everything... [11]

Therefore, the drift of states around the archipelagos of their own illusions about zones of peaceful space in the world's oceans, as well as unrealizable dreams about screens of bilateral agreements, so as not to irritate the two leading players in this process, can lead to a departure from reality and not in meta-uni-

verse of emerging ecosystems of business, leisure and flow management, but to the catastrophe of its own economic failure and complete colonial and currency dependence on the dominant players in the Asia-Pacific region. [12]

Add to this the problem of the poorest player in the region, Afghanistan, the Taliban, which is reviving from the sores of overseas democracy and occupation by Western countries and with the full support of the PRC, the growing costs of production further consideration of the human factor during the onset of the 7th scientific and technological order of machine intelligence and big data bases, automation of production chains and creation of cyborgs and robotics of maximum efficiency. The parliamentary coup in Pakistan, which was carried out in the region, also did not take place without the participation of American ideologists, who are trying to keep both India and Pakistan itself in their zone of interests, manipulating their mutual contradictions and obvious failure to draw them into the anti-Russian sacking agenda.

At the same time, other formats besides ASEAN, such as RCEP (Regional Comprehensive Economic Partnership), TPP (Trans-Pacific Partnership) set multidirectional trends for the entire region and polarize countries from the standpoint of their priorities not only in choosing their place in the MPT or in setting goals for national development towards China or America, but also make the political discourse itself and the proclaimed inter-country content a platform for further concentration of contradictions capable of blowing up the Asia-Pacific region from within, squeezing the Asian NATO to the point of becoming a world policeman, ready to do anything for the sake of his fading before our eyes hegemony of Anglo-Saxon global dominance. [13]

In addition, according to the UN World Investment Report 2021 regarding the RCEP and APEC countries, it can be seen that with a large accumulated volume of bilateral investments, intraregional investments are growing extremely slowly, and their share in the accumulated share of the regional product is not large, which indicates a low degree of interaction in the intraregional market. However, as far as Asian countries are concerned, the prospects for FDI are more positive, since the region is developing internal supply and trade chains, which makes it less dependent on goods produced in other parts of the world and less vulnerable to external shocks, contributing to internal integration processes of various levels of clustering and the creation of a single space for trade and security. This is most relevant for the countries of East and Southeast Asia due to the fact that integration around RCEP and ASEAN strengthens intraregional ties, and the multidirectional nature of the TPP and other options for regional construction such as “One Belt, One Road”, for example, create precedents for an alternative path of development and short bilateral contractual relations that reduce tensions in the Asia-Pacific region. And China, as the geographical and regional leader of this community of states, still holds the lead here. [14]

The consequences of Nancy Pelosi's trip to Taiwan reveal the real state of affairs and the relevance of the doctrines professed by the superpowers, diverging trends in military exercises and propaganda moves that show not only China's responsibility for peace in the Asia-Pacific region, but also a clear division between the priorities of the economy and a military response, which may take place no earlier than in 8 years, according to the fundamental documents of the Celestial Empire in the field of national security and the elimination of the risks of growing threats of further tearing the world apart into military bloc coexistence.

Russia's role in this process remains significant, but requires more concrete steps, including continuing joint military exercises with China in the South China Sea (SCS) and creating a network of naval military bases that guarantee security for the countries of the region, which are assuming responsibility on the basis of the Code of Conduct in the SCS, which is close to being signed and ratified by most players in the Asian Great Game. This pragmatic attitude and in the area of financial counterweights to Anglo-Saxon institutions could be supported by jointly implemented Russian-Chinese initiatives within the framework of new institutions for the development of investment and project financing of infrastructure projects by the SCO and BRICS, for example, through the Asian Infrastructure Investment Bank and the existing BRICS New Development Bank.

Therefore, the consequences of "playing with fire" expected by the world will bear fruit, and in order for their consequences to be predictable and risks to be hedged, the agenda today must already have clear "road maps" and a convergence of scientific and technological Russian-Asian schools that dominate in matters of self-identification and self-sufficiency, in pursuing the tasks of their future in the Asia-Pacific region and in choosing precise historical and civilizational goals in the formation of a global security system and the preservation of national priorities.

And therefore Jack Sullivan, who has not solved anything with China or the Palestinian conflict, and who relies on two aircraft carrier groups in the Mediterranean, will continue to dream of being a "peacemaker", scaring China and Iran with tomahawks and aircraft carriers behind his back, but the geostrategy of neocolonial dreams is coming to an end, as is the power of the US dollar, which also does not want to be state-owned and remains "private, but no longer the main one" in international settlements, at least for the BRICS countries and China itself with its new business partners. The yuan and crypto thoughts are gradually changing both fintech and hedging the risks of American "games not by the rules", the misunderstanding of which can lead to a new Civil War in the United States by the end of 2024. [15]

And therefore, the autumn will be hot and Donald Trump will have to fear for his life more than once from the avengers and creators of the inept defeats

of the “deep state”, which has placed its bets on militarism and a new Cold War 2.0, leading the world to a nuclear catastrophe and putting an end to all the UN’s undertakings for a safe future and SDGs in the 21st century.

References

1. There will be a “massacre”. The US and China have fallen out over the NWO. Arguments and Facts. 08/29/2024.;

Xi Jinping’s Report at the 19th National Congress of the Communist Party of China [Electronic resource] / / Access mode:https://www.gov.cn/zhuanti/2017-10/27/content_5234876.htm(Accessed: 27.08.2024)

2. Analysis of the economic situation A new model of development of internal and external dual circulation: historical origins, logical explanations and political recommendations [Electronic resource] / / Access mode:http://www.chinacer.com.cn/zhiku/202010209356.html(Accessed: 27.08.2024)

3. 中华人民共和国国民经济和社会发展第十四个五年规划 *(14th Five-Year Plan (2021-2025)) [Electronic resource] // Access mode: https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm*

4. Yu Miaojie, “Big Changes” and the New Model of China’s Economic “Double Cycle” Development (Yu Miaojie, “Big Changes” and the New Model of China’s Economic “Double Cycle” Development) / / Yu Miaojie, “Big Changes” and the New Model of China’s Economic “Double Cycle” Development. – 2020. – No. 27(6). – P. 19-28.

5. IA RBC The Chinese economy has officially become the largest in the world [Electronic resource] / / Access mode:https://www.rbc.ru/economics/08/10/2014/5434f48dcbb20faeeafe2a0a(date accessed: 27.08.2024)

6. IA RBC The Chinese economy has officially become the largest in the world [Electronic resource] / / Access mode:https://www.rbc.ru/economics/08/10/2014/5434f48dcbb20faeeafe2a0a(date accessed: 27.08.2024)

7. 《*Made in China 2025*》*(Made in China 2025 Program) [Electronic resource] / / Access mode:https://www.gov.cn/zhengce/content/2015-05/19/content_9784.htm*

8. 中华人民共和国国民经济和社会发展第十四个五年规划 *(14th Five-Year Plan (2021-2025)) [Electronic resource] // Access mode:https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm*

9. Program for the development of new generation artificial intelligence [Electronic resource] / / Access mode:https://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

10. Yu Miaojie, "Big Changes" and the New Model of China's Economic "Double Cycle" Development (Yu Miaojie, "Big Changes" and the New Model of China's Economic "Double Cycle" Development) / / Yu Miaojie, "Big Changes" and the New Model of China's Economic "Double Cycle" Development. – 2020. – No. 27(6). – P. 19-28.

11. 工信部等十部门印发《5G应用“扬帆”行动计划（2021—2023年）》*[Electronic resource] // Access mode:https://www.yinchuan.gov.cn/xxgk/bmxxgkml/ycsdsjj/xxgkml_22120/zcjd_22125/202108/t20210804_2954301.html*

12. 《5G网络安全标准化白皮书》*[Electronic resource] // Access mode:https://www.tc260.org.cn/front/postDetail.html?id=20210512165851*

13. International Federation of Robotics Industrial Robotics Market Report 2023 [Electronic resource] / / Access mode:https://ifr.org/img/worldrobotics/Executive_Summary_WR_Industrial_Robots_2022.pdf(date accessed: 26.08.2024)

14. V.A. Yasinsky, M.Y. Kozhevnikov. "Dual Circulation" – a Model of Chinese Economic Growth in the Next 15 Years // Problems of Forecasting. 2022. No. 1(190). P. 162-173.

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ON METHODS FOR ASSESSING SCIENTIFIC RESEARCH OF COMMERCIAL SIGNIFICANCE, DIRECTIONS FOR THE RUSSIAN FEDERATION'S BREAKTHROUGH INTO A NEW TECHNOLOGICAL ORDER, AND THE FORMATION OF THE FOUNDATIONS OF AN APPROPRIATE INSTITUTIONAL MODEL

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There are many approaches and interpretations in the theory of socio-economic efficiency. Thus, a group of economists argues that the criteria, indicators, indices, coefficients used in assessments, calculations at different stages of regulation of economic processes when calculating the social and economic result do not correspond to adequate assessments of the benefits and usefulness of scientific research of commercial significance. Therefore, a number of experts are of the same opinion. The use of the above criteria can distort the legitimacy of a reliable assessment. In addition, a group of experts is categorically against such assessments and measures. Considering that in such choices of priority scientific research of a commercial nature, it is necessary to give preference to a point assessment based on the opinion of eminent scientists. There is a rational grain in this. The peculiarity of fundamental, applied, industrial, and factory science creates difficulties for the socio-economic assessment of the final results. At the same time, it seems possible to outline the range of those scientific studies of commercial significance for which it is possible to adapt assessment tools, which can be based on typical methodological principles that have firmly entered the practice of assessments. In this matter, problems arise proportionally to the increase in the risk of project implementation, as well as the increase in novelty and scientific significance of the scientific idea. Paradoxicality, depth, complexity of the fundamental, methodological foundations on which the scientific idea is created and, most importantly, implemented. As an example, we can consider mega-large and promising projects on the verge of fantasy: scientific ideas in genetic engineering, brain revitalization, artificial intelligence, nanotechnology and microsystem technology, space

research, space technology, exploration of the universe, etc. As a result, it is more difficult to find criteria, it is much more difficult to determine its economic potential, and even more so socio-economic. That is why many difficulties arise when trying to calculate the economic effect. Consequently, the condition for using the economic effect is the possibility of its calculation. In such a situation, it is necessary to find approaches to selecting a class of scientific research of commercial significance, amenable to socio-economic assessment of the final result [1]. Scientific research of commercial significance is carried out in order to achieve practical results that potentially have an outlet in fundamentally new scientific and technological developments of an experimental nature. These include the results of improving the best existing technology, high technology, advanced technology, production management methods, etc. In Table 1, scientific research of commercial significance can be classified.

Table 1.

Scientific research of commercial significance and its classification

Contents	design
	survey
Degree of implementation	transitional
	completed
Duration	long-term
	short-term
Degree of research	initial
	final
Sources of funding	state budgetary private
Research method	complex target
Area of use of research results	international state region
Freedom of research	full partial limited

To assess the effectiveness, a detailed classification of scientific works by the direction of the effect and the possibility of calculation is proposed (see Table 2).

Table 2

Effect and the possibility of its calculation

	Commercial scientific research (types)	**Efficiency effect (soc/ek)**	**monetary value calculation (possibility +) (no possibility -)**
Development of new equipment and technology			
I.	1.Development of a fundamentally new technological process	Economic	+
	2.Improvement of the best technological process	Economic	+

	3.Development of fundamentally new equipment, installations, devices	Economic	+
	4.Improvement of the best equipment, installations, devices	Economic	+
	5.Development of measures to improve product quality	Economic	+
	6.Development of a fundamentally new material.	Economic	
	7.Improvement of the existing best material	Economic	+
	8.Development of a fundamentally new raw material	Economic	+
	9.Improvement of the existing raw material	Economic	+
	10.Development of new methods and equipment for analysis, testing, research	Economic	+
II.	1.Developments aimed at environmental protection	Social	assessed qualitatively
	2.Developments aimed at labor protection and safe technology	Social	assessed qualitatively
III.	Development of standards		
	1. Development of technological instructions, regulations	Economic	-
	2. Development of labor standards, raw materials, fuel, electricity, etc.	Economic	-
IV.	Development of standards	Economic	in accordance with GOST
V.	Economic research	Economic	

The principles, methodological aspects of evaluation are becoming increasingly important [2]. In the SPAH, FSIG (specialized departmental research institutes, design bureaus, specific SRCS) there is a significant database of the subject of calculation, socio-economic effectiveness of scientific research of commercial significance. In these recommendations of typical purpose, guidelines, typical calculations (provisions of the typical methodology of efficiency) recommended for experimental use are presented. In them, the efficiency/effect (Soc. Ekg - annual socio-economic effect is determined):

$$Соц.Эк_r = (Сс_1 - Сс_2) + E_{Нкэф}(Квл_1 - Квл_2) \cdot СОА - E_H \cdot U \quad (1)$$

where:

СОА - production, application (volume) of results of scientific research of commercial significance (SRCS);

C_{c1}, C_{c2} - costs per 1-tsu of services (works) in the replaced (base) period and after implementation (use) of SRCS results;

$K_{вл1}$, $K_{вл2}$ - capital investments of basic technology and equipment, based on the implemented SRCS in rubles per unit of service, work;

U - pre-production costs (expenses);

$E_{кэф}$ - efficiency coefficient (normative).

The result is obtained from the improvement based on a scientific idea, science of commercial significance. The presented formula has calculation shortcomings affecting the error. In particular, the illegal reflection of costs on a specific topic (SRCS). A more reliable calculation and assessment will be achieved by reflecting the share of the so-called costs (pre-production) invested in a specific unit of the created new technology, equipment, conveyor line, etc. Uд determined by the ratio of the above-mentioned costs to the total volume of production:

$$U_{Д} = \sum \frac{U_{Ф}}{A_{И}} \quad (2)$$

where:

$\sum U_{ф}$ - total reliable actual costs of the SRCS,

$A_{И}$ - total production volume - the result of the SRCS.

In the existing practice, developers encounter many errors in calculations. Most often, calculators overestimate the potential efficiency. The consequences of this lead to further miscalculations and unreliable estimates, and the adoption of incorrect management decisions.

A). In fact, an unprofitable scientific and technological development is launched into production and operation.

B). According to actual calculations, the difference in the negative direction between the estimated and actual efficiency increases.

C). An unjustified increase in the effect (design) as a consequence leads to a significant distortion of pricing (overestimation) for the created scientific technology, the use of which becomes unprofitable.

D). Scientific researchers (developers) are provided with unjustified bonuses, premiums.

D). The planned and estimated pre-production efficiency of the scientific and technological development is reflected in scientific reports, business plans, and standards.

This is clearly shown in the table. 3.

Table 3.

Errors in the results of scientific research of commercial significance at different stages of the research and development process.

SRCS Topics	**calculated-actual effect to planned**							
	0-0,3	**0,4-0,6**	**0,7-0,9**	**1,0-1,1**	**1,2 1,3**	**1,4 1,6**	**1,7 2,0**	**Higher than 2,0**
Topics quantity	25	12	26	32	9	6	2	1
% of total analyzed topics	22,1	10,6	23,0	23,3	8,0	5,3	1,8	0,9

The error is the result of unreliable assessments, calculations. In this regard, we recommend that the calculations for determining the socio-economic result (effect, efficiency) of research institutes and scientific research institutes should be improved in the following.

The grouping of scientific research institutes must necessarily have a sign of the potential possibility of assessing and calculating the effectiveness. The calculation itself, its methodology must take into account the dynamics of the development and use of scientific and technological development, that is, take into account the full period of use of the development: the service life must not exceed the period of moral depreciation; the development parameters must necessarily correspond to the needs of the market; the costs of a unit of scientific development must necessarily include an appropriate share of pre-production costs.

The theory of efficiency, profitability considered on the example of costs, income allows us to explain the correct solution to the most important problems of the market. Taking into account the peculiarity of costs and incomes in research activities, we will consider how this peculiarity manifests itself and will further call the costs in scientific research abbreviated as costs of scientific research of commercial importance (CSRCS), and incomes of scientific research of commercial importance (ISRCS). The theory studies the income, expenses, containing in the indicator often led to the fact that enterprises increased material costs to the detriment of the net product: after all, costs are easy to increase than results" [3].

The dependencies between costs and income in risky investment and scientific and technological projects, scientific research of commercial significance for our study will allow us to clarify the main mechanisms in the management of scientific research of commercial significance (SRC).

Let us explain that risky investment is associated with the economy in science (more precisely in applied science). The peculiarity of assessing costs and income in science is beyond doubt, since traditional economics and its financial mechanisms do not work here, from our point of view.

In many scientific works devoted to the study of science and scientific research of commercial significance, the concepts of costs and income are mixed with how these categories are formed in market production, ordinary production that creates products and goods for everyday use, and not a unique product, science services and scientific research. At the same time, they approach the mechanism of measuring the costs and income of applied development too simply. It is accepted that any labor costs in the field of scientific research activities are socially necessary labor costs.

Costs, income in material production depend, first of all, on intensive factors. Applied scientific research activities, having some analogy with material production, are distinguished by specific features. The production process in material

- traditional production, and production in scientific research of commercial importance are fundamentally different, have a number of differences. First of all, this position is determined by the characteristic features and difference of labor in science. It should be noted that labor in science is unique labor, its intellectual basis and creative nature are also extraordinary.

In science, scientific research of commercial importance, the costs of resources during consumption are not characterized unambiguously, proportionally to the income from their use. While in material production, on the contrary, costs determine income and these are correlation-dependent categories.

Considering competition in the aspect of scientific and technological development and the creation of innovations, M. Porter made a significant contribution to the development of the theory of competitive relations in the second half of the 20th century [4]. In his study of competition theory, M. Porter gives a leading place to the ability to adapt to technological changes. As a source of competition, M. Porter considers its fundamental economic structure and makes it dependent on the possibility of new participants, substitute goods, market influence of buyers and suppliers, and the features of competitive struggle between market participants. Thus, M. Porter considers competition as an extended rivalry.

In our opinion, for the scientific and technological process, competition, unlike traditional production, has some features. In traditional production, the result of competition is the formation of an equilibrium price that satisfies the producer and consumer. In contrast, in innovative processes, the price of a high-tech product most often becomes a monopoly. The company that creates the innovation becomes a monopolist and, due to this, skims the cream on the market until the market masters this innovation, that is, until the moment when the innovation ceases to be an innovation. Consequently, in the scientific and technological process, competition and competitiveness are manifested in the competition of scientific and technical potentials of states, scientific companies, and research teams. As a result, competitiveness is ensured through decent funding of knowledge and investment in scientific research. A long period is required to build, form, and test a mechanism for financing science and scientific and technological projects, the so-called venture financing. Using advanced methods of economic management, priority paths for strategic development in this sector of the economy can be found [5]. Further, we emphasize that the specificity of the income of a research organization is that science acts as a productive force only through other elements of productive forces. In science and SRCS this occurs through objects, means of labor, through labor itself. The income of science, scientific research of commercial significance is a means of intensive use of production, which is subsequently transformed as an economic result in the form of an effect and increased efficiency. But the peculiarity in this case is that this efficiency is obtained (result, effectiveness) not in

the sphere of science itself as a service, a scientific organization, but in material production. Consequently, an increase, growth of the effectiveness (efficiency) of science, SRCS intensification of development cannot be explained and measured using the categories and indicators of science itself. And scientific activity itself, SRCS serve as a transforming means of intensification of social production, outstripping the growth of its income in relation to costs [6]. In science, SRCS intellectual labor must have certain high knowledge, special properties of intelligence. Labor in science, in scientific research of commercial significance cannot be repeated due to the fact that it is impossible to divide it into simple labor operations, therefore it is called non-reproducible. Here we note an important feature. The specific labor of a scientist, intellectual unique labor affects the amount of costs, income of science, scientific research of commercial significance.

Let us apply the obtained findings and conclusions in the economics of science, in the conditions of risky capital investment, what is the correlation dependence between costs and income. Let us consider the process of research in science, scientific research of commercial significance as a production process.

This can be schematically shown on a graph by considering various situations in the activities of a scientist as an employee of a scientific organization. A scientist can work very hard, but despite high costs (CSRCS), there is no income (ISRCS) as such, and the ratio of costs of science and its income in this case can be depicted on a graph (see Fig. 1. Option 1) in this graph on the abscissa axis costs (CSRCS) - U; along the ordinate axis income (ISRCS) - D.

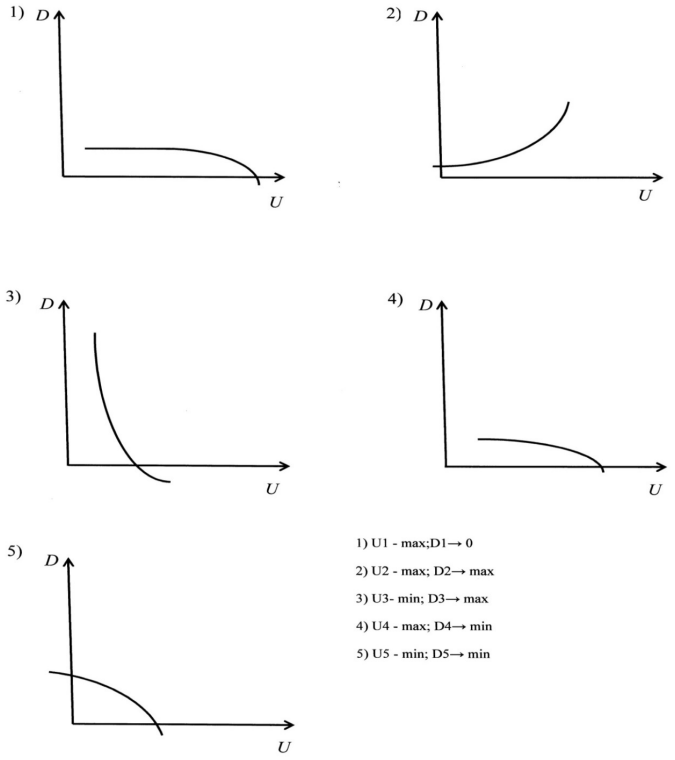

Figure 1. *Cost options (CSRCS) - U1-5 and corresponding income (ISRCS) - D1-5.*

The above graph and conclusions suggest that the output determined in science, SRCS does not determine the productivity of the abstract labor of a research worker, but shows the total volume of costs of SRCS, research institutes:

$$W = \frac{V}{NS} \quad (3),$$

where:

W – output per research worker, rubles;

V – volume of own work, rubles;

NS – research workers (average headcount)

The adjustment of the "output" indicator, proposed by a number of authors through coefficients, basically does not change anything:

$$w = \frac{V}{NS} \cdot K_{б} \cdot K_{к} \quad (4),$$

where:

$K_б$ – in a scientific organization (work volume coefficient, taking into account the labor characteristics in individual divisions of a scientific organization);

$K_к$ – in a scientific organization (quality coefficient of the work performed).

Therefore, we obtain a conclusion. The study of the mechanism of costs and incomes in SRCS, research institutes, showed the features inherent in research institutes, SRCS:

a) costs (including large ones) may not generate income;

b) large costs may be accompanied by huge income;

c) maximum income is achieved with minimal costs.

Thus, in contrast to material production, where there is a close relationship between labor costs and production income, in science such a relationship is noticeably weakened.

In conclusion, we note the following. The Russian Federation, as the largest state on the planet Earth in terms of territory, possessing existing scientific, technical and resource potential, should ensure dynamic growth in the Russian Federation of the gross domestic product (GDP). GDP should grow at rates exceeding 6-10 percent per year.

Russia demonstrated relatively good indicators in the period from 2000 to 2008, GDP growth was on average at the level of 7-8%. Average growth of Russia's GDP in recent years is equal, due to the sanctions and embargo imposed by the West against the Russian Federation, to an unacceptably low figure of 1-2%. And here the main contribution should be provided by fundamental science, applied scientific research, industry science, innovative projects, import substitution. Despite numerous sanctions, the Russian Federation ensured GDP growth by the end of 2023 at the level of 3.6%. In 2024, the Ministry of Economy of the Russian Federation forecasts GDP growth of Russia at the level of 4.5% -5%. We also note that Russian President V.V. Putin instructed the Government of the Russian Federation to ensure that by 2030 Russia enters the top 4 largest economies in the world in terms of GDP calculated at purchasing power parity (PPP). Therefore, the statement of the Head of State during the large press conference on December 20, 2018, was relevant.

The President of the Russian Federation explained the issue of the feasibility of national projects. And noted that these national projects are very important and relevant. He also emphasized in the statement: "We need a breakthrough. We need to jump into a new technological order, without this the country has no future" [7]. The President noted that without setting goals it is impossible to achieve the final

result, so 12 national projects were created - in the field of science, healthcare, education and a comprehensive plan for the modernization and expansion of the main infrastructure were approved to fulfill the tasks set in the May decree of the President of the Russian Federation.

From our point of view, in order to change the situation, it is necessary in the course of reforms and modernization to create state-corporate structures, develop business, organize federal and regional economic entities on the principle of vertical-horizontal integration, capable of synthesizing the work of fundamental science, applied scientific research with the target focus of generating innovations. The rationale for this provision is the new political and economic challenges generated by the Ukrainian crisis of 2014. Sanctions and embargoes imposed by the West against Russia have affected the depreciation of the Russian currency and increased capital outflow.

Protectionism and unfair competition force in this situation to focus on state support in management issues.

As world experience shows, scientific, technological and innovative development is impossible without state support, without identifying state priorities.

In the context of sanctions, embargoes, protectionism, cutting off Russia from investment, the problem can be solved using non-market methods.

For this purpose, it is necessary to create a core in the scientific and technological complex in the national economy, a complex based on selected (chosen), large enterprises, including those with state participation. This is primarily the large business of transnational corporations (TNCs), scientific and production associations, holdings (SPAH), and financial-scientific-industrial groups (FSIGs) that are available in Russia, selected (elected) at the federal level [8].

In forming the institutional model, it is important to take into account that Russia has a phenomenal, unique scientific base, scientific and technical potential. This is an already created system of science cities, academic towns on the territory of the country. The model and system should include the following components:

1. Model (concept) and economic periods of the Russian modern socio-economic system of transition from the traditional type of development to a scientific and technological one focused on innovations;

2. Development and implementation of standard concepts of scientific and technological development of regions (as elements of the system) of the country (subjects of the federation);

3. Formation of a long-term strategy for the implementation of investment, scientific and technological projects at the macro, meso and micro levels;

4. Creation of a system of selected scientific and production associations, holdings, financial, scientific and industrial groups (FSIGs) with a targeted scientific and technological focus, digital economy for the accelerated solution of problems

of a breakthrough in accelerating scientific and technological progress, dynamic growth of the economy and occupying a worthy niche in high technologies;

5. Construction of a subsystem of banks with state participation, aimed, among other things, at venture investment in scientific and technological projects, digital economy, facilitating the implementation of the concept of dynamic scientific and technological development (modernization of production, import substitution, small science-intensive enterprises);

6. Building an infrastructure for attracting capital to regions, special zones, scientific and technological projects (creating a favorable investment climate, an appropriate tax system, resolving organizational issues

References

1. Decree of the President of the Russian Federation of May 7, 2018 No. 204 "On national goals and strategic objectives for the development of the Russian Federation for the period up to 2024."

2. Strategy – 2020: New growth model - new social policy. Final report on the results of expert work on current issues of the socio-economic strategy of Russia for the period up to 2020. Book 1 / Under the scientific editorship of Ya. I. Kuzminov. – M .: ID "Delo" RANEPA, 2013 – 430 p.

3. Novozhilov V.V. Problems of measuring costs and results in optimal planning. - M .: Economy, 1967. – p. 271

4. Michael Eugene Porter Competitive Strategy: A Methodology for Analyzing Industries and Competitors / trans. from English by I. Minervina; - M .: "Alpina Publisher", 2011. – 454 p.

5. Annual ranking of global competitiveness / The IMD World Competitiveness Ranking, 2018 – 127 p.

6. Kurbanov T.Kh. Main directions and trends in managing the country's innovative economy development // Scientific notes of the Russian State Social University. – M., 2013 - No. 11 - P. 112-130.

7. The big press conference of the President of the Russian Federation V.V. Putin on December 20, 2018. Izvestia 14th annual press conference, World Trade Center, Moscow.

8. Kurbanov T.Kh. Russia on the way to a breakthrough into a new technological order: economic and financial aspects article // Magazine "Economist" Moscow 2019 No. 3 pp. 12-24 1.0 p.l.

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ANALYSING FOREIGN EXPERIENCE OF INTEGRATING RISK MANAGEMENT INTO THE PUBLIC ADMINISTRATION SYSTEM OF THE RUSSIAN FEDERATION

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Globalisation processes necessitate the analysis of international practices of risk management at the state level. This makes it possible to identify universal principles and mechanisms adaptable to Russian realities, taking into account the specifics of industrial regions.

The dynamism and complexity of modern risks require continuous improvement of risk management methodology. The study of foreign experience contributes to the identification of innovative approaches applicable in the context of the Russian public administration system.

Comparative analysis of international models of risk management integration provides an opportunity to critically evaluate existing practices in Russia and identify vectors for their optimisation. This aspect is especially relevant for industrial regions (Donetsk People's Republic is one of them), characterised by a high concentration of technological, environmental and economic risks.

A comprehensive study of foreign experience allows to form a holistic view of the problem of risk management in public administration, identifying both successful practices and potential limitations of their implementation [1].

The analysis of the practice of risk management application in the US public administration system demonstrates a comprehensive and systematic approach to the integration of risk management concepts at all levels of government. A key element of the US model is the implementation of Enterprise Risk Management (ERM) [2], a comprehensive risk management system that covers all aspects of government operations.

At the federal level, the Office of Management and Budget (OMB) plays a leading role in ERM implementation, developing the regulatory and methodologi-

cal framework and coordinating the efforts of various agencies [3]. In parallel, the Government Accountability Office (GAO) develops risk management standards, ensuring uniformity of approaches and the possibility of comparative analysis of risk management efficiency in different government agencies.

Special attention should be paid to the experience of industrial regions of the USA, such as Michigan and Ohio, where risk management is deeply integrated into the system of regional economic planning. These states have established interdepartmental risk management committees that develop sectoral risk maps for key industrial sectors. This approach allows not only to identify potential threats, but also to identify opportunities for sustainable development of the regional economy [4].

An important aspect of the American experience is the active use of quantitative methods of risk assessment, in particular, the Value at Risk (VaR) methodology [5]. This allows public authorities to make more informed decisions in conditions of uncertainty, based on statistically significant data. In addition, scenario planning and stress testing methods are widely used, which is especially relevant for agencies such as the Federal Emergency Management Agency (FEMA) responsible for managing risks of natural disasters and unforeseen events [6].

The introduction of the risk management concept into the US public administration system has led to significant positive changes in the socio-economic sphere. Thus, in the period 2010-2020 in the USA there is a 12% decrease in GDP volatility, which indicates an increase in the economy's resilience to external shocks. The decrease in the number of bankruptcies of large enterprises by 18% over the same period indicates the effectiveness of economic risk management measures at the corporate level. Particularly noteworthy is the 2.5 percentage point decrease in the unemployment rate in industrial regions compared to the previous decade, which demonstrates the positive impact of the risk-based approach on the stability of the labour market [7].

The US experience provides valuable lessons for the development of risk-based approach in public administration in the Russian Federation (in particular, in the Donetsk People's Republic). The positive aspects that can be adapted to Russian realities include a systematic approach to the introduction of ERM at all levels of public administration and the integration of risk management into strategic planning processes. The development of a risk management culture in the public sector seems particularly promising, which can help to improve the efficiency and transparency of public administration in Russia and its regions (in particular, in the Donetsk People's Republic).

However, potential difficulties associated with the adaptation of the American experience should also be taken into account. High costs for the introduction of comprehensive risk management systems may become a significant barrier in

conditions of limited budgetary resources. In addition, the need to significantly restructure existing management processes may meet resistance from the bureaucratic apparatus. There is also a risk of a formal approach to the introduction of risk management without a real change in management culture, which may reduce the effectiveness of the reforms.

To summarise, we note that the analysis of the American experience of applying risk management in the public administration system demonstrates the significant potential of this approach to improve the efficiency of the public sector and the sustainability of economic development. Adaptation of the best practices of the USA with regard to the Russian specifics can become an important step in the modernisation of public administration system in the Russian Federation, especially in the context of the development of industrial regions, which includes the Donetsk People's Republic.

The Canadian model of integrating risk management into the public administration system is a comprehensive approach based on the principles of Integrated Risk Management (IRM). This model, developed and implemented by the Treasury Board of Canada Secretariat, is characterised by systematic and deep integration into decision-making processes at all levels of government [8].

A key element of the Canadian approach is the Corporate Risk Profile (CRP) - a corporate risk profile that is developed by each federal department and agency. CRP serves not only as a tool for risk identification, but also as a basis for strategic planning and resource allocation [9]. Such an approach allows government agencies to respond more effectively to emerging threats and take advantage of opportunities.

The experience of applying risk management in industrial and resource-producing regions of Canada, such as the provinces of Alberta and British Columbia, deserves special attention. These regions have developed and successfully operate comprehensive risk management systems that take into account the specifics of the local economy. An important element of these systems are cross-sectoral committees for cumulative risk assessment that bring together representatives of government, business and academia [10]. This approach provides a comprehensive risk assessment and promotes more informed decision-making.

Analyses of the activities of key government agencies in Canada demonstrate a deep integration of risk management principles into their daily work. For example, the Canadian oil company Natural Resources Canada (NRCan) uses sophisticated environmental and economic risk assessment models when developing environmental management policies [11]. This allows for a more effective balancing of economic interests and environmental requirements, which is especially important for resource-producing regions.

The application of the concept of risk management in Canada has led to significant positive changes in the socio-economic sphere. According to Statistics

Canada [12], over the period 2010-2020, there was a 15 per cent decrease in the volatility of GDP of resource-producing provinces compared to the previous decade. This indicates an increase in the resilience of regional economies to external shocks, which is particularly important in the context of dependence on commodity markets.

Of particular note is the impact of the risk-based approach on environmental safety. A 30 per cent reduction in the number of major environmental incidents in the oil and gas sector over the same period [12] indicates the effectiveness of preventive measures and improved risk management practices in Canadian industry. This experience is of particular interest to Russian industrial regions (in particular, the Donetsk People's Republic) facing similar or analogous environmental challenges.

An important aspect of the Canadian experience is the effective interaction between government and business in the area of risk management. Public-private partnership programmes facilitate the sharing of responsibilities and resources between the public and private sectors, resulting in more integrated and effective risk management. This approach may be particularly valuable for the Russian Federation in the context of industrial region development and infrastructure modernisation.

However, when considering the possibility of adapting the Canadian experience to Russian realities, a number of factors should be taken into account. Firstly, the introduction of comprehensive risk management systems requires significant investments in the development of technological infrastructure and personnel training. Secondly, there are differences in the legislative framework and public administration system between Canada and Russia, which may require significant adaptation of methodologies.

Despite these challenges, the Canadian experience demonstrates the significant potential of the risk-based approach to improve the efficiency of public administration and sustainability of economic development. Adaptation of the best Canadian practices with regard to the Russian specifics can become an important step in the modernisation of public administration in the Russian Federation, especially in the context of management of industrial and resource-producing regions, which includes the Donetsk People's Republic.

Thus, the analysis of the Canadian experience of applying risk management in public administration provides valuable lessons and opportunities for improving similar practices in the Russian Federation. The key aspects worthy of attention are a systematic approach to the integration of risk management into strategic planning processes, effective interagency co-operation and the development of public-private partnership mechanisms in the field of risk management.

Next, we will analyse the German experience in the application of risk management in the public administration system, which is of great interest for the

Russian Federation, given the similarity of the federal structure of both countries and the importance of the industrial sector in the economy.

The German approach to integrating risk management into public administration is characterised by a high degree of systematisation and formalisation of processes. The key tool is the Risk-Management-Handbuch developed by the German Federal Ministry of the Interior [13]. This document establishes uniform risk management standards and methodology for all federal authorities.

In addition to this manual, German government agencies actively use such tools as Risikolandkarte (risk map) and Risikoinventar (risk register) [14]. Particular attention is paid to the application of quantitative risk assessment methods, in particular Value at Risk (VaR) methodology and scenario analysis.

The Bundesamt für Sicherheit in der Informationstechnik plays a leading role in the development and implementation of cybersecurity risk management standards. This organisation has developed the IT-Grundschutz methodology, which is widely used in both the public and private sector to assess and manage IT risks [14].

At the level of federal states, especially in industrialised regions such as North Rhine-Westphalia and Baden-Württemberg, risk management is deeply integrated into the regional economic planning system. A characteristic feature of the German approach is the close co-operation between public authorities and industrial enterprises in the field of risk management.

The Ministry of Economics, Innovation, Digitalisation and Energy of North Rhine-Westphalia has developed the Industrie 4.0 programme, which focuses on risk management in the context of the digital transformation of industry [15]. This programme includes the establishment of regional competence centres for risk management, which provide advisory support to small and medium-sized enterprises.

The application of the risk management concept in Germany has led to significant positive changes in the socio-economic sphere. According to Destatis, the following trends were observed over the period 2010-2020 [16]:

- a reduction in the GDP volatility of industrial regions by 10 per cent compared to the previous decade;
- a reduction in the number of industrial accidents in the manufacturing industry by 25 per cent;
- increased efficiency of public investment in R&D: the average return on investment increased by 12 per cent;
- reduction of economic losses from cyberattacks by 30% due to improved IT risk management systems.

The German experience provides a number of positive aspects that can be adapted to Russian conditions. Firstly, a systematic approach to the standardi-

sation of risk management processes at the federal level can help to improve the efficiency and transparency of public administration in Russia. Secondly, the German practice of close interaction between the state and business in the field of risk management can be particularly useful for the development of industrial regions of the Russian Federation (in particular, the Donetsk People's Republic).

A study of developed countries' practices has revealed a trend towards the formation of comprehensive risk management systems at the state level, integrating various tools and methodologies. The most promising for adaptation in Russian conditions are: a centralised approach to standardisation of risk management processes (German experience), integration of risk-oriented approach into strategic planning (US experience). The synthesis of these elements can help to improve the efficiency of public administration in Russia's regions (including the DNR).

List of references

1. Bartsits, I.N. System of state and municipal management / I.N. Bartsits. - Moscow: Izd-vo RAGS, 2011. - Vol. 1. - 464 p.

2. Enterprise Risk Management: Selected Agencies' Experiences Illustrate Good Practices in Managing Risk. - Washington, D.C.: GAO, 2016. - 56 p.

3. OMB Circular No. A-123, Management's Responsibility for Enterprise Risk Management and Internal Control. - Washington, D.C.: Executive Office of the President, 2017. - 30 p.

4. Hardy, K. Enterprise Risk Management: A Guide for Government Professionals / K. Hardy. Hardy. - San Francisco: Jossey-Bass, 2014. - 336 p.

5. Jorion, P. Value at Risk: The New Benchmark for Managing Financial Risk / P. Jorion. - New York: McGraw-Hill Education, 2006. - 624 p.

6. Federal Emergency Management Agency. Risk Management. [Electronic resource]. - Access mode: https://www.fema.gov/emergency-managers/risk-management. - Date of address: 25.07.2024. - Downloaded from the screen.

7. Power, M. The Risk Management of Everything: Rethinking the Politics of Uncertainty / M. Power. Power. - London: Demos, 2004. - 74 p.

8. Framework for the Management of Risk. - Ottawa: Government of Canada, 2010. - 35 p.

9. Renn, O. Risk Governance: Coping with Uncertainty in a Complex World / O. Renn. Renn. - London: Earthscan, 2008. - 455 p.

10. Bouckaert, G. Public Management Reform: A Comparative Analysis - New Public Management, Governance, and the Neo-Weberian State / G. Bouckaert, C. Pollitt. Bouckaert, C. Pollitt. - Oxford: Oxford University Press, 2017. - 404 p.

11. Translated from www.DeepL.com/Translator (free version)Canada's national statistical agency - Statistics Canada. [Electronic resource]. - Access

mode: https://www.statcan.gc.ca/en/start. - Date of access: 25.07.2024. - Downloaded from the screen.

12. Risk-Management-Handbuch. [Electronic resource]. - Mode of access: https://www.adler-group.com/fileadmin/web/docs/IR/Compliance/Adler_Group_Risikomanagementhandbuch_2021.pdf. - Date of access: 25.07.2024. - Zagl. from the screen.

13. Handbuch für Organisationsuntersuchungen und Personalbedarfsermittlung. - Berlin: BMI, 2018. - 455 S.

14. Bundesamt für Sicherheit in der Informationstechnik. IT-Grundschutz. [Electronic resource]. - Access mode: https://www.bsi.bund.de/DE/Themen/Unternehmen-und-Organisationen/Standards-und-Zertifizierung/IT-Grundschutz/it-grundschutz_node.html. - Date of address: 25.07.2024. - Zagl. from the screen.

15. Statistisches Bundesamt: Startseite. [Electronic resource]. - Access mode: www.destatis.de. - Date of address: 25.07.2024. - Downloaded from the screen.

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THEORETICAL ASPECTS OF INTERNATIONAL REGIONAL ECONOMIC INTEGRATION IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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At the present stage of development of the world productive forces, there is a tendency towards the integrity and continuity of their national elements. This creates the advantage of centripetal forces in the functioning of the global economy and increases the openness of national economies, which is a catalyst for the internationalization of economic activity. The current state of the world economy is determined by two main trends.

On the one hand, there is growth and strengthening of international economic integration. This phenomenon is characterized by the absence of discrimination against foreign partners in each national economy, as well as the blurring of boundaries between economic participants in different countries.

On the other hand, integration processes are not unambiguous, since disintegration processes also arise caused by political, national and religious factors.

International economic integration can be considered as a new stage of internationalization, involving convergence and mutual adaptation of the structures of national economies.

Integration can be understood as the absence of discrimination and as a process leading to the unification of economic entities. At the level of small economies, transnational corporations become obvious, representing the most integrated structures [1]. At the state level, integration develops through the creation of economic associations with varying degrees of policy consistency, which indicates the phenomenon of economic regionalism (Fig. 1).

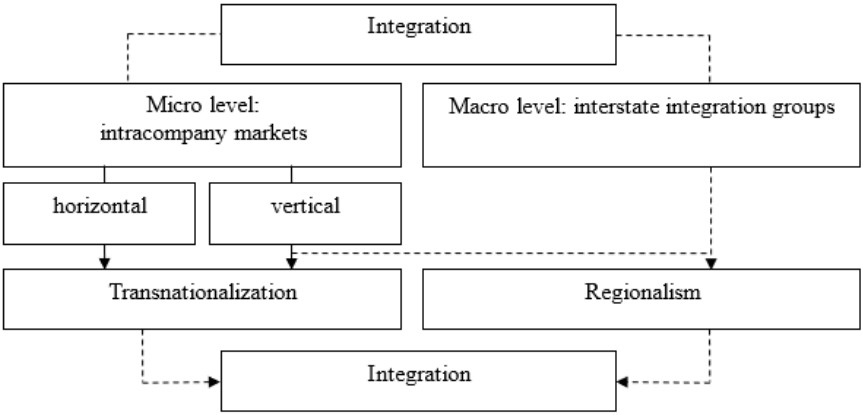

Figure 1. *Structure of the integration process*

Economic integration is a process where several countries come together to form a larger economic space. Countries sign integration agreements with the expectation of economic benefits, while they may pursue political and other interests. Based on economic factors, political associations also arise, where, along with economics, political integration also occurs.

The essence of integration groupings and their relationship is determined by the logic and continuity in the process of international regional economic integration. The creation of preferential and free trade zones, as well as customs unions, focuses on exchange, which promotes trade integration [2]. Deeper coordination between states creates the conditions for integration in the production sector. It is important to take into account that the levels and forms of international economic integration are interrelated (Fig. 2).

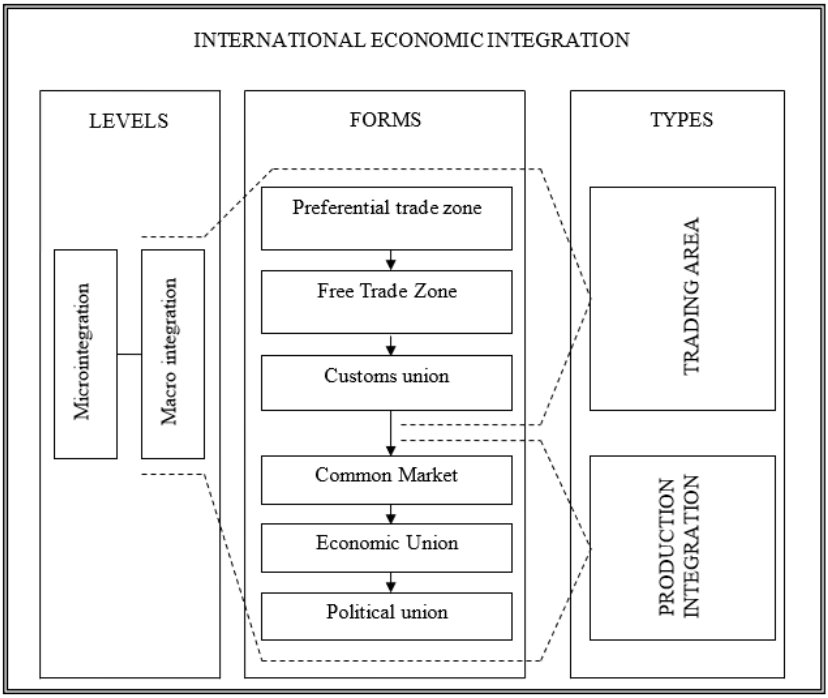

Figure 2. *Levels, forms and types of international economic integration*

To form an integration group, certain political, legal, economic, sociocultural and infrastructural conditions are required. The compatibility of political systems and legislation, the level of development, as well as the resource potential of countries are of key importance. Integration processes demonstrate pronounced regional specificity, which ultimately makes it possible to more effectively use the economic potential of states and accelerate their development.

At the same time, the key tasks of social policy are being solved through an objective reduction in the cost of basic products and services, as well as through the creation of new jobs, thanks to the concentration of the efforts of the participating countries on priority socio-economic development programs. It should be noted that in mature integration associations, powerful and effective mechanisms and tools are developed and applied to ensure general economic security.

Despite the obvious economic benefits, the processes of international regional economic integration are accompanied by an interweaving of political and socio-economic problems. The main reasons for the occurrence and persistence of these problems are as follows:

- nationalism, traditional conflicts between countries and groups of countries, ideological differences;
- political, legal, economic and sociocultural differences between participating countries;
- increased costs for implementing regulatory functions at the supranational level; contradictions associated with the expansion of integration associations, etc.

Modern processes of international economic integration are characterized by special features:

- the dynamism of the processes of international economic integration as a whole, due to both objective factors and the "chain" reaction of the countries of the world to the development of individual integration associations;
- uneven development and implementation of forms of international economic integration, caused by obvious differences in the economic level of development of countries and regions;
- development along with integration processes of disintegration processes that have deep roots in the historical, political, economic and social patterns of world development [3].

Scientists emphasize that in our time, integration and disintegration are developing unevenly and represent two opposing processes. Moreover, the phenomena of disintegration can be not only local, but also worldwide.

Integration and disintegration are objective interrelated processes. Moreover, disintegration creates the preconditions for integration on new quantitative and qualitative bases. Sometimes conditions arise for re-integration.

The successful development of integration processes in the international arena requires the presence of a number of objective and subjective prerequisites, the level of development of which varies significantly in different regions of the world economy. This has an impact on the nature and extent of regional economic integration. The most significant objective prerequisites are:

- modern scientific and technological revolution, which simultaneously serves as the material basis for international economic integration. Fundamental changes in the productive forces, the emergence of new means of production and technologies, as well as the transformation of the structure and nature of production conflict with the limited nature of national markets and the presence of interstate barriers to the movement of capital, goods, services and labor. The new scale and nature of problems in modern socio-economic development inevitably make their solution impossible or ineffective at the level of individual countries, emphasizing the need to pool various resources. The modern scientific and technological revo-

lution objectively determines the creation of an optimal economic space, within which the emergence and renewal of a large assortment of goods and services, the stable functioning of production and the satisfaction of the growing needs of society within one or several countries are ensured [4];

- socio-economic homogeneity of converging national economies. In modern economic development, there are two main models of organizing production and foreign economic relations: market and planned. The formation of a single economic space presupposes the existence of similar principles for organizing national production and the same conditions for producers;
- high and comparable level of economic development of countries, groups of countries and regions of the world in conditions of uneven distribution of resources. Significant differences in the level of labor productivity, labor qualifications and competitiveness of products of integrating countries can lead to unilateral advantages and specialization of individual national economies, which will create economic and administrative barriers to the formation of a common economic space;
- significant historical period and experience of economic cooperation in a group of countries. Integration represents the continuation of economic interactions between countries at a new level, the deepening and expansion of economic cooperation;
- purposeful activities of social groups and classes, legislative and executive bodies of countries to stimulate integration processes. This is a subjective prerequisite that reflects objective economic processes and can either promote the development of integration or slow it down [5];
- trends in demographic development;
- the presence and need to solve global problems (energy, food, environmental, ocean and space exploration, economic growth, population growth, economic security, disarmament);
- reduction of distances due to the development of transport and communication networks;
- market "unification" of economic development.

In general, the main theoretical aspects of integration processes were considered for their subsequent practical application.

References

1. Basnukaev, K. U. Foreign experience in implementing the state policy of spatial development / K. U. Basnukaev // Bulletin of the Altai Academy of Economics and Law. – 2018. – No. 6. – P. 18-24. – EDN PMPITF.

2. Sharypova O.A., Galtseva N.V., Favstritskaya O.S. Foreign experience of structural transformation of economic systems // Regionalistics. – 2022. – T. 9. – No. 6. – P. 109-125. –http://dx.doi.org/10.14530/reg.2022.6.109

3. Adamanova, Z.O. THEORETICAL FOUNDATIONS FOR THE DEVELOPMENT OF WORLD INTEGRATION PROCESSES / Z. O. Adamanova, A. A. Ametov // Scientific notes of the Crimean Engineering and Pedagogical University. – 2022. – No. 3 (77). – pp. 14-17. – ISSN 2658-364X. – Text: electronic // Lan: electronic library system. – URL: https://e.lanbook.com/journal/issue/338804

4. Mikhailichenko, M.Y. Transformation of the paradigm of balanced spatial development of the region: domestic and foreign experience / M. Y. Mikhailichenko, MY Mikhailichenko // Economics. Informatics. – 2023. – No. 4. – P. 768-780. – ISSN 2687-0932. – Text: electronic // Lan: electronic library system. – URL: https://e.lanbook.com/journal/issue/351623

5. Yatsenko, M.P. Features of studying multipolarity at a university as an effective model of global strategic stability / M.P. Yatsenko, I.D. Peskovets // Professional education in the modern world. – 2019. – No. 3. – P. 2938-2947. – ISSN 2224-1841. – Text: electronic // Lan: electronic library system. – URL: https://e.lanbook.com/journal/issue/311369

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CREATIVE TEACHER TRAINING: A CASE OF THE ”CHILDREN AT UNIVERSITY” AFTER-SCHOOL PROGRAM

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Abstract. *The paper describes a case of a campus-based after-school program ”Children at University”. It was started as a creative learning environment which could bridge the gap between the time the students spend on studying theory before practicing teaching and the social demand for the university graduates who are ready-to-go flexible professionals with highly developed soft skills. In the program, freshmen and sophomores volunteer to deal with various matters of children’s homework, recreational and enrichment activities, thus coming close to understanding what school teaching jobs are like. The research shows that the students working in the program prove to become more creative, proactive and skilled students with more optimism about their future careers.*

Keywords: *after-school program, training teacher, creative teaching.*

This article shares the results of a research project, regarding the impact that a creative, engaging and positive environment has on the efficiency of training prospective teachers in the first two years of study. The research was done at Shuya Teacher Training University in Shuya, Russia, from September, 2023 to May, 2024.

Theoretical background. For the last two decades, creativity in the classroom has occupied a major position in the Russian pedagogical research. The federal doctrine of the Russian vocational education defines proper teacher training as a main constituting element influencing the country’s economic, social, and cultural development, so the aspirations now are connected with the development of new paradigmatic foundations of creative pedagogy.

In the book ‘Creative Pedagogy: Methodology, Theory and Practice’, it is argued that the requirements and standards for teacher training are made outside the

education system, and the ability to anticipate the possible trends of higher education development is considered to be of utmost importance in any teacher training institution (*Popov, Kruglov, 2012*) .

Teacher training should be predictive, ensuring advancements in the design and the methodology of pedagogical research. This idea coincides with the theory by Lev Vygotsky, who claimed that 'pedagogy must be oriented not to the yesterday, but to the tomorrow…; only then can it call to life in the process of education those processes of development which now lie in the zone of proximal development' (*Vygotsky, 2004)*.

The concept of creativity has been considered as central in the fields of education worldwide, and there are many resources available on how to foster it in the classroom.

A study (*Horng, 2005*) found that there are various factors that influence creative teaching, namely:

• personal traits, such as self-confidence, openness to experience, drive and ambition, risk-taking;

• growing up and learning experiences;

• peer interaction, which includes relationships with peers, common beliefs in education and communication;

• devotion to developing ideas, designing curricula, arranging activities, revising teaching plans, preparing materials, reflecting on the students' performance and the students' feedback;

• motivations;

• organisational environment.

The study also proposed some strategies for creative teaching, like using student-centred learning, assisting students through using multi-teaching aids, connecting teaching contents with the students' real life experiences.

A teaching is considered to be creative when an instructor combines the existing knowledge with a new way that is new or unique or introduces a new process to nourish cognition to obtain a useful outcome. That can be planned in advance or adopted as a response towards the students' needs in a certain learning context, so prospective instructors need to develop a range of skills which they can apply later to different classroom situations. *Davis and Rimm (2004)* acknowledged that personal creativity can be enhanced, and they proposed that creativity could be taught.

Morais and Azevedo (2011) conducted research that showed that practice supports the theory, and the most important characteristics of a creative teacher are: enthusiasm, an individualized approach to each pupil, security, scientific competence, the ability to promote autonomy in the learners.

So, creativity is not so much an abstract notion, rather, it is the change and sequential transformation of a teacher/instructor. There is a fairly widespread opin-

ion that the ability to be creative is a "gift from God" and therefore it is impossible to be taught. However, apart from the outstanding personal traits, creative teachers are always characterized by fundamental knowledge of the subject they teach and the methodology. Moreover, many of those are life-long learners, so creativity can and should be taught *(Popov, Kruglov*, *2012*).

We share the opinion that specific learning environments, that enhancce rather than inhibit the students' innovative potential, should be designed for trainee teachers to become creative instructors. There is no denying the fact that the capacity to innovate and create can be cultivated if a learning environment has been designed properly. Developing creative instructors should begin with their training.

A learning environment may be a wide variety of settings, including outside-of-school locations and outdoor environments, and it includes both the physical elements such as classrooms, furniture, materials, technology, and other resources as well as the social dynamics between the teacher and student or among students themselves.

Richardson and Mishrab (2018) consider learner engagement, physical environment, and learning climate as the three key areas that support student creativity. They have developed a tool that is supposed to provide educators with specific examples for the support of creativity termed the SCALE (Support for Creativity in Learning).

Physical Environment includes a comfortable working space and various sources and work areas that are available to students.

Learning Climate is regarded as supportive if it allows active discussions among students, who understand that that are cared for and respected, the atmosphere is collaborative and friendly, their differences are valued, and moreover, the teacher/professor is a co-learner, explorer, and resource person.

Learner Engagement embraces the following major provisions:

1. Students are given tasks that are open-ended or involve choice.
2. Students are involved in interdisciplinary tasks.
3. Students can take time developing their ideas, they work at their own pace.
4. Multiple ways of knowing and learning are encouraged.

Fan and Cai (2022) also emphasize the importance of the creative learning environment on students' creativity. In their research, they propose a mediation model that studies the relationship between a creative learning environment and student creativity through multiple intervening mechanisms.

Ovbiagbonhia, Kollöffel, and Brok (2019) consider a positive and innovative learning environment, outlining six major elements: creativity, leadership, creative self-efficacy, energy and ambiguous problem-solving. Although these five elements are discussed individually, in practice they are interconnected and interdependent.

Program design. In Russia, one of the major issues that are relevant at the moment is that a teacher is supposed to be perfectly skilled and trained to guide, support, facilitate children, as well as be able to meet all kinds of the challenges posed by the rapidly changing society. Yet, very few young teachers are ready to face the challenges, which results in quick dissatisfaction and disillusionment with the reality and quitting jobs. In order to acquire the necessary knowledge and skills it is important that professional development is offered while the students are in training.

To maintain supportive learning environment at the pedagogical university, professors have to let their students understand the basic context and composition of teaching the schoolchildren, in order to facilitate efficient delivery of instruction and classroom management that nurture and inspire the prospective teachers to actively participate, cooperate and collaborate in a learning process.

The authors consider that a creative trainee teacher should have a conscious positive attitude towards the chosen teaching job, an ability to be quickly involved into a required teaching activity, mastery in the basic professional skills, competencies of interaction with children of different age, a steady interest in pursuing innovations and life-long learning. They should be equipped with the knowledge and skills of giving creative instructions.

In Russia, the system of teacher training still retains a lot of traditional characteristics. It is based on studying the Theory of Education, repetition and memorizing facts, it often fails to help the prospective teachers to actively apply information gained through experience and reasoning. This style of learning doesn't allow students to get to the deeper levels of understanding required for complex concepts and lifelong learning. Moreover, the students come to schools to practice teaching only in Year 4 and 5, while the first three years are spent at the university studying the core subjects.

At the same time, it takes a lot of time and experience for senior students to learn to implement the knowledge and skills obtained in the classroom into the actual teaching process in the workplace. In order to bridge the gap between the long time students spend at university studying theory rather than practicing teaching and the demand for the university graduates who are ready-to-go flexible professionals having the necessary up-to-date soft skills, we have come with the idea of setting up a creative environment that would allow freshmen and sophomores to come close to understanding what school teaching jobs are like without leaving the campus.

As a result, a project was developed seven years ago, which was called the "Children at University" Program. The target group to be involved in running the project were the freshmen and the sophomores of the six schools of Shuya Universuty: the School of IT and Maths, the School of Linguistics, the School of

Psychology, the School of Elementary Education, the School of Physical Education, the School of Fine and Applied Arts. The project was designed to cater local elementary school children.

It was not accidental that the after-school program had been chosen as an experimental creative format. A daycare for elementary school children is an essential service that many families need in the community. Children start elementary school at the age of 6 or 7, while they still lack independence and time-management skills. While there is a good system of kindergartens in which children get full-time care, the state-funded schools no longer provide the day-care as they used to do in the past. Once a child starts school, they are left to themselves after lessons are over. And a lot of parents are concerned about that fact. There are youth centers and societies for the children who are interested in art, music, sports, but these are mostly for children aged 9 to 11, so there are a lot of children over 6 but under 10, who need supervision and guidance.

It occurred to the administrative staff of the university that an after-school program could be mutually beneficial both for the community and the university. It is known that professional development is an effort to bring about change in classroom practices in both skills and beliefs *(Guskey, 2002).* So, for the prospective teachers, who are still in their first two years of study, working with the children could provide the necessary experience allowing them to obtain the necessary social and professional skills and develop new attitudes to the teaching professions in an informal creative environment.

The Center was designed as a blend of the after-school Day Care programme and the homework club for elementary school students based on the university campus. It has been free of charge, the children group being formed at the beginning of the academic year in September and remaining unchanged up to late May. It is open Monday to Friday, from 12 to 6 p.m. The schedule is fixed (Table 1).

Table 1.

The Schedule of the "Children at University" Center (2023-2024)

Activity	Mon.	Tue.	Wed.	Thur.	Fri.	Total
Homework	1.00 -2.30 p.m	1.00 -2.30 p.m	1.00 -2.30 p.m	1.00 -2.30 p.m	1.00 -2.30 p.m	**5**
IT Lab		2.30-3.30 p.m.	2.30-3.30 p.m.		2.30-3.30 p.m.	**3**
Languages	2.30-3.30 p.m.			2.30-3.30 p.m.	3.30-4.30 p.m.	**3**
Sports	3.30-4.30 p.m.	3.30-4.30 p.m.	3.30-4.30 p.m.	3.30-4.30 p.m.		**4**
Arts	4.30 -5.30 p.m.			4.30 -5.30 p.m.		**2**
Small Talk		4.30 -5.30 p.m.	4.30 -5.30 p.m.		4.30 -5.30 p.m.	**3**

Children are free to come right after their lessons end, irrespective of an individual timetable, because they are different in different schools. They have meals at the university canteen and do their homework under the supervision of the stu-

dents from the School of Primary Education. Then the children are involved in other activities like:

- exploring subjects of interest in the university labs with the students of IT and Maths Department,
- playing sports and games with the students from the School of Physical Education,
- learning a foreign language with the students from the School of Linguistics, doing arts and crafts with the students from the School of Fine and Applied Arts.

Students volunteer to try themselves as teachers, working out short lessons designed to teach a topic.

Each child coming to the Center is observed by a student from the School of Psychology. If the parents permit it, they analyze a child's cognitive features and personal characteristics. Based on the results, recommendations are given to both students working at the center and the parents of the children. This activity is supervised by the professors of the Department of Psychology and Social Pedagogy, as well as a tutor assigned by the particular department for the subject study. The team of the students is dynamic.

Results and discussion. Generally, the "Children at University" Program promotes a creative teaching and learning environment for the children, because the students are young, positive, creative, open and energetic carers. They are eager to help, instruct, assist, influence the children as a positive role model; they introduce the children to the university facilities that differ a lot from those of the non-commercial schools.

The parents have given a positive feedback saying that the children:

- improve their knowledge of the subjects;
- master their socializing skills;
- become better at developing and following their afternoon schedule;
- develop genuine interest for learning;
- find it easier to adjust to the formal schooling atmosphere;
- get more interested in further learning.

Parents say that the university is a trusted environment where their children get a better vision of their future, given the access to university labs, gyms, studios, and other facilities. From the outset, the program has been very popular with the local parents, because the university is highly regarded in the city, and it also provides a safe, secure, positive, creative and caring environment, that stimulates the children's interest for learning and achieving academic success.

At the same time, the university students have an opportunity to develop their competences, creativity and practical skills at an early stage of their vocational training. An interview was done with the volunteers running the Center. It was

found out that the greatest benefit the interviewees see in being able to teach and provide childcare at the center is learning to deal with real issues the children have. Besides, they learn the following important things:

1) true motivation in education: what it takes to motivate children to study;

2) patterns if the interpersonal communication in children of elementary school age;

3) features of children's communication with peers and adults;

4) motivating children to lead a healthy lifestyle.

The students come to realize that the more they know and can do, the more they can connect and combine, the more new things they are able to make. Through daily study and practice, they are able to use what they have imagined as the basis for creating work or a product of some kind. Through experience, they become more proficient at matching possibilities and capabilities. The greater their comfort with multiple solutions and complexity, the more capable they are in dealing with ambiguity and uncertainty in productive ways. This correlates with the opinion that when prospective teachers discover new professional knowledge and put into practice what they have learned, they begin to feel more effective and content *Timperley (2008).*

We have conducted a survey to understand what personal important goals the students think they have achieved by working in the project. The answers can be seen in Table 2. There the first column is the answers of the students whose job was helping children out with homework. The second column is the answers of the students teaching children subjects of their choice. The total number of students interviewed was 26.

Table 2.

The students' feedback about the individual results they achieved while working in the "Children at University" Program

Students' Responses	**Frequencies**	
	Homework supervisors	**Play group supervisors and subject teachers**
1. Encourage research	21	20
2. Improve problem-solving and critical thinking skills	18	15
3. Good opportunity to communicate with fellow-students and children	14	18
4. Adopt more soft skills	18	18
5. Check my understanding of my major subject	22	24
6. Improve self-evaluation	14	19

7. Good to practice teaching from my first year at university	22	24
8. It is interesting to see real children learning	24	18
9. Enables freedom of expression in teaching methods compared with the regular classroom	19	24
10. Fosters focus on real issues of teaching elementary school students	16	22
11. We learn, teach and have fun at the same time	19	24
12. This activity reduces stress and anxiety connected with teaching	22	19
13. Helps boost emotional development	25	20
14. Improves Thinking Capability	22	19

If we generalize, the most important aspects are:

1) improving problem-solving and critical thinking skills by developing an ability to brainstorm new ways to address a problem instead of finding answers already written in the textbooks;

2) adopting more soft skills, because they have to use more complex tools, compared with the classroom setting, to finish the task. Also they learn how to manage lesson time, prioritise tasks, communicate properly;

3) checking and expanding their knowledge;

4) improving self-evaluation by getting a better understanding about what they have learnt and what they are missing;

5) boosting creativity and freedom of expression, as the informal atmosphere at the Center allows students to express themselves freely with no fear of an error and step outside their comfort zone;

6) having broader resources for scientific work and innovation research, they test new ideas and approaches, which can lead to innovations in the areas of study at university as well as finding out what really interests them;

7) fostering collaboration between students from different departments, because collaboration can be a powerful drive of innovation, allowing diverse perspectives and ideas to come together. Diverse teams, regarding expertise and backgrounds, are more innovative than homogenous teams.

Generally, the work in the project “Children at University” contributes to the students’ professional competences: they develop soft skills, e.g. the skill of productive communication; the skill of efficient team-building and team management; the skill of evaluation of innovation in education; critical and systematic thinking; self-management; time-management; emotional intelligence; leadership; empathy; persuasion and reasoning; goal orientation, and many more. All of those soft skills add up to shape a modern-age teacher who is able to apply their creativity,

leadership, creative self-efficacy, energy and ambiguous problem-solving in the work place.

Following the prime aspects that contribute to establishing an effective creative learning environment to foster students' teaching competencies, we can also conclude that the program develops all of them:

It provides a newer physical space— the studio for everyday activities, university labs and gyms, materials available for use from the libraries and the departments.

It improves teacher/child expectations, trust between learners and instructors.

It creates mutual positive emotions of students and children, adds up to optimism from the students about their future careers, ensure healthy association among the students from different departments.

Conclusion. In response to the growing need for the new-age professionals with strong innovation competence and creativity, many educational institutions are looking for ways to foster those. It may seem a hard goal to achieve because, apart from being a creative person, a teacher or instructor is expected to have a great deal of vigour and self-confidence, a warm outgoing nature. Besides, they have to be intelligent, original, a bit playful, free of judgement and impatient behaviour. Creative teachers are supposed to be student-centered, foster students' interest in the classroom, show a high awareness and interpersonal skills, have internal motivation based on culturally and socially relevant values, and willing to take risks while still within the compounds of their safe environment. But big goals are achieved with small steps.. The authors are convinced that creativity can be stimulated by creating some relevant safe, yet supervised, learning environments in which trainee teachers can become intellectual risk-takers and creative problem solvers.

The research showed that the suggested conditions and methods used in the "Children at University" after-school program have had a positive impact on the vocational orientation, social skills and professional competences of the Shuya University students.

References

1. Davis, G., & Rimm, S. (2004). Education of the Gifted and Talented (5th ed.). Needham Heights, MA: Allyn & Bacon.

2. Donaldson, J.P. (2018). Designing Learning Environments to Facilitate Creativity. URL: https://www.researchgate.net/publication/332863880_Designing_learning_environments_to_facilitate_creativity

3. Fan, M., & Cai, W. (2022) How does a creative learning environment foster student creativity? An examination on multiple explanatory mechanisms. Current Psychology, 41, 4667–4676. https://doi.org/10.1007/s12144-020-00974-z

4. Guskey, T. (2002). Professional development and teacher change. Teachers and teaching: theory and practice, (8), 381-391.

5. Horng, J.-S., Hong, J.-C., ChanLin, L.-J., Chang, S.-H., & Chu, H.-C. (2005). Creative teachers and creative teaching strategies. International Journal of Consumer Studies, 29, 352-358. doi:10.1111/j.1470-6431.2005.00445.x

6. Mikhailov A.A., & Keremli N.V. (2023). On the concept of «professional competences» of a trainee teacher fostered in the «Children at University» project. Review of Pedagogical Research, 5 (2), 219 – 225.

7. Morais, M.F., & Azevedo, I. (2011) What Is a Creative Teacher and What Is a Creative Pupil? Perceptions of Teachers. Procedia-Social and Behavioral Sciences, 12, 330-339. https://doi.org/10.1016/j.sbspro.2011.02.042

8. Ovbiagbonhia A. R., Kollöffel B, & Brok P. (2019) Educating for innovation: students' perceptions of the learning environment and of their own innovation competence. URL: https://link.springer.com/article/10.1007/s10984-019-09280-3

9. Paniagua A., & Istance D. Teachers as Designers of Learning Environments. The Importance of Innovative Pedagogies. OECD. 2018.

10.Popov, V.V., Kruglov, Yu.G. (2012). Creative Pedagogy: Methodology, Theory and Practice. 3rd Ed. Moscow, Binom Publishers.

11.Richardson, C., & Mishrab, P. Learning environments that support student creativity: Developing the SCALE. Thinking Skills and Creativity, 27, 45-54. https://doi.org/10.1016/j.tsc.2017.11.004

12.Timperley, H. (2008). Teacher professional learning and development. In J. Brophy (Ed.), Educational Practices Series, 18. International Academy of Education and International Bureau of Education: Brussels.

13.The Glossary of Education Reform. URL: https://www.edglossary.org/learning-environment

14.Vygotsky, L. (2004) Imagination and Creativity in Childhood. Journal of Russian and East European Psychology, 42 (1), 7–97.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN DEVELOPING COMMUNICATIVE SKILLS IN NON-NATIVE SPEAKER LEARNERS

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Introduction

In the global world, proficiency in language is essential for success in the personal, intellectual, and professional areas of life. This is especially acute for young students who have to learn in settings where the language of instruction differs from their mother tongue. For example, learning the requisite conversational skills in Russian can be extremely difficult for many non-native speakers in Russia. The pace of migration processes has accelerated due to the development of digital technologies, growing socio-political tensions, and increasing social differentiation. This has created certain issues related to the adaptation of migrants to the social, cultural, educational, and other aspects of life in Russia. Several studies show how critical it is to address the difficulties in educating children of migrants [1, 2, 3].

According to the Federal State Statistics Service of the Russian Federation, over 590 thousand persons immigrated to the Russian Federation in 2020, with over 535 thousand arriving from CIS countries [4].

Traditional methods of language instruction often fail to meet the different demands and learning styles of learners who are not native speakers. Therefore, there is increasing interest in using advanced technology, particularly generative AI, to improve communication and language acquisition abilities [5]. Feuerriegel, Hartmann, and Janiesch [6] define generative AI as computational methods that can produce seemingly original, meaningful content, such as text, images, or audio, from training data. Generative AI can be widely applied in teaching languages due to its ability to design customized learning experiences. Offering personalized educational content, adaptive assessments, and real-time feedback, AI provides a stimulating and productive learning environment. It provides anytime-anywhere access to resources and support and can aid in closing the gap in language acquisition, encouraging student autonomy and motivation [7].

AI provides many advantages for language learning. According to studies, AI-driven instructional software can enhance students' speaking, listening, reading, and writing. The effectiveness of AI in these tasks might be even higher than those of the conventional teaching methods. Natural language processing (NLP) in AI can help people understand and use language more effectively by giving students tools to practice and develop their communication skills in authentic contexts [8].

Nevertheless, the integration of AI in education brings certain risks. To ensure the fair and responsible use of these technologies, it is necessary to solve concerns about algorithmic bias, data privacy, and the ethical use of AI. Furthermore, it is necessary to find out how well AI Technologies integrate into teaching methods and how beneficial they can be when fostering long-term language proficiency [7].

This research aims to look into different ways to use generative AI to help non-native speakers in Russian schools and improve their communicative skills. The author analyzes pros and cons of introducing AI into education. This provides significant perspectives for current teachers and future educators (i.e., those currently studying at universities), particularly those who interact with non-native students. This research examines the theoretical components and incorporates practical applications and case studies to demonstrate the successful implementation of AI in real-life educational environments.

The results of this research demonstrate the considerable potential for AI to improve the communication skills of individuals who are not native speakers. It makes learning a language easier and helps people get used to a new educational, cultural, and linguistic environment. Using neural networks, teachers can customize learning experiences and make learning a language more effective, engaging, and fun. Thus, this makes the setting better and more welcoming for non-native speaker learners.

Materials and Methods

This research explores various options to apply generative AI to develop the communicative skills of non-native speaker learners in Russian schools. Thus, it seems reasonable to conduct a theoretical study of AI's potential in language teaching, particularly to non-native speaker learners. The accelerated pace of migration has created a need to address and resolve the difficulties faced by non-native speaking children in adapting to a new linguistic environment [9]. Many scholars emphasize the necessity of addressing the issues of non-native speaking children and organizing all necessary work with them [10, 11] to provide these children with the opportunity to learn the Russian language for further education and integration into Russian society.

Thus, this research integrates an in-depth review of existing literature and case studies on the application of AI in language learning. It focuses on analyzing how

advanced AI technologies can enhance the language proficiency of young children who are non-native speakers.

Results

The education of non-native speakers in Russian schools is governed by various legal frameworks designed to ensure equitable access to quality education. The Law of the Russian Federation "On education" (No. 273-FZ) outlines the rights of all children to receive education and specifies provisions for students who require additional language support. According to this law, schools must provide appropriate conditions for studying the Russian language, including additional language courses and the use of innovative educational technologies [12].

Furthermore, the Federal State Educational Standards (FSES) include guidelines for the development of communicative competencies among students, emphasizing the importance of language proficiency for academic success and social integration. These standards mandate the use of effective pedagogical methods, including advanced technological tools, to support non-native speakers in acquiring the Russian language.

Non-native speaking children, their parents, and teachers face many challenges every day. In our opinion, part of these problems can be solved with the use of AI [9].

AI-based tools have been found to significantly increase learner engagement. The interactive and gamified elements of these tools make learning enjoyable and motivating for young learners. Generative AI, with its ability to create and customize content, offers significant potential for personalizing education. For non-native speakers in Russian schools, generative AI can address individual learning needs, enhance engagement, and improve language acquisition. Generative AI can analyze a student's current language proficiency, learning style, and progress to create personalized learning pathways. By assessing these factors, AI can generate content that targets specific areas where a student needs improvement. For instance, if a student struggles with verb conjugation, the AI can create exercises and activities focused on this aspect of the language. This tailored approach ensures that each student receives the most relevant and effective instruction [13].

One of the key advantages of generative AI is its ability to adapt learning materials in real-time based on student performance. For example, if a student finds a particular exercise too challenging, AI can simplify the content or provide additional scaffolding. Conversely, if a student excels, the AI can introduce more complex tasks to keep the learner engaged and challenged. This adaptability helps maintain an optimal learning pace for each student, reducing frustration and enhancing motivation [14].

Generative AI can provide immediate and personalized feedback to students, which is crucial for language learning. AI can evaluate student responses, high-

light errors, and offer constructive suggestions for improvement. Additionally, AI-driven assessments can be tailored to a student's proficiency level, ensuring that tests are neither too easy nor too difficult. This personalized feedback loop helps students understand their strengths and weaknesses and track their progress over time [15].

Personalized learning pathways created by generative AI involve a dynamic approach to education, tailoring the learning experience to the individual needs, strengths, and preferences of each student. At the outset, generative AI conducts comprehensive assessments to understand a student's current language proficiency, evaluating various aspects such as vocabulary, grammar, listening comprehension, and speaking skills. Alongside this, AI can adapt to the student's learning style, identifying whether they respond best to visual aids, auditory content, hands-on activities, or a combination of these. This initial profiling is crucial because it allows AI to customize the delivery of educational content to match the student's preferred learning methods.

As students engage with the learning material, AI can be used to continuously monitor the learner's performance, collecting data on test scores, response times, and error patterns. This data collection can allow teachers, parents, and learners to assess the results achieved and change the educational track if necessary. For instance, if a student demonstrates proficiency in a particular area, a teacher can start providing more challenging materials to keep the student engaged and progressing. Conversely, if a student struggles with certain concepts, a teacher can simplify the content or provide additional practice to reinforce learning.

Generative AI can also be used in creating exercises that focus on specific skills a student needs to improve. For example, if a student has difficulty with verb conjugation, the AI can generate targeted exercises to address this gap. Moreover, the AI offers a variety of multimodal resources, including text, audio, and visual content, catering to different learning preferences and ensuring a holistic learning experience. Generative AI can create multimodal learning resources, which are educational materials that integrate various forms of media and sensory input, such as text, audio, or images [16]. The foundation of multimodal learning resources lies in their ability to engage multiple senses simultaneously, thereby enhancing comprehension and retention. For instance, a lesson on Russian vocabulary might include written words, corresponding images, pronunciation audio clips, and interactive exercises that require students to match words with pictures or use them in sentences. Thus, it is possible to use AI and ensure that learners can understand and retain new information more effectively. AI can generate content that is contextually relevant and culturally appropriate for non-native speakers. By incorporating real-life scenarios and culturally significant themes, AI-generated materials can make learning more relatable and engaging for students. Moreover,

teachers can use AI in developing interactive resources. For example, AI can help in creating presentations, provide some ideas on improving the existing games or quizzes, or help make test less stressful and more engaging.

AI-based tools support autonomous learning by providing resources and feedback that students can access independently. This autonomy is particularly beneficial for non-native speakers, who may need extra practice and support outside of regular classroom hours. AI tools enable students to practice at their own pace and receive immediate feedback, fostering a sense of responsibility and ownership over their learning.

While the benefits of AI-based educational tools are substantial, the analysis also highlighted the importance of addressing ethical and privacy concerns. The use of AI in education involves the collection and processing of student data, which raises concerns about data privacy and security. Ensuring that these tools comply with data protection regulations and implementing robust security measures is crucial to safeguarding students' information [17].

Furthermore, there is a need to address potential biases in AI algorithms that could disadvantage certain groups of students. Ensuring that AI tools are designed and trained using diverse and representative data sets can help mitigate these biases and promote fairness and inclusivity in education [18].

The ethical use of AI also involves considering the role of human teachers in the learning process. While AI tools can enhance language learning, they should not replace the human element of education. Teachers play a critical role in providing emotional support, motivation, and personalized instruction that AI tools cannot replicate. Therefore, the integration of AI in education should be seen as a complement to, rather than a replacement for, traditional teaching methods [19].

The implementation of AI-based educational tools in language learning presents several challenges. Technical issues, such as the need for reliable internet access and compatible devices, can hinder the effective use of these tools. Additionally, there is a need for professional development and training for teachers to effectively integrate AI tools into their instructional practices.

Despite these challenges, the prospects for AI in language education are promising. Advances in AI technology continue enhancing the capabilities of educational tools, making them more effective and accessible. The ongoing development of natural language processing and machine learning algorithms holds the potential to further improve the accuracy and personalization of AI-driven language learning.

Moreover, the growing recognition of the benefits of AI in education is likely to drive increased investment and support for the development and implementation of these tools. Collaboration between educators, technologists, and policymakers will be essential to address the challenges and maximize the potential of AI in language education.

Conclusion

The analysis of AI-based educational tools and their application in developing communicative skills among non-native speaker learners in Russian schools demonstrates significant benefits. These tools enhance language proficiency, increase learner engagement, provide personalized learning experiences, and support autonomous learning. However, addressing ethical and privacy concerns and ensuring the integration of human elements in education are crucial for the responsible use of AI.

By leveraging the potential of generative AI, educators can create more effective and engaging language learning environments that cater to the diverse needs of non-native speaker learners. The continued advancement of AI technology and its thoughtful implementation hold the promise of transforming language education and helping students achieve greater success in their linguistic and academic pursuits.

References

1. Kasenova N.N., Kergilova N.V., Egorychev A.M. Adaptation of foreign, bilingual, and migrant children in educational organizations as a condition for effective integration into Russian society // Science for Education Today. – 2017. – Vol. 7. No. 6. – P. 101-112.

2. Romanenkova O.A., Ulanova S.A. Cyclic workbook on Russian language as an effective means of organizing independent work of foreign language students // Humanities and education. – 2017. – No. 4. – P. 69-75.

3. Armuzanova, R.A. Teaching Russian to foreign children: Difficulties and ways of overcoming them. Collection of Materials of the Second All-Russian Scientific and Practical Seminar for Teachers of General Education Organizations Working in Classes with Multi-ethnic Students. / R.A. Armuzanova; T.M. Balykhina (Ed.). – Moscow: RUDN, 2019. – 232 p. – ISBN: 9785209096856.

4. Population size and migration in the Russian Federation: [Electronic resource] // Federal State Statistics Service of the Russian Federation. URL: https://rosstat.gov.ru/compendium/document/13283 (Accessed: 20.08.2024).

5. Rusmiyanto, N. The Role of Artificial Intelligence (AI) In Developing English Language Learner's Communication Skills. Journal on Education. / N, Rusmiyanto, N. Huriati, N. Fitriani, N. K. Tyas, A. Rofi'l, M. N. Sari // Journal of Education. – 2023. – No. 6(1). – P. 750-757.

6. Feuerriegel S. et al. Generative AI // Business & Information Systems Engineering. – 2023. Vol. 66. No. 1. – P. 111–126.

7. Srikanthan, P. Learning Assistant to Acquire the Fundamental Language Skills for Non-Native Learners Using AI. / P. Srikanthan, K. Lalitharan, R. Nizar, S. M.

B. Harshanath, A. Ravikumar // Proceedings of the 2nd International Conference on Advances in Computing (ICAC), IEEE. – 2020. – P. 210-218.

8. Devasena, R. Artificial Intelligence in Education: An Alternative to Traditional Learning. // Journal of English Language Teaching. – 2024. – Vol. 66. No. 1. – P. 13-21.

9. Shestakov, I. E. Adaptation and Education of Non-Native Speaker Learners in the General Education System of the Russian Federation / I. E. Shestakov // Lomonosov Pedagogical Educational Journal. – 2023. – Vol. 21, No. 3. – P. 75-90. – DOI 10.55959/MSU2073-2635-2023-21-3-75-90.

10. Lobanova E.V., Fedoseeva E.A. Some difficulties in social interaction of bilingual children // Bulletin of the Russian New University. Series: Man in the Modern World. – 2006. – No. 10. – P. 135-138.

11. Zinovieva T.I. Teacher readiness to educate the child as a person of culture in a linguistically diverse school environment // Proceedings of the Institute of Pedagogy and Psychology of Education. – 2017. – No. 1. – P. – 114-119.

12. Federal Law of December 29, 2012, № 273-FZ (as amended December 29, 2022) "On Education in the Russian Federation". [Electronic resource]. - Access from the information-legal system "ConsultantPlus." – URL: https://www.consultant.ru/document/cons_doc_LAW_140174/ (Accessed: 10.08.2024).

13. Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges [Electronic resource] // Nesta. URL: ttps://www.nesta.org.uk/report/education-rebooted/. (Accessed: 10.08.2024)

14. Holmes, W. Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. / W. Holmes, M. Bialik C. Fadel. // Online: Center for Curriculum Redesign.

15. Luckin, R. Intelligence unleashed: An argument for AI in education. / R. Luckin, W. Holmes, M. Griffiths, L. B. Forcier. //

16. Luckin, R., Holmes, W., Griffiths, M., Forcier, L. B. Intelligence unleashed: An argument for AI in education. / R. Luckin, W. Holmes, M. Griffiths, L. B. Forcier // London: Pearson, 2016. – 58 p.

17. Wang S. Artificial intelligence in education: A systematic literature review / S. Wang, F. Wang, Z. Zhu, J. Wang, T. Tran, Z. Du // Expert Systems with Applications. – 2024. – Vol. 252. – P. 124167.

18. Floridi L. Establishing the rules for building trustworthy AI / L. Floridi // Nature Machine Intelligence. – 2019. Vol. 1, No. 6. – P. 261–262.

19. Luckin R. Machine Learning and Human Intelligence: The Future of Education for the 21st Century. [Electronic resource]. 2018. URL: https://eric.ed.gov/?id=ED584840. (Accessed: 10.08.2024)

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THE SPECIFICS OF THE INCLUSION OF VIRTUAL REALITY IN THE EDUCATIONAL PROCESS

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Abstract. *The term "virtual reality" is analyzed, the specifics of including virtual reality in the educational process are considered. The pros and cons of this teaching method in the realities of a general educational institution are also indicated.*

Keywords: *education, virtual reality, educational process, inclusion in virtual reality.*

A modern teacher is faced with a lack of interest in the educational process among students, often blaming himself for this. In fact, this accusation is unfair. Psychologist L.I. Bozhovich defines this problem as a decrease in motivation in a child. The psychologist claims that primary school students moving to the main general educational stage of education have a high external motivation for learning, which should then turn into internal motivation. Students after primary general education come with a positive attitude and are motivated for further education, and also have an interest in gaining new knowledge. It is important to take into account the following feature: students in grades 6-9 have a decrease in motivation for learning. Students lose interest in learning new subjects, skip classes, and tend not to do homework. These factors lead to a decline in the authority of the teacher and, as a consequence, his control over the educational process. It is worth noting that a modern child is not motivated by constant lessons in the form of a traditional format. Outside of school, the student is faced with various interesting, interactive games on the phone, programs on TV, which undoubtedly spoiled and led to the problem of perceiving information in the form of a teacher's monologue. It is necessary to look for an approach to students that takes into account modern realities and look for those methods that will correspond to the comprehensive development of the student within the framework of the present. One of the methods for including a student in the educational process can be virtual reality. The use

of this method contributes to the improvement of visual learning, therefore, the student acquires the skill of practical work with a particular task, which leads to an increase in interest in educational activities and, as a result, successful assimilation of school material.

Consideration of the specifics of virtual reality in the creative activity of the student's personality is based on psychological and pedagogical studies of the role of virtual reality in general. Thus, in the works of F.I. Girenok, D.V. Ivanova, I.G. Korsuneva, P.I. Braslavsky, V.D. Emelin, M.B. Ignatiev, E.A. Shapovalov, the dynamics of the formation of this term are considered. Modern education in Russia recognizes the appropriateness of the use of virtual technologies for teaching in comprehensive schools. According to the Decree of the President of the Russian Federation "On approval of priority areas for the development of science, technology and engineering in the Russian Federation and the list of critical technologies of the Russian Federation" No. 899 dated July 7, 2011, they are classified as critical technologies (item 8 of the list - ... cognitive technologies) for the country [1].

It is customary to distinguish several approaches by which the term "Virtual reality" is interpreted; let us consider and analyze each of them.

Researchers F.I. Girenok, D.V. Ivanov, I.G. Korsunev define this term as: "virtual reality is the whole reality, since the subject interacts with ideas about the objective world" [2]. In other words, the student encounters the real world thanks to the virtual one. Let us note that the opportunities of comprehensive schools are quite different, while "virtuality" will allow you to visit various points in the country without leaving the classroom.

P.I. Braslavsky, V.D. Emelin, M.B. Ignatiev, E.A. Shapovalov and others consider this term as follows: "virtual reality as a modern information technology" [3]. The modernity of this process consists in the ease of obtaining the material of interest in a matter of minutes. Note that at the moment, students can get comprehensive answers and see the object of interest to them thanks to photos/videos or virtual immersion in the reality being studied by students.

Researchers O. N. Astafieva, N. B. Mankovskaya, E. E. Pronin, A. I. Neklessa, N. A. Nosov, V. S. Polikarpov, V. S. Svechnikov: "virtual reality is considered as a reality of abstract concepts, cognitive competence" [4]. Considering the category "cognitive competence" from the psychological and pedagogical points of view, we note that in pedagogy the term "cognitive" means: "related to cognition only on the basis of thinking" [5]. At the same time, psychology considers the term "cognitive" as: "related to knowledge, psychological processes, human consciousness or associated with cognition in general" [6]. Consequently, virtual reality is understood as an interactive real world, thanks to which students are immersed in the reality being studied by students.

The inclusion of virtual reality in the educational process has a number of advantages:

– a high degree of use of visual material. What is important is that this technology allows the teacher to demonstrate in detail any phenomena (historical, natural, social);

– students' involvement in the educational process;

– practical activities, we note that obtaining theoretical knowledge is a very important factor in learning. But obtaining practical skills is also a necessary component, the inclusion of students in virtual reality will give useful practical skills that will contribute to further development in the future;

- focusing students in the educational process. While in virtual reality, the student is focused on the environment that is presented to him, therefore, no external stimuli can distract him from the learning process [7].

Despite a number of advantages of virtual reality in learning, it is necessary to note the difficulties with the implementation of this educational technology:

– the cost of equipment. The practical component, namely the cost of equipment, is a problematic factor, because the purchase of high-quality equipment for the entire school requires huge expenses;

– learning technologies for working with virtual reality. Virtual reality is being introduced as an experiment, therefore, it is not fully included in the educational process. It is quite difficult for teachers to learn how to work with virtuality due to the small amount of literature and training courses;

– a minimum number of Russified versions. At the moment, there is a limited number of programs in Russian, which greatly complicates the education of students in schools.

Despite some shortcomings in the process of including virtual reality in the general education organization, this trend is very promising and modern. The development of virtual reality in the future will allow students to fully develop not only theoretical knowledge, but also practical skills.

Thus, the use of virtual reality in training will be a popular method in the future. The prospects of virtuality consist in the availability of visiting museums, theaters, galleries around the world without additional preparation and purchasing tickets.

References

1. Pobokin, P.A. The influence of virtual reality on the development of thinking and knowledge of schoolchildren in mathematics during training: thes. of Cand. of Psych. Sciences: 19.00.07: protected: 11.11.15: approved. 23.09.15 / scientific director. V.V. Selivanov; Federal State Budgetary Educational Institution

of Higher Professional Education Kaluga State University named after K.E. Tsiolkovsky. – Yaroslavl, 2015. – 167 p.

2. Ivanov, D.V. Virtualization of Society. Version 2.0 / D.V. Ivanov. – SPb.: Petersburg Oriental Studies, 2002. – 224 p.

3. Ignatiev, M.B. Information Looking-Glass World: the Future of Humanity / M.B. Ignatiev // Virtual Realities. Transactions of the Virtualistics Laboratory. – 1998. – No. 4. – P. 161- 162.

4. Astafieva, O.N. Computer Virtual Reality and Art (on the Issue of Expanding the Aesthetic Experience of the Individual) / O.N. Astafieva // Virtual Realities. Transactions of the Virtualistics Laboratory. – 1998. – No. 4. – P. 141-145.

5. Slastenin, V.A. Pedagogy: innovative activity / V.A. Slastenin. – M.: Magistr, 2002. – 224 p.

6. Solso, R.L. Cognitive psychology / R.L. Solso. – St. Petersburg: Piter, 2006. – 422 p.

7. Ivanova, A.V. Virtual and augmented reality technologies: possibilities and obstacles to application / A.V. Ivanova // Strategic decisions and risk management. – 2018. – No. 3. – P. 88-107.

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AN INNOVATIVE APPROACH TO FORMING PATRIOTIC ATTITUDES IN TEENAGERS

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Abstract. *The article considers ecotourism and tourist attractiveness of territories as a factor contributing to the formation and development of patriotic attitudes in adolescents. The authors define the potential of psychological and pedagogical impact of ecotourism: aesthetic pleasure, through the natural attractiveness of natural territories, the formation of patriotic attitudes and love for the Motherland; obtaining environmental knowledge about the region in which the teenager lives; involvement of adolescents in public life; social adaptation; environmental behavior in interpersonal communication; establishing synergistic connections between nature and man. The article shows that the passive nature of recreation among adolescents is quite pronounced, but many adolescents note that ecotourism attracts them. The interviewed adolescents noted that ecotourism should combine the opportunity to see and learn something new, but at the same time they did not want to get tired either physically or mentally and they expressed a desire to be in a state of psychological peace. It was determined that the opinion that visiting beautiful natural places awakens a feeling of love for the Motherland, a feeling of patriotism was shared by the majority of the interviewed adolescents.*

Keywords: *patriotic attitudes, innovative approach, ecotourism, formation, love for the Motherland, teenagers.*

The development of the tourism industry brings countries to a new level, affects the recognition of the territory and its positioning and perception in the modern world. The modern tourism industry is one of the most rapidly progressing

sectors of the world economy, which can be considered both as an independent type of economic activity and as an inter-industry complex. Therefore, it is no coincidence that interest in this activity is growing every year, involving almost all countries of the world, including Russia [3, 4]. To date, there is no fundamental study devoted to the problem of using ecotourism to form patriotic attitudes in adolescents. J. Kaczmarek identifies different approaches to defining a tourism product [9]. The author notes that in the literature, definitions based on the structural approach are most often encountered. V.G. Gulyaev believes that a tourism product is a complex of services provided by tourism and excursion enterprises to citizens (tourists). As noted by a number of authors, "for characterizing the tourist attractiveness of a region," both the features of the tourism product and the features of the tourism service are important [1, 5]. It is also worth highlighting studies related to innovation processes in society and technologies of innovation activities in tourism.

E.A. Zavgorodnyaya talks about the role of innovations in the modern economy and defines innovations as "an important part of socio-economic existence and human activity in all its manifestations." V.S. Novikov addresses the topic of innovations. Based on the experience of domestic and foreign studies, he reveals the features of innovation processes in socio-cultural services and tourism, as well as evolutionary changes in these areas. N.D. Kondratyev also develops this issue. He talks about the need for a systemic view of innovations and studies innovation issues at the macro levels. Directly within the framework of ecotourism, the works of T.K. Sergeeva, V.V. Khrabrovchenko, E.Yu. Kolbovsky and other authors stand out [6, 8, 10]. There is also a need to search for alternative methods of forming patriotic consciousness, patriotic attitudes in modern teenagers [2, 11]. Formation of patriotic attitudes in teenagers is a significant and key problem of modern society [7, 12]. In the current situation, which is characterized by rapid changes in the political, economic and socio-cultural spheres, it is very important to instill in the younger generation a deep sense of attachment to their homeland, and ecotourism is one of the possible factors for its formation.

In the context of modern trends, the innovative approach to using ecotourism under consideration is the most suitable for developing patriotic consciousness and its structural components, in particular, patriotic attitudes [13, 14]. Many countries are already beginning to treat ecotourism differently, as a source of new thinking. Innovation is, first of all, a novelty - a new or improved product, service, technology introduced into the market, in production and economic, cultural, educational activities, in public life, which, of course, attracts the attention of consumers. The practical focus of the innovative idea is its attractive force not only for entrepreneurship, but also for the cultural and educational component. In addition, it is necessary to note the potential for the psychological and pedagogical impact of ecotourism, presented in Figure 1.

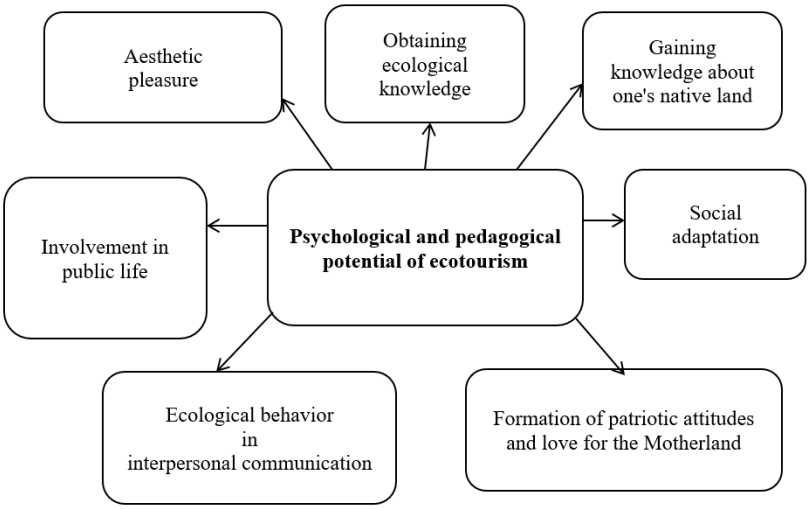

Figure 1. *Psychological and pedagogical potential of ecotourism*

Ecological tourism allows not only to receive aesthetic pleasure, but also through the natural attractiveness of natural areas to form patriotic attitudes and love for the Motherland; to obtain environmental knowledge about the region in which the teenager lives; to involve teenagers in public life and help the teenager to adapt socially; to develop environmental behavior in interpersonal communication and to establish synergistic connections between Nature and Man.

The purpose of the study is to determine the possibilities of using ecotourism in the formation of patriotic attitudes in adolescents. The study used the questionnaire method. The questionnaire consists of three blocks. The first block is aimed at identifying the preferred type of recreation. The second block is aimed at studying the attitude to natural objects. The third block is to study the attitude to ecotourism as a way of forming patriotic attitudes.

279 students in grades 5-8 took part in the study. The following results were obtained: 68% of respondents prefer to spend their free time at home. Most informants (79%) spend time at the computer, as a result, the passive nature of rest among teenagers is quite pronounced. On the other hand, peace and quiet for respondents also occupies an important place when organizing their rest, this answer option “peace and quiet” was chosen by 24% of respondents, answering the question: “What, first of all, interests you when you are going to rest?” Many informants (35%) answered that tourism should combine the opportunity to see and learn something new, however, they would not like to get tired either physically or mentally, that is, they express a desire to be in a state of psychological peace.

Analyzing the distribution of the share of teenagers participating in the survey, when answering the question "Where do you usually relax, spend your vacation?", we can conclude that the majority, namely 63% of respondents, spend their vacation outside our country. Having your own plot of land, a summer house is also of great importance for analyzing the formation and organization of free time. When answering the question: "Do you have a summer house, a house outside the city or your own plot of land?" 67% of respondents have a country house, respectively, they can spend their free time there, and only 26% of respondents spend their vacation at a summer house. Asking the question about how much respondents are aware of the research problem, that is, about the term "ecological tourism" itself, several questions were asked. Thus, analyzing the distribution of the share of respondents to the question "Do you know any national parks, reserves, sanctuaries (other protected natural areas)?" the majority of respondents (68%) claim that they know national parks, reserves and other protected areas, while when asked about specifying such, teenagers often found it difficult to answer.

As indicated by respondents, they unquestioningly follow fire safety rules in the forest (100%), but, as is known, the human factor, when forest fires occur, still ranks first in the list of causes of fires. Almost all respondents noted the rules for maintaining cleanliness in the forest and other recreation areas.

Answering the question: "Do you agree with the statement: Charging money for entering a forest, park or other valuable corners of nature is wrong?" the majority of respondents (51%) do not agree, that is, they consider monetary contributions to the maintenance of national parks and reserves to be legitimate and necessary. The opinion that "visiting beautiful natural places awakens a feeling of love for the Motherland, a feeling of patriotism" was shared by the majority of the surveyed teenagers - 78%.

In the current situation, the level of development of ecotourism and the methods used in this, of course, affect such a characteristic of the region as its image, along with such factors as culture, standard of living, education, and infrastructure development. In connection with the modern tendency of increasing competition between the regions of Russia, the problem of forming the image of the regions is becoming increasingly important. In our opinion, ecotourism can be considered as a resource not only for the attractiveness of the region, but also for the formation of patriotic attitudes in the younger generation.

References

1. Aleksandrova A.Yu. The structure of the tourist market. - M .: Press Solo, 2002. -384 p.

2. Golovan S.A. Formation of patriotic values in the minds of modern youth // Humanitarian, socio-economic and social sciences. 2020. No. 9. URL: https://cyberleninka.ru/article/n/formirovanie-patrioticheskih-tsennostey-v-soznanii-sovremennoy-molodezhi (date of access: 04.05.2024)

3. Durovich A.P. Marketing in tourism. - M .: OOO "New knowledge", 2000. -496 p.,

4. Zorin I.V., Kaverina T.P., Kvartalnov V.A. Tourism as a type of activity. — M.: FiS, 2000.-288 p.

5. Zorin I. V., Kvartalnov V. A. Encyclopedia of tourism: Handbook. - M.: FiS, 2000.-365 p.

6. Sergeeva T. K. Ecological tourism. M., 2004. – P. 27.

7. Semenkova S. N. Influence of psychological factors on the manifestation of patriotism. Actual issues of modern science. 2015; No. 42: 139 - 148.

8. Kolbovsky E. Yu. Ecological tourism and ecology of tourism: a textbook. – M., 2006. – P. 67.

9. Kaczmarek Ya., Stasiak A., Wlodarczyk B. Tourist product. Concept. Organization. Management. - M.: UNITY-DANA, 2008. - 495 p.

10. Khrabrovchenko V.V. Ecological tourism. - Study guide. M.: Finance and statistics, 2003. 208 p.

11. Patriotism in the era of globalization // Rabkor: Internet magazine. URL: https://rabkor.ru/columns/analysis/2014/03/26/global_patriot/ (date of access: 12.05.2024)

12. Sharonov, A.A. Mechanisms for the formation of patriotic activity of adolescents / A.A. Sharonov // Innovative technologies in the science of the new time: collection of articles of the International scientific and practical conference - Ufa: NITs AETERNA, 2017.– P. 191–193,

13. Decree of the President of the Russian Federation of 09.11.2022 No. 809 "On Approval of the Fundamentals of State Policy for the Preservation and Strengthening of Traditional Russian Spiritual and Moral Values" // Administration of the President of Russia. [Electronic resource]. URL: http://www.kremlin.ru/acts/bank/48502 (date of access: 13.07.2024).

14. Decree of the President of the Russian Federation of 19.12.2012 No. 1666 "On the Strategy of the State

National Policy of the Russian Federation for the Period through 2025". // Administration of the President of Russia. [Electronic resource]. URL: http://www.kremlin.ru/acts/bank/36512 (date of access: 11.07.2024).

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CYBERBULLYING: A SOCIO-PSYCHOLOGICAL ANALYSIS OF PREDICTORS

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Abstract. *The Internet is a platform where a person can fully satisfy their needs for information and communication. At the same time, both real and virtual communication can have negative consequences that people often face. An important social problem around the world is cyberbullying or the so-called Internet bullying. The purpose of the study was to analyze the characteristics of the cognitive sphere (emotional intelligence) of victims of cyberbullying and bullies. The sample of subjects included 80 students of both sexes aged 18 to 25 years, studying in bachelor's, master's and specialist programs. It has been proven that the forms of cyberbullying change depending on the specifics of virtual communication and the characteristics of the subjects. The following most commonly used forms of cyberbullying have been identified: intimate information, blackmail, harassment, flaming, hating. It has been revealed that the purpose of cyberbullying on the part of bullies is: entertainment, personal interest and self-affirmation.*

Keywords: *cyberbullying, virtual communication, social networks, bully, cognitive sphere.*

Speaking about modern society, it is difficult to imagine people's lives without virtual communication. Social networks and instant messengers are effective tools

not only for communication, but also for self-presentation, socialization, building professional relationships, and searching for information. At the same time, the expansion of technical capabilities has led not only to more efficient use of instant messengers, dating applications and social networks, but also to the formation of negative impacts, for example, to the phenomenon of cyberbullying, which has spread throughout the world [12].

The authors define cyberbullying as a separate area and at the same time emphasize the important features of cyberbullying - systematicity, purposefulness, as well as the specification of the bullying tool. Internet bullying can be carried out through social networks, instant messengers, e-mail, video portals and other information Internet resources [11, 16].

The most popular among the cyberbullying space are social networks and instant messengers. Let's dwell on them in more detail. A social network is a website that a user can use to organize social relationships on the Internet. Recently, instant messengers have joined social networks, which are also a space for individual and group communication between people. The relevance of these platforms can be characterized by the following features (see Figure 1).

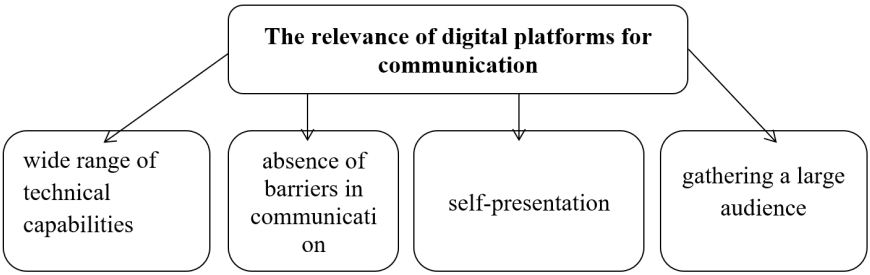

Figure 1. *Relevance of these platforms for the modern generation*

The widespread use of social networks and instant messengers, in addition to the positive impact on the process of interpersonal and intergroup communication in the virtual space, has led to the emergence of such a negative social phenomenon as cyberbullying. The psychological characteristics of this phenomenon are expressed in systematicity, pronounced aggressiveness, and inequality of power between the victim and the persecutor. Let us highlight the most important features of cyberbullying (see Figure 2).

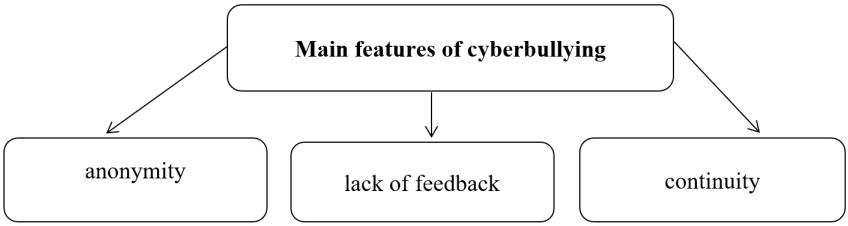

Figure 2. *Main features of cyberbullying.*

The identified features of cyberbullying are fundamental for identifying the psychological and emotional-behavioral characteristics of cyberbullying subjects. Let's consider them in more detail:

- anonymity (this feature of online bullying allows the stalker to remain incognito, making the victim more vulnerable to the aggressor. The lack of information about the stalker can significantly affect the victim's personality through anxiety, decreased sense of security, and decreased self-esteem);

- continuity (unlike real bullying, cyberattacks can be committed at any time of the day and be a link in an endless chain of further attacks on the victim by other users. Such a traumatic experience is very dangerous for the victim and can lead to various negative consequences);

- lack of feedback (communication on the Internet, like communication in the real world, involves a two-way process of information exchange. In cyberbullying, the two-way nature of the phenomenon is disrupted; a person cannot respond to the aggressor, since he remains anonymous. Hence, the victim may perceive bullying as a complete loss of opportunities for further communication not only on the Internet, but also in real life).

In the role structure, it is customary to divide cyberbullying subjects into victims, bullies, and observers. Some researchers also take the ambivalent role of victims-aggressors, in which a person who has previously been bullied (virtual or real) becomes an aggressor. Our study will focus on victims and bullies. In addition, having analyzed domestic and foreign publications, as well as some Internet sources, the main characteristics of cyberbullying subjects were identified. Aggressors (bullies), as a rule, counting on anonymity, do not assume responsibility for their own actions. This behavior is called the "phenomenon of social disinhibition" and is characterized by the fact that people, not fearing potential punishment due to certain circumstances (anonymity), allow themselves to act much more provocatively and dangerously than in ordinary life, where, due to social norms, they are responsible for their actions and statements [3, 4, 6]. Speaking about victimization and victimization, which are given much attention in various psychological studies, it is impossible not to mention this problem in the aspect of study-

ing the personality of cyberbullying victims. It is important to note that the listed traits make the personality vulnerable to its own kind of negative virtual influence. For example, an individual may exhibit an interesting phenomenon - the phenomenon of digital damage, which consists in the deliberate and anonymous posting of self-harming content in the virtual space.In addition, victims of cyberbullying have a certain repertoire of coping strategies, including distancing (blocking from the resource where the hostile situation occurred), as well as asking for help from loved ones. Currently, there are a large number of studies, each of which focuses on identifying the possible causes of cyberbullying, and researchers abstract from personal factors and factors of the virtual and real environment, considering only the characteristics [2, 7].

It should also be noted that the risk of becoming a victim of cyberbullying in most cases correlates with the mental health of the victim, which in turn aggravates the emotional state and forms an inadequate behavioral response to such a stressful situation. Undoubtedly, there is a certain relationship with the phenomenon of cyberbullying with emotional intelligence, which is a certain skill to notice one's own and others' emotions and desires and, in connection with the intended goals, manage them. The development of this skill requires not only internal human resources, but also the creation and dissemination of special programs and methods. The use of emotional intelligence allows a person to adequately and rationally manage various interpersonal interactions, effectively solve practical problems [1, 8, 13]. Today, emotional intelligence is one of the most important factors in managing interpersonal relationships [5, 10]. Emotional intelligence as soft skills is a changing system that can be developed and changed using certain methods and tools [14, 15].

The subjects of the study were 80 students of different sexes of higher education institutions studying in bachelor's, master's and specialist programs aged 18 to 25 years.

The following research methods were used:

1. Psychological testing using the following psychodiagnostic methods:

1) A. V. Karpov's reflexivity questionnaire [9];

2) D. V. Lyusin's emotional intelligence assessment test (EmIn) [17]:

2. Questionnaire survey using the author's questionnaire "Features of virtual behavior in social networks".

A. V. Karpov's reflexivity questionnaire measures personal reflexivity.

Mathematical data processing was carried out using Spearman's linear correlation coefficient to search for significant relationships and the Mann-Whitney U-test to search for significant differences. In this study, correlation analysis and assessment of differences between nonparametric samples were performed using IBM SPSS Statistics software.

In characterizing the general awareness of the subjects-victims and subjects-bullies, questions were asked about security measures and their effectiveness. It should be noted that only 30% of the subjects-victims consider the measures effective. The measures taken include two-factor authentication, closed access to the profile on social networks, use of VPN. Speaking about the virtual security of the subjects-bullies, only 6% consider the measures taken ineffective. And the measures used by the bullies include two-factor authentication, invisibility mode (anonymity), restricted access to profiles on social networks. That is, the specificity of cyberbullying suggests a great concern of bullies about anonymity and security measures. Next, we will consider the specificity of virtual communication of victims.

Regarding the frequency of exposure to cyberbullying - 39% of respondents had episodic experience of cyberbullying and 61% of respondents had experience of encountering it more than once. Systematic experience of encountering virtual bullying may indicate the victimization of the subjects. Forms of bullying experienced by victim subjects included use of personal information, harassment, blackmail, flaming, and hating.

We see that the subjects were equally subjected to blackmail (35%) and the use of personal information (35%). These data can allow us to create a program in which users will find information about these forms of cyberbullying, the formation of personal information security on the Internet, as well as advice on responding to situations of blackmail, harassment and other negative impacts. Speaking about the emotional reaction of victims to cyberbullying, 48% of the subjects experienced aggression, 30% did not express an emotional reaction, and 22% of the subjects experienced fear, anxiety from the situation. Speaking about the emotions of victims, it is the aggressive reaction to the cyberbullying situation that can be a trigger for a response to the bully. More than half of the respondents prefer to put an anonymous bully on the blacklist, 26% have no reaction to repeated cyberbullying, which can be a kind of coping strategy of avoidance and only 17% respond to the bully in an aggressive form.

Reflecting on the possible goals of cyberbullying, the majority of the respondents-victims (52% of respondents) choose bullying as a way of self-affirmation, 22% consider it a way of entertaining the bully, 17% consider personal motives as the goal, and only 9% assume that the information in their profile is the true reason for cyberbullying.

The above allows us to conclude that 70% of the respondents are dubious about cybersecurity measures. They mainly encountered systematic bullying in the form of using personal information and blackmail. The main reactive response is aggression, and with repeated bullying, the aggressive response decreases. Among the measures to combat it is possible to single out adding the bully to the blacklist,

and speaking about the motives of the bully, the majority of respondents choose bullying as a way of self-affirmation.

Almost half of the respondents engaged in cyberbullying several times, 23% bullied systematically, for 30% cyberbullying was a single episode. For 40% of the respondents-bullies, cyberbullying was a kind of entertainment. In equal percentages (30%) for bullies it was a way of self-affirmation and a personal goal. More than half of the respondents-bullies do not consider their actions "harmful" to their moral and psychological state and do not feel guilty for cyberbullying. The bully's assessment of his actions is subjective and may indicate the peculiarities of empathy.

Speaking about virtual communication, it can be noted that the subjects-bullies are more concerned about their own Internet safety and consider it effective. The measures used by bullies include two-factor authentication (a method of user identification that ensures effective protection of their account from possible intrusion), invisibility mode (anonymity), and restricted access to profiles in social networks. The subjects-victims are less likely to attribute the effectiveness of the chosen protection methods (two-factor authentication, closed access to a profile in social networks, use of a VPN). Depending on the specifics of virtual communication and the characteristics of the subjects, the forms of cyberbullying change. In our case, the analysis of the questionnaire showed an equal degree of exposure of victims to such forms of bullying as "use of personal information" (35%) and "blackmail" (35%). To a lesser extent, the subjects were subjected to harassment (22%), flaming and hating. The goals of cyberbullying on the part of the subjects - bullies are of an entertaining nature (40%), equally personal (30%) and self-affirmation (30%).

Analysis of the victims' reflections on the cyberbullying situation showed that 48% of the subjects experienced aggression, 30% did not express an emotional reaction, and 22% of the subjects experienced fear and anxiety from the situation. In a repeated cyberbullying situation, 57% of the surveyed victims prefer to blacklist the anonymous bully, 26% have no reaction to repeated cyberbullying, and only 17% respond to the bully in an aggressive manner.

The data obtained from the analysis of psychodiagnostic methods allow us to judge that the subjects-bullies have more developed critical thinking skills. The skill of interpersonal emotional intelligence is a tool for them to achieve their goals, including negative impact in the Internet environment. The indicators of victims are mainly normative and their lack of expression is one of the possible reasons for vulnerability to the negative virtual impact of bullies.

Correlation analysis did not reveal significant direct and inverse relationships between emotional intelligence and reflexivity of victims. Therefore, the majority of subjects-victims have insufficiently developed emotional intelligence indicators

for more effective interaction in conflict situations on the Internet and assessment of their own communication skills for rational emotional response.

The revealed significant differences between the two groups of subjects in the "emotional intelligence" indicator, obtained using the Mann-Whitney criterion, established that these indicators are at different levels of development in victims and bullies of cyberbullying. Next, we will conduct a correlation analysis. First of all, within the Emotional Intelligence (EmIn) methodology, as well as between this methodology, the A.V. Karpov reflexivity questionnaire for victims and bullies of cyberbullying. Correlation matrices were compiled using the SPSSStatistics program.

A direct correlation was found between the Interpersonal Emotional Intelligence and Understanding Emotions scales ($p \leq 0.001$), that is, the higher the victims' tendency to understand and manage other people's emotions, the higher their ability to understand their own emotions. Internal Emotional Intelligence and Understanding Emotions ($p \leq 0.001$) have a direct correlation, that is, the higher the victims' ability to understand and manage their own emotions, the higher their ability to understand their own and other people's emotions. The Internal Emotional Intelligence and Understanding Emotions scales ($p \leq 0.001$) also have a direct correlation. This suggests that the higher the victims' ability to understand and manage their own emotions, the higher their ability to manage their own and other people's emotions. No inverse correlation was found. A direct correlation was found between the scales "Interpersonal emotional intelligence" and "Internal emotional intelligence" ($p \leq 0.001$), indicating that the higher the bullies' tendency to understand and manage other people's emotions, the higher their ability to understand their own emotions and manage them. "Interpersonal emotional intelligence" and "Understanding emotions" ($p \leq 0.01$) have a direct correlation, that is, the higher the bullies' tendency to understand and manage other people's emotions, the higher their ability to understand their own emotions. A direct correlation between the scales "Interpersonal emotional intelligence" and "Emotion management" ($p \leq 0.01$) indicates that the higher the bullies' tendency to understand and manage other people's emotions, the higher their ability to manage their own emotions and the emotions of other people.

"Internal emotional intelligence" and "Understanding emotions" ($p \leq 0.01$) have a direct correlation and indicate that the higher the ability of bullies to understand their own emotions and manage them, the higher the ability to understand their own and other people's emotions. "Internal emotional intelligence" also has a direct correlation with the "Emotion management" scale ($p \leq 0.01$). This suggests that the higher the ability of bullies to understand their own emotions and manage them, the higher the ability to manage their own and other people's emotions. The "Understanding emotions" and "Emotion management" scales ($p \leq 0.001$) have a

direct correlation, that is, the higher the understanding of their own and other people's emotions, the higher the ability to manage them.

Bibliographic list

1. Alimbaeva, R.T., Esnazarova, L.U. Theoretical aspects of emotional intelligence // Innovative science.–2017.–№03. –P.242

2. Anderson, J. Cognitive psychology. – SPb.: Piter, 2002. – 496 p.

3. Bochaver A.A., Khlomov K.D. Cyberbullying: bullying in the space of modern technologies // Psychology. Journal of the Higher School of Economics. – 2014. –Vol.11. –№.3. – P. 55-61.

4. Volkova E.N., Volkova, I.V., Golubovskaya, A.S. Review of foreign studies on the problem of cyberbullying among adolescents and young people // Theoretical and experimental psychology. –2019. –Vol.12– №2. – P.71-81.

5. Daineka O.S., Dukhanina, L.N., Maksimenko, A.A. Cyberbullying and victimization: a review of foreign publications // Prospects of science and education. –2020. –Vol.47. –№5. –P.273-292.

6. Efimova E.S. Cyberbullying as a problem of psychopedagogy of virtual environments // Advances in chemistry and chemical technology. – 2014. – Vol. 28. – №. 7 (156). – P. 65-66.

7. Ilyukovich T.S. Electronic verbal bullying of an Internet user // Scientific research in the modern world: theory, methodology, practice. – 2019. – P. 191-196.

8. Isaeva O.M., Savinova, S.Yu. Development of emotional intelligence: a review of research//Modern foreign psychology. - 2021. - Vol. 10. - No. 1. P. 105-116. [Electronic resource]. URL: https://publications.hse.ru/articles/385887452 (date of access: 12.01.2023).

9. Karpov A. V. Reflexivity as a mental property and the methodology of its diagnostics // Psychological journal. - 2003. - Vol. 24. - No. 5. - P. 45-57.

10. Kiryukhina D. V. Cyberbullying among young users of social networks// Modern foreign psychology.–2019. –Vol.8. –№3. –P.53-59.

11. Knyazeva M. S. Characteristics of the main types of cyberbullying // Moral education in the modern world: psychological and pedagogical aspect. –Ufa: Publishing house Agency for international research, 2019. – P.62-64.

12. Kobets P.N. Counteracting the threats of cyberstalking - the most important problem studied in the framework of improving the aspects of information security of regions in the context of globalization of the information space // Bulletin of the Prikamsky Social Institute. –2017. –№1(76). –P.27-35.

13. Kochetova Yu.A., Klimakova, M.V. Methods for diagnosing emotional intelligence // Modern foreign psychology. –2019. –Vol.8. –№4. – P.106-114

14. Kochetova Yu.A., Klimakova, M.V. Emotional intelligence in the context of the information society and cyberbullying // World of science. Pedagogy and psychology. –2019. –Vol.7 –№2. –P.1-6.

15. Kraytorov A.N. Emotional intelligence as an integrative phenomenon of psychological knowledge in the structure of social and general intelligence // Scientific almanac. –2017. – №4-2. – P.212-215.

16. Luchinkina A.I. Psychological analysis of deviations in the process of online socialization of an individual // Humanities. – 2016. – №. 1 (33). – P.54-62.

17. Lyusin D.V. New technique for measuring emotional intelligence: the EmIn questionnaire // Psychological diagnostics. – 2006. – V. 4. – P. 3-22.

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THE ABILITIES OF A PSYCHOTHERAPIST AS THE BASIS OF HIS EMOTIONAL COMPETENCE

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Annotation. *The article contains an analysis of various approaches to studying the emotional competence of psychotherapists and its role in building therapeutic relationships. The work presents the most common contemporary approaches to describing the personality traits underlying emotional intelligence. Theoretical and empirical research has expanded these concepts and described nine abilities of psychotherapists necessary for creating an atmosphere of emotional safety and establishing "helping" relationships. The results of an empirical study involving 71 psychotherapists are presented, leading to the conclusion that it is possible to enhance the emotional competence of psychotherapists through specialized training programs.*

Keywords: *emotional competence, emotional intelligence, emotional security, psychotherapist skills, psychotherapeutic relationship.*

According to numerous studies, one of the main driving forces of the psychotherapeutic process is the "therapist-patient" relationship (Bugental, 1992; Araujo, 1975; Rogers, 2021, and others). This is a unique relationship that differs from the patient's previous experiences. It can be either emotionally safe or, conversely, traumatizing for both the patient and the therapist, leading to emotional burnout and a decrease in professional effectiveness. The responsibility for building this relationship lies with the therapist, and its success primarily depends on the emotional competence of the therapist. Moreover, research shows that the effectiveness of the entire psychotherapeutic process is determined not by the differences

in methods and schools of psychotherapy, but rather by the personal qualities of the helping professional (Boyatzis, McKee, 2005).

In this regard, it is relevant to study: what specific abilities of a psychotherapist determine his emotional competence? How can they be operationalized? Can they be developed? In this article, we will pay special attention to these questions.

The concept of "emotional competence" is related to the concept of "emotional intelligence", and they are often used synonymously. Nowadays, "emotional intelligence" is most often understood as "a form of social intelligence that includes the ability to observe feelings and emotions in oneself and others, to differentiate between them, and use this information to control thoughts and actions" (Salovey, Mayer, 1995). The authors based "emotional intelligence" or "emotional competence" on four personal abilities: 1) the ability to recognize emotions, 2) the ability to the ability to use one's emotions as a factor of motivation and activation of the thought process, 3) the ability to understand and interpret emotions, including ambivalent feelings, 4) the ability to manage one's emotions and the emotions of other people to choose the right behavior and goal achievement. Thus, the level of emotional competence depends on the level of development of individual emotional abilities.

Based on the above-described model of emotional intelligence, and on numerous studies of the quality in and the abilities of the personality of psychotherapists, on the works of the founder of positive psychotherapy N.Peseschkian and his followers (Peseschkian,1996; Frolov, 2022 and others), as well as on his own psychotherapeutic and research experience (Goncharov,2024),let's expand our ideas about the abilities of a psychotherapist that underlie his emotional competence and are necessary for creating an atmosphere of emotional safety in psychotherapeutic relationships.

In the theoretical part of the study, conducted at the St. Petersburg Scientific Research Psychoneurological Institute named after V.M. Bekhterev (Goncharov, 2003), 9 abilities of a psychotherapist were selected and substantiated, which are necessary for creating an atmosphere of emotional safety and building "helping" relationships. Let us briefly characterize each of them.

1. *The ability to understand the patient's feelings*. This ability is related to empathy, which means understanding another person's emotional state through shared feelings. It depends on the availability and richness of the psychotherapist's experience, as well as on the accuracy of perception and the ability to attune to the patient. To better understand the patient's emotional experiences, the psychotherapist can ask clarifying questions such as, "What do you feel when you talk about this?" or "What do you feel right now?" and others.

2.*The ability to listen empathically*. This ability is also related to empathy, but differs in that here the psychotherapist gives the patient the opportunity to speak

out and reveal his experiences, carefully listens and encourages the patient's statements. You can use phrases like "Please continue, I think this is very important," "I see that it is not easy for you to talk about this, but try it anyway," and others.

3.*The ability to be aware of one's feelings*, or congruence, authenticity, genuineness. This ability of the psychotherapist allows him to be in touch with his own feelings in the psychotherapeutic process, to be aware of them, to be sincere and honest towards himself and the patient.

4.*Cons ability express your feelings constructively* It is expressed in the ability of the psychotherapist to understand his or her current feelings and the feelings of the patient, as well as the ability to convey this understanding using words (verbalization) in a language understandable to the patient.

5. The ability to focus on future problem-solving and see opportunities. This ability is related to instilling and reinforcing hope in the patient for positive changes in their condition during psychotherapy and achieving goals in their life. The psychotherapist can strengthen hope with phrases like, "I believe you can handle this, and I will help you," or "You can do it; you just need to put in enough effort, patience, and time," and so on.

6. The ability to recognize the patient's resources. This ability manifests in the psychotherapist's skill to acknowledge the intrinsic value of the patient, liberate, activate, and encourage their self-help resources. In positive psychotherapy, these resources are described in detail as basic and current abilities that can also develop during the therapeutic process (Peseschkian, 1996).

7. The ability to provide the patient with freedom of response. This ability means that the psychotherapist accepts the patient as they are, and this acceptance is always colored by warmth and respect. As a result, the patient begins to relate to themselves in the same way and can allow themselves to relax, feel safe, trust, and have confidence in themselves.

8. The ability to dedicate time to the patient. This involves moving through the therapeutic process at the patient's pace, providing them with the necessary time to understand and accept themselves, work through their negative experiences and resistance, and learn to make decisions and implement them in life. It is also related to the ability to structure session time and teach the patient to consciously dedicate time to work on their difficulties.

9. The ability to remain patient with the patient's expressions. This ability is expressed in the psychotherapist's support for the gradual development of the patient's abilities and recognition of their uniqueness in development, despite arising doubts and disappointments. It is the capacity to wait and be satisfied with partial successes, allowing for maturation and readiness for change in the patient.

In the empirical study, 71 psychotherapists participated, including 38 doctors and 33 psychologists aged between 24 and 55 years, with practical experience as

psychotherapists ranging from 2 to 30 years. The "Emotional Safety of the Psychotherapist" questionnaire (Goncharov, 2024) was used to diagnose the abilities of the psychotherapists, containing 9 scales corresponding to the 9 abilities described above. The results of the study revealed the following findings.

The lowest ratings for both doctors and psychologists engaged in psychotherapy were given to abilities such as ability No. 1 - "empathetic understanding," No. 3 - "congruence," and No. 6 - "faith," indicating that according to the internal hierarchy of specialists, they hold the least significance. Overall, the group of doctor-psychotherapists showed a higher average score in most abilities compared to psychologist-psychotherapists. However, psychologists scored higher than doctor-psychotherapists in abilities No. 6 - "faith," No. 7 - "freedom of response," and No. 9 - "patience."

Based on the theoretical concept and the results obtained from the diagnostics, a training program was developed and conducted to enhance the abilities to establish an atmosphere of emotional safety. The main objectives of the training were: to improve the abilities of psychotherapists to better understand themselves and their patients, to recognize their strengths and weaknesses, to understand their behavior in the psychotherapy process, and to develop skills for creating an atmosphere of emotional safety. A comparative analysis of diagnostics before and after the training showed statistically significant changes in eight out of nine scales, except for ability No. 6 - "faith." Additionally, before the training, the assessment of the significance of abilities showed unevenness, meaning some abilities were overestimated while others were underestimated. After the training, the evaluations of abilities became more uniform, with a shift from the average range to a higher one.

Conclusions:

1. The emotional competence of a psychotherapist is based on the level of development of their abilities to create an atmosphere of emotional safety and build "helping" relationships.

2. The success of the psychotherapy process as a whole depends on the emotional competence of the psychotherapist.

3. The nine abilities for creating an atmosphere of emotional safety described in this article can be measured using the appropriate questionnaire and can be purposefully developed through specialized training programs that enhance the professionalism of the psychotherapist.

References

1. *Araujo Gomes de HA(1975).What is Psychotherapy? - S. Karger.*

2. Boyatzis RE, McKee A. (2005). Resonant Leadership: Renewing Yourself and Connecting with Others Through Mindfulness, Hope, and Compassion. Harvard Business Review Press.

3. Bugental James F.T. (1992). The Art of the Psychotherapist. - W. W. Norton & Company.

4. Goleman D. (1995). Emotional intelligence. -Bantam Books.

5. Goncharov M.A. (2003) Emotional relationships and their role in the interaction of a psychotherapist and a patient. - Abstract of a dissertation for the degree of candidate of medical sciences, specialty 14.00.18. - St. Petersburg's. Petersburg Research Institute V. M. Bekhterev State Psychoneurological Institute.

6. Goncharov M.A. (2024). Emotional security and safety in the practice of a psychotherapist. - Moscow, Publishing house "Institute of General Humanitarian Research".

7. Peseschkian N. (1996). Positive Family Therapy. The Family as Therapist. - New Delhi: Sterling Paperbacks.

8. Rogers C. (2021). Client-Centered Therapy: Its Current Practice, Implications, and Theory. -Paperback.

9. Salovey, P., Mayer, J. D. and others (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker (Ed.), Emotion, disclosure, and health (pp. 125-154). - Washington, DC: American Psychological Association.

10. Frolov P. (2022). Some aspects emotional competence of a psychotherapist. - Pozitum, 2022, No. 3, pp. 26-40.

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THE USE OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF JOURNALISM: OPPORTUNITIES AND CHALLENGES

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Annotation. *In the context of digitalization, intelligent media are emerging that have the ability to perceive and provide multifaceted, multi-level, personalized and niche information services. This paper discusses the opportunities and challenges of using artificial intelligence in the field of journalism.*

Keywords: *Artificial Intelligence, mass media, journalism, digitalization, intelligent media.*

The emergence of intellectual products has a profound impact on the political, economic and cultural life of human society. This process is defined as the "fourth industrial revolution" of mankind.

Artificial intelligence technologies have given rise to new forms of news production.

Almost 15 years ago, in 2010, The Wall Street has already started using robots to write financial news. In 2014, the intelligent robot "Quakebot" on the Los Angeles Times website in the United States reported an earthquake. In 2017, a 7.0 magnitude earthquake occurred in Jiuzhaigou, China, and the public account of the China Earthquake Network immediately published a message automatically written by a robot in 25 seconds.

And in recent years, the use of artificial intelligence (AI) in work has become not an accidental practice of individual media outlets, but a widespread phenomenon in the media industry, media education, and media consumption. With the update and iteration of algorithmic technology, the scale of artificial intelligence applications in the field of journalism is also constantly expanding.

Intelligent media are emerging with the ability to perceive and provide multifaceted, multi-level, personalized and niche information services.

Smartization of information collection; mechanization of writing materials; enhancement of the accuracy of news transmission; automation of user feedback... The use of artificial intelligence technology gives journalistic work completely new characteristics.

Currently, most news platforms and information services have mastered the technology of personalized service based on recorded data about user likes, preferences, geographical location, social circles, and so on.

It should be pointed out that despite the obvious convenience and advantages of using artificial intelligence, its use devalues the work of a journalist and poses significant threats to traditional journalistic values. This cannot but affect consumers of media products and information exchange. In this connection, the problems of determining the risks of introducing AI into media practice are being updated.

It is obvious that the intellectual media provide the audience with the information they need at first glance. However, the "Information cocoon room", "filter bubble", "echo chamber effect", etc. aggravates the formation of a "mimicking environment". In the long run, this seriously harms the human potential to understand and transform the objective world.

In the application of artificial intelligence, big data correlation replaces causality as a new system of logical interpretation. As noted earlier, automating the writing of a creation using artificial intelligence increases the efficiency of news production and reduces labor costs. However, robotization in media production creates an information cocoon of an intensive level. The abstract filtering mechanism recommends information messages to specific users and audiences that are automatically generated by the machine, but journalists cannot interfere in this process. The closure of the "information cocoon" directly challenges publicity, which is considered the norm in traditional journalistic values. In this case, writing news using artificial intelligence makes journalistic values algorithmized.

Artificial intelligence technology allows media platforms relying on new technologies to satisfy their own commercial interests in the name of meeting public information needs.

Behind the challenge of using artificial technologies to traditional journalistic values is a change in the existing mechanism for the distribution of powers.

When using artificial intelligence, a new round of hierarchical division is imperceptibly taking place.New media platforms using artificial intelligence have huge information resources due to the close connection between artificial intelligence and big data.

Big data naturally includes personal information about audience privacy. The use of artificial intelligence in the media sphere often blurs the boundaries between privacy and data, which makes the latter vulnerable.

Thus, in the era of "intelligent media" journalistic professionalism is also undergoing a certain transformation. Professionalism implies that journalists are obliged to provide comprehensive and objective information to the public. And "intelligent media" based on machine algorithms blurs the line between "people looking for information" and "information looking for people". Algorithm compa-

nies continue to use confidentiality in their relationships with users when creating "digital identification files", thereby achieving accurate transmission of information.

In the current context, when it comes to artificial intelligence, the word "intelligence" is given enough attention, while the word "artificial" has faded into the background. It is worth mentioning that digital algorithms are written by humans. The significance of this fact lies in the fact that, logically, a person should have absolute initiative in the issue of the functioning of artificial intelligence. Artificial intelligence does not completely replace intelligence, since it is artificially created by man. However, at the current stage, there is a practical task of how to make artificial intelligence serve journalism without shaking the traditional values of journalism, without shaking the status of a person as the main subject, and how not to create a threat to the information and psychological security of the individual, which the robotic media product is aimed at.

It is obvious that in our technologically developed world, manifestations of the cult of material wealth, the desire for easy success are becoming more acute, such moral qualities of a person as the desire for inner self-improvement, politeness, good-naturedness to others, respect for elders are being lost, the egocentrism of each personality dominates. All this leads to the collapse of the system of moral principles and value orientations of society.

The modern anonymous, open virtual network world filled with "digital" and "electronic people"" leads even more to a "moral landslide", creates the illusion and emptiness of interpersonal relations, causing a spiritual crisis of the whole society.

In the hope of satisfying the needs of the spiritual life of the individual and resolving the spiritual crisis of society, improving the moral image of the people and creating harmonious relations in society, media texts should actualize the values of humanism and urge to cultivate high moral qualities in a person, and with positive examples inspire the audience to be a person with high moral qualities.

The ultimate goal of digital technology development is focused on achieving "comprehensive human development". That is why the task of guiding rational personal behavior, harmonious interpersonal relationships and the moral principles of a social group in modern society through, for example, basic Confucian ideas such as "humanity" is of extremely important practical importance for the healthy development of society in the digital age. It is important to pay attention to human values, the meaning of human existence and the future fate of mankind, to the formation of the material, spiritual and institutional civilization of society in order to embody the unity of the process of personalization and socialization of man, to strive for high integration of science and technology with the humanistic component of social development.

We support the view that only with the rational use of modern opportunities caused by new technologies, a combination of technological progress and the humanitarian spirit, it is possible to increase the humanistic literacy of society in the process of radical changes in social development.

In order to achieve the goal of the harmonious development of individuals and the healthy integration of society into the conditions of digitalization, the effort of the whole society is required. And here, first of all, journalists themselves, taking digital technologies into the process of their work, must understand their professional responsibility to represent, present, interpret and actualize the modern humanistic values of their audience.

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THE ROLE OF THE MAHAYANA SCHOOL IN SHAPING THE IMAGE OF MYTHICAL CREATURES IN THE BUDDHIST CULTURE OF INDIA

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Abstract. *The article analyzes the role of the Mahayana school in shaping the image of mythical creatures in the Buddhist culture of India. The origins of Buddhist mythology, its features and connections with pre-Buddhist movements are analyzed. Special attention is paid to the comparative analysis of two theological sources - the Jataka of the Mahayana and Hinayana canon. Based on the study of mythological images through the prism of the basic concepts of Buddhism, the authors showed the distinctive features of the Nagas as dual beings. The authors used culturological research methods. The historical comparative method made it possible to analyze the image of mythical snakes and its penetration into the written culture of India through the use of sources similar in content. The logical method was used to substantiate the conclusions reached in the conclusion.*

Keywords: *Buddhism, India, Mahayana school, Nagas, ambivalence, Buddhist mythology, Jatakas.*

It is standard practice to divide the directions of Buddhism into three branches - Hinayana (Small Chariot), Mahayana (Great Chariot) and Varjayana (Diamond Chariot) [1, p. 66]. It is important to note that representatives of the Hinayana try to achieve personal enlightenment - the achievement of nirvana, “Mahayanists” and “Varjayanists”, on the contrary, direct their prayers and good thoughts for general rebirth. They follow the path of the Bodhisattva. A bodhisattva is one who does not try to go to nirvana, although he is capable of doing so, since he sincerely wants to free all living beings from the “dirty swamp of samsara” and therefore continues to be in the circles of samsara in order to help get rid of suffering [1, p. 70]. From the very beginning, Mahayana ideas spread throughout the world

areas of India where there was Sarvastivada (a philosophical school of Buddhism, classified by Mahayanists as Hinayana) is active [2, p. 134]. The school initially appeared in Magadha, but the most suitable place for it was the north-west of India, where contact with other cultures stimulated thought and helped to formulate Buddhist teachings in a new way. Ultimately, the Mahayana doctrine received a rational basis in the works of such outstanding thinkers as Nagarjuna, Asanga and Vasubandhu, and the logicians Dignaga (5th century) and Dharmakirti (7th century) [2, p. 135]. By the eighth century, Mahayana with an admixture of Tantrism penetrated directly from India to Tibet [2, p. 156].

During the spread of this movement in the territory of Ancient India, hundreds of Buddhist sources were compiled, based on the sayings of the Buddha, bodhisattvas (enlightened ones), texts from before or non-Buddhist times, integrated into the Buddhist context. Thus, in Buddhist sutras (treatises) images began to appear more and more often that were not typical for the biography of the Teacher - mythical creatures, including gandharvas, kumbhandas, nagas and yakshas. In its attitude to mythology, Buddhism differs sharply from other religions. This is connected with the basic concept of Buddhism, according to which man (and only man) occupies a special place in the hierarchy of all (including mythological) beings, since he alone has the opportunity to escape from the shackles of beginningless samsara and achieve nirvana (i.e., become arhat or Buddha) [1, p. 101]. All other beings, including gods and other mythological figures, cannot directly achieve nirvana (for this they must be born as humans), and in this sense they are on a lower level than man, although they may have qualities that are not available to him (Buddhas and some bodhisattvas are superior to all other beings in this respect) [1, p. 102]. The teachings of Buddhism borrowed a number of plots and characters from Vedic and Hindu mythologies, but gods in Buddhism occupy a secondary place [3, p. 245]. Buddha is not a god, but a man who has humbled his passions and achieved complete enlightenment of the spirit. By living a righteous life, everyone who professes Buddhism can become a Buddha [3, p. 247]. The cosmological ideas of Buddhist mythology are characterized by breadth of scope and the desire to multiply all the elements of the universe to infinity [4, p. 6].

One of the main features of Mahayana is the mythologization of the setting for the creation of sutras (a laconic and fragmentary statement, an aphorism) [3, p. 266]. According to Mahayana mythology, Buddha Shakyamuni preaches the dharma not only to his disciples. He is surrounded not only by gods and bodhisattvas, but also by Nagas and other mythological characters, the number of which is often called innumerable [3, p. 267]. At the same time, countless Buddhas in other worlds are preaching the same dharma (“cosmic law and order,” “universal law of existence”) to similar surroundings. This feature indicates that Buddhist mythology is in many ways close to Brahmanic and Hindu mythology.

The word Naga in the meaning of "snake" or "snake-like demon" first appears in the Shatapata Brahmana [5, p. 33], which can be dated to the first half of the first millennium BC. The epic Mahabharata is the first text to talk in detail about the Nagas as such and the stories of individual people. Nagas such as the cosmic serpent Shesha, the Naga kings Vasuki, Takshaka, Airavata and Karkotaka or the princesses Ulupi. Shesha and Vasuki are the most worshiped names of the Nagas, even today they are depicted on many posters and walls as the bed of God Vishnu, as the garland of God Shiva and as the rope used to churn the ocean of milk.

Nagas can be found in several fragments of the text of the Life of the Buddha (Jataka), and there they are often depicted in a positive way. The most famous example, Of course, there is an example of Naga Mucilinda, who protects the Buddha from heavy downpours after his enlightenment by spreading his hood [10, p. 757]. Other examples include the two Naga kings who bathe the Bodhisattva on his mother's right side as he is miraculously born, Naga Kelika who encourages the Bodhisattva to go to the Bodhi tree, or the Naga Elapatra who questions the Buddha in the form of a giant snake [10, p. 760]. Elapatra had already crossed the historical area of influence of the Buddha, Magadha and the surrounding areas in the Ganges basin, that is, the region of northwestern India, where the Naga cult apparently played an important role [10, p. 761].

The later in the IV-V centuries. North India, where Mahayana Buddhism was more widespread, a distinction was made between Nagas as supernatural beings and their manifestations in the form of snakes [6, p. 97]. However, a Naga living in a lake in the Hindu Kush supposedly describes his own species as "wild animals" of low and vicious appearance, but of great strength, riding on the clouds, drinking the wind, walking on the sky and water, often overcome by hatred and violence, which they forget to control [6, p. 99]. For Mahayana, Nagas are beings who are born into this existence due to their previous bad karmic substance, but can be converted and redeemed. In their nature and action, Nagas are generally ambivalent - in the Indian context, there are even attempts to explain this ambivalence by arguing that there are in principle two types of Nagas, "good and evil" - and their menacing nature constantly manifests itself as natural disasters [7, p. 52]. To keep both types of actions under control, they must be tamed, which in the Buddhist version is often described as "difficult handling." The attitude towards Nagas is fully consistent with their ambivalent nature: on the one hand, they are treated with compassionate love (maitri), but on the other hand, they are also subjected to at least magical violence (dhyarani), Buddhist magical formulas [8, p. 307].

Having analyzed the Jatakas (ancient Indian parables about the earthly reincarnations of the Buddha) in the Theravada Buddhist canon "Tipitaka", as well as in the Mahayana canon "Garland of Jatakas", the first thing that catches your eye is the complete absence of passages dedicated to the ability of the Nagas to cause

rain. This part of the Naga character was developed by the Buddhism of the northern regions of India. The original concepts of these semi-divine snakes, living in water or underground, gave them the power to drive clouds and cause thunder, and also to manifest themselves as clouds, but not to cause rain. Of course, it is very easy to conclude that cloud deities produce rain, but it seems that this idea, which turned them into benefactors of humanity, first originated in the minds of the Mahayana school. According to the original ideas, on the contrary, they gave vent to their anger only by frightening people with thick clouds, thunder and earthquakes [8, p. 332].

The ability of Nagas to thicken clouds and cause thunder in a state of anger was transformed by the Mahayana school into an extremely beneficial force, through which rain was brought to the suffering earth [9, p. 110]. These terrible snakes, under the influence of Buddhist Law, became benefactors of humanity. Mahayanists divided the Nagas into the following four classes [9, p. 113]:

1. Heavenly Nagas who guarded the Heavenly Palace and supported it so that it did not fall.

2. Divine Nagas, benefactors of humanity, who caused clouds to thicken and rain to fall.

3. Earthly Nagas, who dried up rivers (removed barriers) and opened floodgates (drains).

4. Hidden Nagas, guarding the treasures of the "Kings of the Wheel" (Chakravarti-raja) and blessing humanity.

Nagas, as a rule, were benevolent towards Buddhism, but were dangerous creatures due to their hot temper, deadly poison and colossal magical power. They possessed countless jewels and knew powerful spells that they bestowed on those to whom they were disposed, and who often stayed in the beautiful palaces of the Nagas at the bottom of ponds, rivers, or seas. Nagas' ability to send rain, not mentioned in the Jatakas, apparently, was emphasized more by northern rather than southern Buddhism. In accordance with the original concepts, these semi-divine snakes, who lived in the land of Patala, underground, could condense clouds and cause thunder, or themselves appear in the form of clouds in front of trembling people. However, northern Buddhism transformed these terrible creatures into rain-bringing benefactors of people to whom prayers for rain were offered in special ceremonies. As for the division of Nagas into four castes: "Heavenly, Divine, Earthly and Hidden Nagas", this is probably also a northern feature, since there is no mention of this anywhere in the Jatakas. Hot wind and hot sand, sudden storms are what Nagas fear most. By strictly observing Buddhist restrictions, they can be reborn in human form.

References

1. Ermakova T.V., Ostrovskaya E.P. Classic Buddhism. St. Petersburg: Petersburg Oriental Studies, 2009. – P. 66-102.

2. Collier E. Dictionaries and encyclopedias on Academician // Open Society. – 2000. P. 134 – 156.

3. Grintser P. A., Myall L. E., Neklyudov S. Yu. Garuda // Myths of the peoples of the world. 1980., pp. 245 - 247, 266 - 267.

4. Abaeva L.L., The phenomenon of the Earth in the context of traditional religious views of the Mongolian peoples and the vector of adaptation of Buddhist theories and practices: a comparative analysis // Power. 2018. No. 5. 6 p.

5. Mayrhofer M. Etymologisches wörterbuch des altindoarischen //(No Title). – 1986. – 33 p.

6. Deeg M. Der Buddha und die nȷgas: Buddhistische Unterwerfungsmythen und Regenmagie. – 2008. P. 97-99.

7. Deeg M. Das Gaoseng-Faxian-Zhuan als religionsgeschichtliche Quelle: der älteste Bericht eines chinesischen buddhistischen Pilgermönchs über seine Reise nach Indien mit Übersetzung des Textes. – Otto Harrassowitz Verlag, 2005. – 52 p.

8. Schmithausen L. Maitri and magic: aspects of the Buddhist attitude towards the danger in nature. – 1997. P. 307-332.

9. Vogel J.P., Vogel J.P. Indian Lore of Snakes: or Nagas in Hindu Legends and Art. – Asian Educational Services, 1995. pp. 110-113.

10. Maksimova O. A. About the Jatakas with a hermit hero (based on stories from the collection "Garland of Jatakas") // Mongolian Studies. – 2024. – T. 15. – No. 4. – pp. 757-761.

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PUBLICATION AND REISSUE OF THE TEXT OF THE NATIONAL CONSTITUTION AS MULTIPLICATION OF ARTIFACTS

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Abstract. *The multiplication of various artifacts related to the national constitution is an integral part of the propaganda of its significance and at the same time an important contribution to the national culture. A special role in this is played by the publication and reprint of the text of the national constitution. The article analyzes the influence of the features of the original constitution on this process. Attention is paid to the characteristics of the handwritten originals of the texts of the constitutions, especially the United States and India. When publishing and reprinting the text of the constitution, the most significant and widespread areas of multiplication of artifacts include: creating digital copies of the texts of constitutions on the websites of state bodies and libraries, facsimile publications, first editions, highly artistic editions of the text of the constitution, autographed editions of prominent people, scientific publications, editions of the constitution for children and youth. The latter ensure that the next generations are introduced to the values of the constitution. In conclusion, the author concludes that there is a variety of types of artifacts when publishing and reprinting the text of the constitution.*

Keywords: *national constitution, artifacts, multiplication of artifacts, handwritten originals of constitutions, facsimile editions, first editions, rare and small-circulation editions, autographed editions, scientific editions, editions for children and youth.*

In modern cultural studies, the term “artifact” refers to an artificial object in general, the main structural unit of culture, [1, pp. 354-355]. The Constitution, as the main legal act of the state, defining the contours of the legal system and basic legal values, is a significant phenomenon not only for law, but also for national culture. The provisions and principles contained in it influence the social system

as a whole and are embodied not only in law, but also in literary works, cinema, works of fine art, and architecture. In honor of the anniversary dates of the national constitution, jubilee coins and paper bills, commemorative medals are issued. All these objects become artifacts associated with the constitution. To one degree or another, they are used to popularize the ideas of the constitution and for this they are multiplied.

The activity of multiplying artifacts associated with the constitution is predetermined by a number of factors. It differs depending on whether it is a valid or repealed constitution; how significant an impact this act had on world constitutional processes; whether the original text of the constitution has recognizable features; whether outstanding people participated in its creation; whether outstanding works of fine art dedicated to this constitution and a number of other factors were created. Their "set" differs from country to country, nevertheless, it is possible to distinguish the directions of multiplication that are found everywhere (as, for example, publications and reprints of the text of the constitution; issuing commemorative medals and jubilee coins) or relatively frequently (creating souvenirs dedicated to the constitution).

A special place in the multiplication of artifacts associated with the constitution is occupied by the publication and reprint of its text.

Original constitution as a source for multiplying artifacts related to the constitution

To a large extent, the prospects for multiplication of these artifacts are predetermined by the meaningful and design features of the originals of national constitutions. In substantive terms, to a higher extent, there is a multiplication of those constitutional acts that have made a great contribution to the development of world constitutionalism, have become some kind of milestones in the deployment of the constitutional process (Magna Carta of 1215, French Declaration of Human and Citizen Rights of 1789, US Constitution of 1787, Polish Constitution 1791 and others). The high importance of the national constitution for world constitutional processes stimulates the active multiplication of related artifacts. New artifacts can be created not only on the basis of the original constitution, but even its individual elements, such as the phrase "We People" from the preamble of the US Constitution of 1787 or the reproduction of the seal of John Landless attached to Magna Carta of 1215 [2, p. 190].

The design features of the original constitution also significantly affect the multiplication of related artifacts. The originals of the old constitutions have a number of features that reflect the specifics of the office work of their time, and are a kind of "exotics" from the point of view of modern methods of creating typewritten and electronic documents. This applies primarily to handwritten originals of constitutions. The original texts of the 1787 United States Constitution,

the 1814 Norwegian Constitution, the Constitution of India, adopted in 1949 and entered into force in 1950 and several other active constitutions are handwritten. The original US Constitution was written by calligrapher Jacob Shallus, clerk of the Pennsylvania General Assembly [3]. This handwritten text is widely circulated in the United States and is therefore easily recognizable.

The impression of handwritten texts is enhanced when accompanied by drawings. This was taken into account in India, where two versions of the handwritten text of the Constitution were created in English and Hindi, written by calligraphers and decorated with illustrations created by a group of Indian artists from the history of the country from ancient times to the present day [4, p. 788].

Since the old acts are handwritten, this entails imitating them in the form of creating handwritten versions of already published printed constitutions at the initiative of official bodies [5] or the public [6, p. 160-161]. On the other hand, the features of these constitutions are reproduced in works of fine art and design products created for mass consumption, recalling the historical character and roots of the constitution.

Copying the texts of the original constitutions starts the process of multiplying the artifacts associated with them, during the publication and reprint of the text of the constitution.

Informing the population about the content of the national constitution is carried out, first of all, through various kinds of publications of its text. The official publication of the text is usually carried out in the official source of the state and precedes all other publications. This, usually a newspaper publication, is the source for all further publications (subject to change). Among the numerous editions of constitutions, some of their types with special value can be especially distinguished.

Digital copies of original constitutions, current texts and various editions of constitutions

In the context of digitalization, the most accessible to the population are not printed, but digital copies of the originals of canceled and current constitutions and current updated texts of constitutions.

The originals of the constitutions are kept in the national archives. Being valuable artifacts of national importance, they are in public ownership, unlike most other artifacts, which can be in both public and private ownership. If the state of the original allows, then it is exhibited for viewing by the public in a special room and conditions of increased security measures (as, for example, in the USA, Argentina and some other countries). If an examination of the state of the original text of the constitution shows the undesirability of exposing it to the public in order to avoid the rapid degradation of the material on which the text is located and the text itself, then copies are made, recently digital. These copies are usually posted on the website of the corresponding national archive.

Actual updated texts of constitutions are posted on the websites of parliaments and often other supreme bodies of the state, in particular, constitutional control bodies.

Some of the most interesting for readers and/or facsimile editions of national constitutions can be posted on the websites of libraries. Thus, a digital copy of one of a thousand copies of the photolithographic edition of the original Constitution of India is freely available on the website of the Library of Congress [7].

Facsimile editions of the original text of the constitution

Most often, facsimile editions of those constitutions that have handwritten text or text decorated with illustrations are issued. Facsimile editions of the constitution allow you to get acquainted with the text as close as possible to the original constitution. As a rule, in addition to historical value, such a publication also has high artistic merits. Since facsimile publications have small circulations, already at the time of publication they become rarities and attract the attention of collectors. One example of such a publication is the facsimile reissue of the text of this Constitution undertaken in Spain on the occasion of the bicentennial of the Constitution of 1812, undertaken in 1814 at the time of the return of the Cortes to Madrid. The publication has an original leather binding, embossing on the pages and spine, engraving on the cover depicting the city of Cadiz (in which this Constitution was adopted) [8].

No less colorful is the facsimile reprint of the Constitution of India, associated with the peculiarities of its original, namely, the reproduction in it of the drawings of artists available in the original [7].

First editions of the constitution

The first editions of national constitutions as artifacts are of particular value primarily because they reflect the spirit of the era in which these constitutions were promulgated. The style of the text, the font, the location of the articles, and other typographic features of the first edition of the constitution are characteristic of this period. The first editions are of particular interest to historians studying the process of the birth of constitutions, at the same time, the first editions of the old constitutions are antiques and cultural artifacts that carry additional information and revive the memory of the time of the adoption of the constitution and the peculiarities of book publishing in the corresponding period. The first small-circulation publications occupy a special place among artifacts related to the constitution, since they themselves can become the object of multiplication, for example, in the form of facsimile copies. In some countries, the first editions were not issued for general use, but only for members of the body that drafted and adopted the constitution. So, in the USA, the first edition in the amount of 500 copies was distributed to the participants of the Philadelphia Convention in 1787 [9]. To date, only 13 copies remain, and only two of them were privately owned. Some idea of

the value of this first edition is given by information about the cost of one of these copies, sold in September 2021 to contribute funds to the charity fund created by the owner (Dorothy Goldman) to promote public understanding of democracy. Goldman's copy of the first edition of the Constitution was called by specialist Sotheby's, "one of the rarest and most coveted historical documents that has ever been auctioned" [9], in connection with which it was exhibited along with works of fine art. The final sale price of the copy at auction was $43.2 million, unprecedented for a historic document at auction [10].

It should be noted that not only small-circulation, but also any first editions of national constitutions acquire significant historical value over time and their cost increases. But the smaller the circulation, the faster the interest of collectors in it increases and, accordingly, its market value grows.

Highly artistic editions of the text of the constitution

The tradition of creating highly artistic illustrated editions of the text of the constitution arose at the dawn of constitutionalism, with the advent of the first constitutions and reflected a serious and respectful attitude to this act. In addition, highly artistic publications had to additionally draw attention to the constitution with their originality. This tradition persisted throughout the 19th century. in different countries. For example, the 1831 edition of the Belgian Constitution, issued in 1852, contained 11 drawings by V. Ladier and engravings by several artists [11].

With the development of the modernist trend in the visual arts, publications with humorous illustrations to the text of the constitution were widely distributed. In Spain, for example, one of the most famous is the illustrations of a cartoonist who created a recognizable image of the constitution in the form of a woman in antique attire and at the same time a fairly modern Spanish woman, humorously beating the corresponding tradition in the visual arts [12, see also 13, pp. 22-23].

Autographed editions by prominent people

Autographs by prominent people involved in the constitution's creation result in "doubling" the meaning and value of any document related to the constitution. For example, a letter from a statesman related to the preparation or adoption of a constitution becomes an important "double" artifact, allowing you to more accurately describe both his biography and the constitutional process, and also allow you to clarify the dates for making specific decisions on the constitutional text, as, for example, a letter from J. Washngton to T. Jefferson, written the day after the signing of the Constitution at the Philadelphia Convention in 1787 [14]. In relation to the editions of the constitutions, autographed editions of an outstanding figure are of particular value. Pencil marks of J. Washington on his copy of the US Constitution next to Section II of Article II of the US Constitution allow us to draw conclusions about his interpretation of the constitutional powers of the country's

president [15]. This is especially valuable since he generally did not make notes on books.

Scientific editions of the text of the constitution

Scientific editions of the text of the constitution are available in all countries and include editions of the text with comments by leading scientists of the country; monographs examining the content of the constitution; various kinds of reference books with court decisions related to various articles of the constitution; studies on the history of the creation of the text of the constitution; monographs and articles devoted to individual articles or sections of the constitution, etc. The number of such publications varies from country to country and largely depends on the scale of the scientific community in it. The works of the most famous and authoritative researchers are translated into foreign languages and ensure that the scientific community is informed about the national doctrine of a given country abroad. This kind of publication sets the "scientific standard" for a long time. So, in Russia, studies of the Constitution of India in modern scientific literature are still based on its study, carried out by the famous Indian constitutionalist dean of the University of Calcutta Durga Das Basu and translated into Russian in 1986 [16].

Editions of the Constitution for Children and Youth

A significant contribution to the multiplication of artifacts related to the constitution is made by publications intended for children and youth. In some countries (USA, Spain, Italy) there is more than one such publication.

Publications for children about the constitution reproduce these acts not in their entirety, but in the form of an exposition of the most important principles of the constitution, in a simplified form understandable to children of the corresponding age category and often in a game presentation. Comics and quests are widespread. At the same time, other literary forms are used. So in Italy, a publication is popular, where the main character is the hero of the Italian animated series and a number of books, the mouse-journalist Geronimo Stilton [17], but along with it there is a publication built by the author on dialogue with his daughter [18].

One of the newest publications of this kind is the comics "Political Constitution for Schoolchildren" prepared with the assistance of the Congress of Peru. They reflect serious issues of equality, non-discrimination, ecology and other important aspects of society. The main character of the comics goes on a journey through time with his pet and friends to get acquainted with the most important provisions of the country's Constitution and the history of its adoption [19].

The value of these publications, although they do not fully reproduce the text of the constitution and in this sense cannot be considered its reprint, is that they demonstrate the interest of citizens and the state in maintaining the constitutional order, in introducing the next generations to the constitutional regime, and preserving constitutional principles.

Conclusion

The analysis allows us to conclude that there is a variety of types of artifacts when publishing and reprinting the text of the constitution. The inclusion in the process of multiplying artifacts of digital products and the creation of sites dedicated to the constitution expands their impact on society and increases the possibilities of popularizing the ideas of the constitution.

References

1. Dobrokhotov A.L. Philosophy of culture: Textbook. Moscow: Ed. House of the Higher School of Economics, 2016. 557 pp

2. Andreeva G.N. The Magna Carta as a legal act, a cultural and historical artifact and an object of fine art // Herald of Culturology. 2022. No. 2 pp. 163-194. DOI: 10.31249/hoc/2022.02.09

3. Fascinating Facts about the U.S. Constitution. URL: https://www.constitutionfacts.com/us-constitution-amendments/fascinating-facts/ (accessed 05.08.2024).

4. Aswal D.K. Constitution of India : Preservation of original // 788 Current science. 2018. Vol. 115, No. 4. P. 788.

5. Rojo A. «Está prácticamente como el primer día». El ejemplar original de la Carta Magna con la firma del Rey es custodiado en el Archivo del Congreso/ A. Rojo. 06.12.2013. URL: https://www.larazon.es/espana/esta-practicamente-como-el-primer-dia-XF4632321/ (accessed 05.08.2024).

6. Andreeva G.N. On some artifacts related to the 1993 Constitution of the Russian Federation/ 关于与 1993 年俄罗斯联邦宪法有关的一些文物 // Proceedings of the International Conference "Scientific research of the SCO countries: synergy and integration" - Reports in English (April 26, 2024. Beijing, PRC). Beijing (PRC), 2024, pp. 156-163. DOI 10.34660/INF.2024.14.95.191

7. Constitution of India. Photolithographic reproduction // Library of Congress. URL: https://www.loc.gov/item/57026883 (accessed 05.08.2024).

8. Constitución de 1812. Edición conmemorativa del Bicentenario de la primera Constitución de España. URL: https://tabernalibraria.es/ediciones-conmemorativas/constitucion-1812-edicion-conmemorativa-del-bicentenario-la-primera-constitucion-espana/ (accessed 05.08.2024).

9. Gorman S. Sotheby's to auction rare first printing of U.S. Constitution. 1 September 18, 2021 URL: https://cnnespanol.cnn.com/video/subasta-copia-primera-edicion-constitucion-eeuu-sothebys-vo-alejandra-oraa-cafe-cnn/ (accessed 05.08.2024).

10. Rare first printing of U.S. Constitution sells for record $43 million. Nov 19.2021. URL: https://www.pbs.org/newshour/nation/rare-first-printing-of-u-s-constitution-sells-for-record-43-million (accessed 05.08.2024).

11. Constitution de la Belgique. Editionión illustrée. Bruxelles : Delevingne et Callewaert, 1852, 52 p.

12. La Constitución por Forges. URL: https://www.bne.es/es/dosieres/constitucion-por-forgeshttps://www.pbs.org/newshour/nation/rare-first-printing-of-u-s-constitution-sells-for-record-43-million (accessed 05.08.2024).

13. Andreeva G.N. Female image of the constitution//Sat. scientific works of the international forum "Culture, Art and Creativity: History, Directions of Development and Achievements" (Moscow, November 19, 2019). Moscow, 2019, pp. 14-31.

14. Chesters L. Washington letters sell but constitution on hold. 24 December 2022. URL: https://www.antiquestradegazette.com/print-edition/2022/december/2573/auction-reports/washington-letters-sell-but-constitution-on-hold/ (accessed 05.08.2024).

15. Chervinsky L.M. Acts of Congress / L.M. Chervinsky URL: https://www.mountvernon.org/library/digitalhistory/digital-encyclopedia/article/acts-of-congress/ (accessed 05.08.2024).

16. Das Basu D. Fundamentals of Indian Constitutional Law. Moscow: Progress, 1986. 662 p.

17. La Costituzione italiana raccontata ai ragazzi. Roma :Edizioni Piemme, 2015. 55 p.

18. Ambrosini G. La Costituzione spiegata a mia figlia. / Giangiulio Ambrosini Torino : Einaudi, 2004. 170 p.

19. Constitución Política del Perú para escolares. Lima: Fondo Editorial del Congreso del Perú, 2023. 136 p.

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ABOUT IRREVERSIBLE CHEMISORPTION OF MEF_2 MOLECULES (ME = CR, TI, NI, MN, CU, FE) ON THE METAL ZIRCONIUM SURFACE

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Abstract. *Surface interactions of zirconium and doping 3d-metals in sublimation purification process of ZrF_4 have been studied by the methods of electron microscopy, X-ray diffraction analysis, EXAFS and Auger spectroscopy. According to the obtained data the mechanism of irreversible chemisorption of MeF_2 molecules (Me = Cr, Ti, Ni, Mn, Cu, Fe) on the metal zirconium surface followed by diffusion of Me atoms or ions into Zr crystal lattice has been suggested.*

Keywords: *Zirconium fluorides, sublimation-desublimation, adsorption layer of Zr.*

Vacuum sublimation is one of the effective methods of ZrF_4 purification widely used to produce fluoride glasses and fibers with low optical losses [1]. We have been investigating physical and chemical model of sublimation-desublimation process to determine effective ways of sublimation fluorides purification. In the experimental part of the model called "investigations" kinetic and macrokinetic behavior of sublimation purification are shown. So during the macrokinetic studying we have considered all three stages of sublimation and desublimation processes:

1 reversible reaction on the crystal surface;

2 transport of gaseous reaction products formed inside the layer, surface — inside diffusion;

3 transport of gaseous reaction products from inside the layer to gas flow core — outside diffusion.

Metal zirconium was suggested as a sorbent (active packing) permitting to execute sublimational purification of ZrF_4 from impurities of Fe, Mn, Cr, Cu, Ni fluorides determining the index of optical losses in the fiber glasses [2]. The zirconium surface irreversibly absorbs volatile compounds of the impurities but remains inert to the base ZrF_4 substance. Concentration and transformation of the doped phases on the sorbent surface and mechanism of surface conversion of volatile metal fluorides exert a great effect on the efficiency of ZrF_4 purification.

The purpose of the present study is to investigate morphology, element and phase composition of the sorbent surface and mechanism of formation and transformation of metal fluorides of the zirconium surface.

ZrF_4 containing different concentration of 3-d metal impurities was sublimed in evaporator at 850-870 Vapour of ZrF_4 passed through the layer of metal zirconium cut having 0,5 • 4,0 • 40 mm diameter and 0,4 g/cm^3 poured density. Sublimation degree of ZrF_4 was 90-95 %. Zirconium samples were tested by physical and chemical methods before the sorption process and after it (Fig1.)

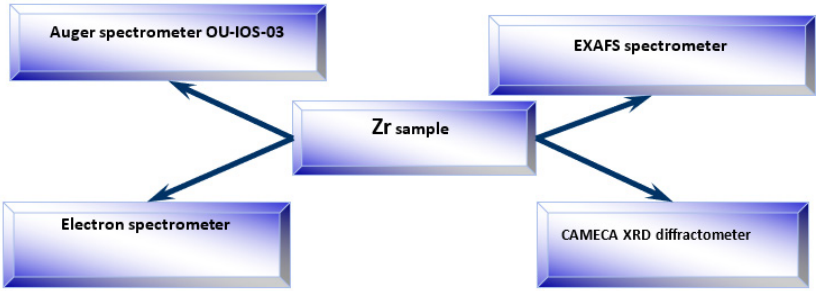

Figure 1. *Investigation scheme of chemisorbed layer of Zr support sample. Efficiency of zirconium sorbent effect on ZrF_4 purification index was determined using atomic-absorption analysis and NAA (Table 1).*

Table 1

Efficiency of ZrF_4 sublumation purification using and without the Zr-sorbent (NAA and ESA date)

Impurities	**ZrF_4 purity • 10^4 wt, %**		
	C_o (initial)	**after sublimation**	
		without Zr	**using Zr**
Fe	770	50	• 2,3
Ni	80	13	< 1,0
Cr	16	8,0	< 2,0

X-ray diffraction spectra registered on DRON-3 diffractometer, microradiographic were carried out using CAMECA microanalizer, photomicrographs were obtained on EMMA-2 and TESLA-BS-540 electron microscopes. Auger spectra were recorded on OU-105-03 spectrometer (Ar^+ ion flow, energy 3 keV, current density 20 mcA/cm^2). The EXAFS spectra were obtained at the EXAFS Station of Siberian Synchrotron Radiation Center. The storage ring VEPP-3 with electron beam energy of 2 GeV and an average stored current of 70 mA has been used as the source of radiation. The X-ray energy was monitored with a channel cut Si(111) monochromator. All the spectra were recorded under transmission mode using two ionization chambers as detectors. The background was removed by extrapolating the pre-edge region onto the EXAFS region in the forms of Victoreen's polynomials. Three cubic splines were used to construct the smooth part of the adsorption coefficient. The inflection point of the edge of the X-ray adsorption spectrum was used as initial point (k=0) of the EXAFS spectrum. The radial distribution of the atoms (RDA) function was calculated from the EXAFS spectra in $k^3\chi(k)$ using Fourier analysis at the wave number interval 4.0-13.2 Å^{-1}. Curve fitting procedure with EXCURV92 code was employed to determine precisely the distances and coordination numbers. The similar wave number intervals after preliminary were realized for $k^3\chi(k)$. EXAFS determines function of atom radial distribution, i.e. some atoms around the studied atom depending on the distance. Short track length of photoelectron limits distance ranges up to 4Å. Interatomic distance, coordination numbers and Debye-Valler factor have measurement uncertainty amount for 0.5-1.0%, 20% and 10-3 Å, respectively. To study contaminating influence of structural materials, we used EXAFS method which is able to determine surrounding structure of one chemical element of any complexity.

The experiment was carried out step by step:

- the sample preparation with calculation of concentrations and linear dimension;
- direct managing the experiment, i.e. tuning on the K-absorption edge and establishing the registration parameters;
- spectrum elaboration, i.e. calculation of phases and amplitudes, detachment of function of X-ray far edge absorption structure $\chi(k)$, spectrum modeling.

For EXAFS tests at the mode of measurement of secondary X-ray fluorescence a spectrum of K-absorption edge of Fe atom in subsurface layer of Zr support was recorded (Fig. 2).

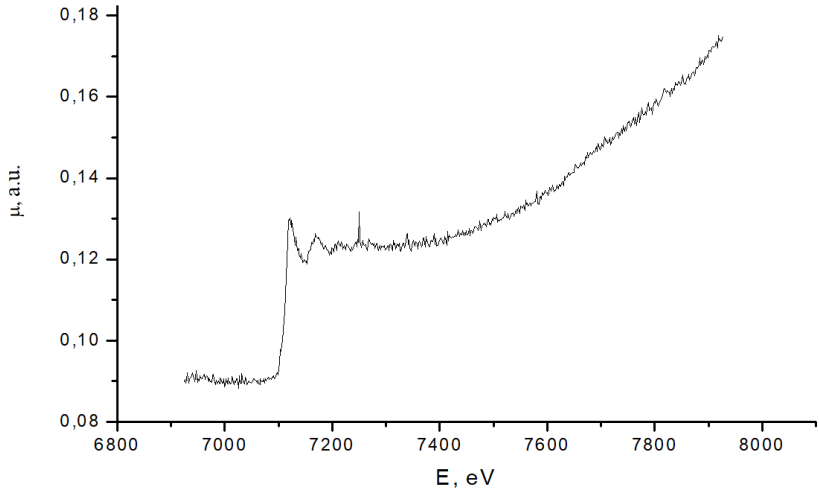

Figure 2. *Spectrum of Fe K-absorption edge*

Far fine structure of EXAFS oscillations was detached from the absorption spectrum and analysis of the obtained oscillations was carried out. Based on intervening results EXAFS oscillations of the supposed structural units were modeled and the structure of the compound (Fe_2O_3) was determined. We obtained the following data: interatomic distances R, A-1,811 and 2,970; coordination numbers N-2,031 and 2,915; Debye-Waller factors σ -0,009 and 0,017 (Table 2).

Table 2

EXAFS data (distances, coordination numbers) of Fe, Fe2O3 local arrangement for Zr samples

First coordination sphere			**Second coordination sphere**		
R, (Å)	*N*	*σ*	*R,(Å)*	*N*	*σ*
1.8111	2.03123 *(Fe-O)*	0.009	2.9695	2.915 *(Fe-Fe)*	0.017

X-ray diffraction analysis was not effective in this case. In the composition of the surface layer we could reliably identify only zirconium dioxide from the following collection of interplanar distances: d, A: 2.68/2.32/1.32/1.63/1.39 /1.33/1.05/1.03/0.94/ 0.88.

More information was given by the microradiography method. The LIF, PET and TAP crystals were used to obtain the spectra. Fig.3 shows characteristic spectra of the initial zirconium surface (a) and the one after chemisorption process

(b). The comparison of these two spectra indicates the appearance in b-spectra of signals of k-train attributed to Fe, Cr and Ti.

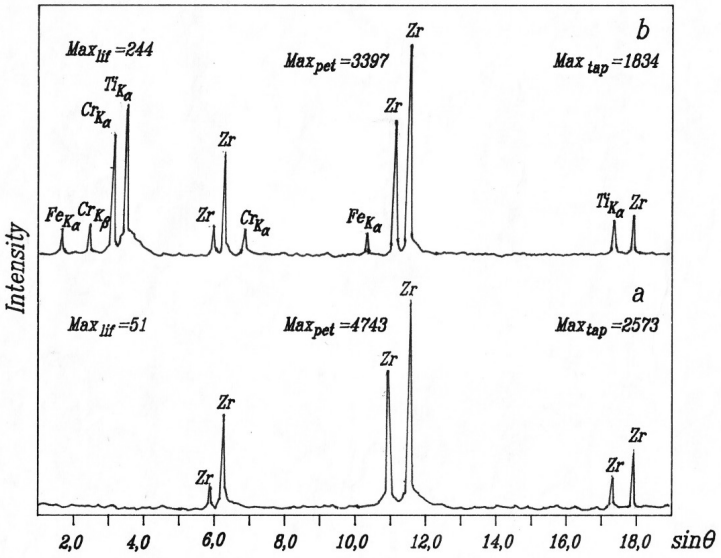

Figure 3. *MR-spectra of the zirconium surface before (a); after sorption process (b)*

Studying all samples of the sorbent after chemisorption process showed the presence of these metal impurities on the surface of zirconium cut.

The experiments enabled to determine the presence of a-Fe_20_3 (Table 3), a-Fe, FeF_3, $Zr0_2$ (tetragonal). All phases, except $Zr0_2$ in small amount, were lacking at from the surface of initial zirconium sample.

Table 3

Date of electron-diffraction study of doped Zr surface

d_{exp}, Å	$d_{a\text{-}Fe203\ theory}$, Å	$d_{Zr\ theory}$, Å
3.58	3,66	
2,81	-	2,79
2,66	2,69	
1,81	2,20	1,89
1,62	1,81	1,62

Method of Auger spectroscopy permits to obtain the data of element analysis of zirconium sorbent surface. The analysis results before and after the purification process are presented in the Table 4.

Table 4

Concentration of the elements on the sorbent surface (AES data)

Element	Zn	Ar	C	N	O	F	Ti	Cr	Mn	Fe
before exp., at %	4,30	0,11	2,10	0,90	2,30	-	-	-	-	-
after exp., at %	3,10	0,12	0,90	0,80	0,37	0,34	0,02	0,03	0,02	0,02

MS were more informative for investigation (Fig. 4).

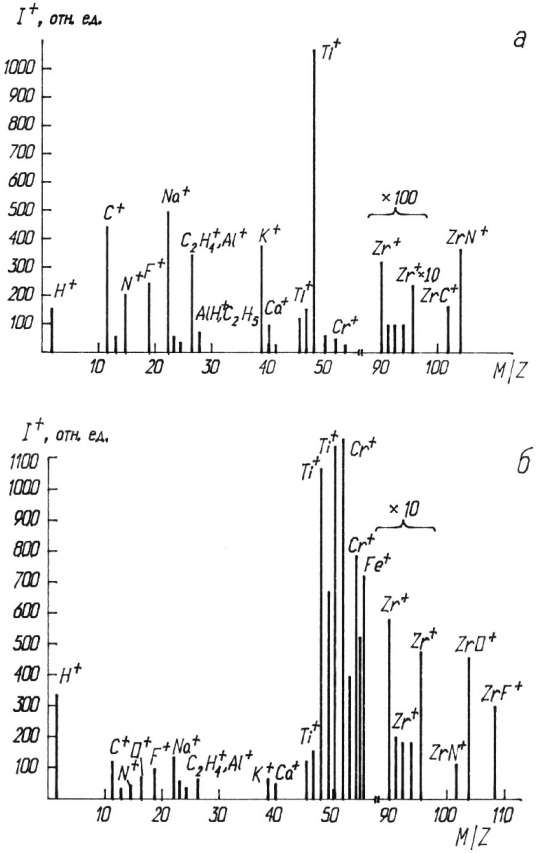

Figure 4. *MS-spectra of the zirconium surface before (a); after sorption process (b)*

All the data indicate the surface layer enriching 3d-metals and fluorine and depletion with carbon and oxygen take place when ZrF_4 sorption purifying.

Such a change of the element concentration enables to suppose that ZrF_4 sorption purification is due to irreversible dissociating chemisorption of the volatile 3-d metal fluoride molecules on the zirconium sorbent surface. At the same time the oxidation of surface carbon with oxygen and fluoride occurs.

The degree of zirconium surface covering with other atoms and ions is about 0,5. As the F/O ratio is close to 1, we may assume the presence in the surface layer of Zr and 3d- metal oxyfluorides of MeO_nF_2 type.

The activated character of the volatile 3-d metal fluoride chemisorption is confirmed by increasing the surface concentration of iron when heating at 680-760 °C. The activation energy of FeF_3 chemisorption on metal zirconium equals approximately 34,7 kJ/mole.

All these reactions do not have thermodynamic prohibitions. The exchange of oxygen and fluorine atoms between the surface oxide cluster and volatile MeFn molecule is favored by the close atomic and ionic radiuses (1,36 A for 0 ~ and 1,29 A for F) as well as higher binding energy for Zr-F as compared with Me-F.

To make better purification of ZrF_4, it is necessary to use a sorbent having high surface area [3]. The promising method of the zirconium surface treatment is radiochemical treatment with ionized radiation of different nature and energy followed by the cut thermovacuum “training” that affords necessary reconstruction of the zirconium surface.

Conclusions

1. Concentration of 3-d metal impurities on the surface of metal zirconium sorbent occurs during ZrF_4 sublimation purifying.

2. The adsorption layer on the zirconium surface after the sorption process contains a-Fe,Ni, Zr, Mn and their oxides. Fe, MnO, Ni and $Zr0_2$ phases have the highest concentration.

3. Two probable mechanisms of the impurities chemisorption are suggested such as redox and exchange ones.

References

1. Ozherelyev O.A., Kochubey D.I., Fedin A.S. Chemical-technological model of purification of zirconium and hafnium tetrafluorides in: ISIF-2008 Vladivostok, 2008. P. 110-115.

2. Fedin A.S., Ozherelyev O.A., Kalaev M.E. Object and mathematical simulation of ammonium hexafluosilicate sublimation Procedia Chemistry, ISSN:18766196, Vol.11C, 2014. P.78-83.

3. O.A. Ozherelyev, V.L.Sofronov, A.S.Buynovskiy Nuclear zirkonium fluoride Global Science & Innovation 2022:Central Asia ISSN 2664-2271, №2(16),2022 p.48-52

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ANALYSIS OF ZINC AND COPPER LEVELS AGAINST THE BACKGROUND OF EXISTING SOMATIC PATHOLOGY IN PRIMARY SCHOOL CHILDREN LIVING IN THE TRANS-BAIKAL TERRITORY OF THE RUSSIAN FEDERATION

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Summary. *The study of the provision of essential trace elements in children, including primary school age, is due to a high pathological lesion, including a variety of somatic pathology. Important essential trace elements vital for a growing organism include zinc (Zn) and copper (Cu), as they are involved in most physiological processes and are part of important metalloenzymes and hormones.*

The purpose of this study was to study the level of Zinc and Copper availability against the background of existing somatic pathology in children of primary school age (7-11 years old) living in the Trans-Baikal Territory of the Russian Federation.

The biological material for the study of trace elements (Zn, Cu) was daily urine. The determination of Zinc and Copper in daily urine was carried out by photometry.

According to the results of our study, there was no deficiency of zinc and copper levels against the background of various somatic pathologies in primary school-age children living in the Trans-Baikal Territory. The structure of somatic pathology in children was dominated by diseases of congenital anomalies (malformations), deformities and chromosomal abnormalities, diseases of the eye and its accessory apparatus and diseases of the respiratory system, endocrine system, eating disorders and metabolic disorders, and diseases of the digestive system.

Keywords: *children, somatic pathologies, Zinc, Copper.*

Introduction

The interest in studying the role of essential chemical elements in children is currently associated with changes in elemental status due to various reasons, including changes in eating behavior, adverse environmental factors, and increased morbidity. The study of the provision of children with the necessary vital trace elements (essential) is a very important task for modern pediatrics. In our opinion, this is especially necessary for primary school children, since increased school loads, unjustified frequent use of computer gadgets, and changes in eating habits have a harmful effect on the growing body, leading to the formation of increased pathological morbidity in schoolchildren and a decrease in the body's immune defense. Zinc and copper are among the essential trace elements that make up most of the enzymes and hormones necessary for a growing child's body [1-11].

Zinc (Zn) – an important trace element, it is part of more than 300 metalloenzymes [1, 2]. Vital hormones (insulin, corticotropin, somatotropin, gonadotropins) are Zn-dependent. Zinc is necessary for normal growth and support of the immune protective properties of the body [3]. Zinc, like copper, being a cofactor of enzymes responsible for the synthesis of collagen and glycosaminoglycans, is directly involved in the synthesis of the bone matrix, plays a leading role in osteogenesis and the formation of peak bone mass [4]. With insufficient intake into the body, the concentration of Zn in bone tissue decreases rapidly [4, 5]. Zinc has an antioxidant effect - it stabilizes cytoplasmic membranes after lipid peroxidation [6].

Zinc deficiency conditions in children are accompanied by decreased immunity, hypogonadism, stunting, impaired bone mineralization, skin deterioration, and decreased vision [1-10]. Zinc deficiency contributes to a delay in fetal development, and in combination with a disadvantage of selenium and copper is considered as a risk factor for premature termination of pregnancy [3]. In some cases, Zn deficiency is accompanied by selenium deficiency [9].

There is no zinc depot in the human body [9]. It enters the body with food. The main food sources of zinc for humans are animal products - meat, liver, cheese. Oysters, pumpkin seeds and beans occupy a leading position in terms of the content of these trace elements. The need for zinc increases during pregnancy - there is a transplacental transport of zinc to the fetus [10]. Antenatal Zn deficiency contributes to the disruption of the formation of neurobehavioral reactions in infancy and early age (memory loss, motor disorders). Zn deficiency in critical periods of brain development (8-12 weeks of gestation and the third trimester of pregnancy) is accompanied by a decrease in brain volume, the total number of neuronal cells, as well as a change in the nuclear-cytoplasmic ratio of zinc (inhibition of cell division during the formation of large neurons) [10].

The efficiency of zinc absorption in the intestine depends on other trace elements – excess copper significantly reduces its absorption due to its competitive

relationship with transport metal enzymes [9]. The impact of adverse factors disrupts the balance between zinc and copper, contributing to the development of oxidative stress [9-11].

Copper (Cu) is an important essential trace element necessary for the normal implementation of hematopoiesis, the functioning of the thyroid gland, the cardiovascular system, nerve impulse conduction, and energy exchange processes [4- 7, 9, 11]. Copper is necessary for extracellular maturation of collagen - it is a part of the lysyloxidase coenzyme, which provides intermolecular bonds of collagen and elastin, is the main component of the myelin sheath, participates in skeletal mineralization, erythrocyte synthesis [6, 11]. The multicomponent nature of copper functions causes a variety of negative effects when it is deficient in the child's body. Antenatal copper deficiency leads to the formation of congenital heart defects, dystrophic changes in the myocardium, and impaired skeletal formation. In the postnatal period, with a lack of copper, damage to the central nervous system, the cardiovascular system, increased bone fragility, impaired collagen and elastin formation, increased membrane permeability, early aging of mitochondria, hematological and endocrine problems are observed [9, 11].

It is known that 95% of this element enters the human body with food. Copper is found in sufficient quantities in marine products, legumes, cabbage, potatoes, carrots, apples, spinach. Zinc deficiency can lead to an excess of copper or increase it due to the competitive relationship of these elements [11].

There are few works devoted to the problem of providing the body of primary school children with zinc and copper, and there are no works on the Trans-Baikal Territory and the Far East of the Russian Federation.

The purpose of the study

The aim of the study was to study the body's provision of primary school-age children living in the Trans-Baikal Territory with essential trace elements - zinc and copper against the background of existing somatic pathology.

Materials and methods

The study was approved by the Local Ethics Committee at the Chita State Medical Academy of the Ministry of Health of the Russian Federation.

A cohort of children (n=40) aged 7-11 years old, who are in a difficult life situation, receiving rehabilitation at the State Autonomous Social Service Institution "Rehabilitation Center for Children and Adolescents with Disabilities "Rescuer" of the Trans-Baikal Territory, was examined.

The legal representatives of the children provided written consent for the research and processing of personal data. An individual questionnaire has been prepared for each child with anamnesis, clinical examination, laboratory and functional parameters.

Children underwent anthropometry using the standard method, consultations were held with specialists: pediatrician, neurologist, pediatric orthopedic trauma-

tologist, pediatric endocrinologist, pediatric pulmonologist, pediatric gastroenterologist, pediatric ophthalmologist, pediatric dentist; daily urine was collected using the standard method.

A daily urine sample was taken using the standard method to determine the level of zinc and copper. The determination of zinc and copper levels in daily urine was carried out by photometry using an Indiko biochemical analyzer (Thermo scientific, Finland).

The laboratory part of the study was conducted on the basis of the Laboratory of Experimental and Clinical Biochemistry and Immunology of the Research Institute of Molecular Medicine of the Chita State Medical Academy of the Ministry of Health of the Russian Federation (head – PhD, Candidate of Medical Sciences P.P. Tereshkov).

The results of the study were processed in the Exel program and the standard SSP-statistic package.

Results and discussion:

Table 1

Distribution of patients by gender

	Boys Study group (n=40) 20 50.0 20 50.0		**Girls**	
	Abs.	**%**	**Abs.**	**%**
Study group (n=40)	20	50,0	20	50,0

Note: n - is the number of people

Table 2

Distribution of patients by age

gender	**Boys (n=20)**	**Girls (n=20)**
average age (in years)	10,0 (8,3:10,0)	10,0 (9,0:10,0)
average age (in years)	10 [9,0; 11,0]	

Note: n - is the number of people

Table 3

Anthropometric data of patients

	Boys (n=20)	**Girls (n=20)**
Weight (kg)	33,3 (29,5:46,9)	31,9 (29,0:36,9)
Height (cm)	140,7 (133,0:144,2)	138,0 (132,8:149,2)

Note: n - is the number of people

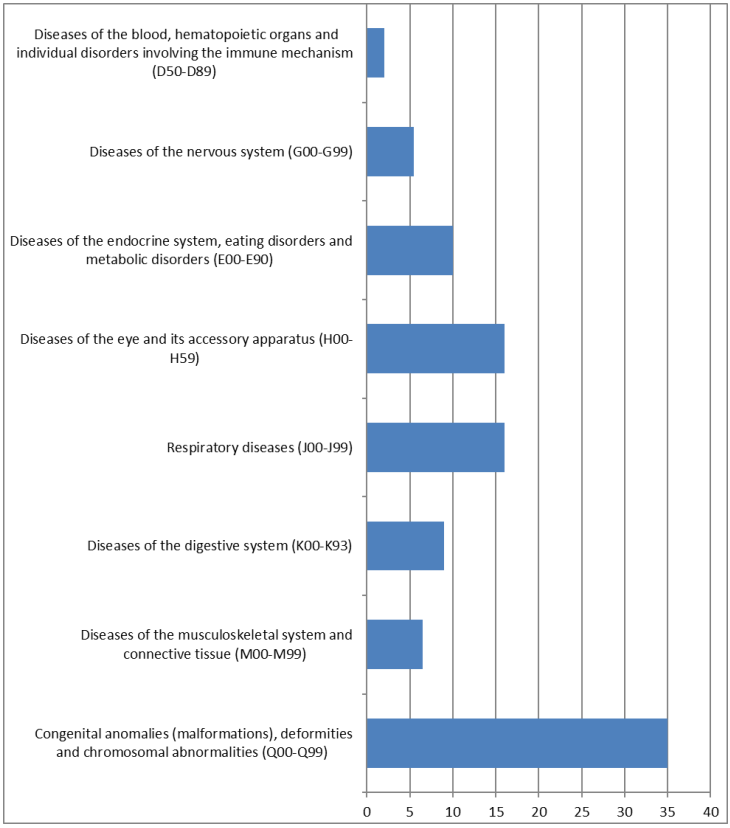

Figure 1. *Nosological structure of somatic pathology*

Table 4

The content of zinc and copper in daily urine

	Reference values*	**Research group (n = 40)**
Zn	150 – 1200 мкг/л	219,2 мкг/л (174,0: 270,6)
Cu	0,03 – 1,26 мкмоль/л	0,59 мкмоль/л (0,33: 0,84)

Note: n - is the number of people

* - [12] Melnichenko G.A. Encyclopedia of clinical laboratory tests. Ed. prof. N. W. Titsa. - M .: Labinform, 1997 (translation, edited by V.V. Menshikov). *Problems of Endocrinology*. 1999;45(1):55-55. (In Russ.) https://doi.org/10.14341/probl11709

Results and discussion:

The study involved 40 children of primary school age (7-11 years old), whose average age was 10 years with comparable gender differences – 20 boys and 20 girls (see Tab.1). Gender age differences are also comparable – the average age of both girls and boys turned out to be, on average, 10 years old (see Tab.2).

Anthropometric indicators of the study group: average height of boys - 140.7 cm, girls - 138.0 cm; average weight of boys - 33.3 kg, girls – 31.9 kg. The indicators of physical development of all children corresponded to the average harmonious type (see Tab.3).

The nosological structure of the somatic pathology of all children was dominated by congenital anomalies (malformations), deformities and chromosomal abnormalities (see Fig.1). – in almost every child, due to a congenital anomaly of the chordal apparatus of the left ventricle - 87% for the entire population.

Diseases of the eye and its accessory apparatus and diseases of the respiratory system are in second place - 16% each in the general nosological structure (in every second child) (see Fig.1). The structure of eye diseases consisted of hypermetropia - 12.5%, myopia - 7.5%, astigmatism - 7.5%, accommodation disorders -12.5%, amblyopia - 2.5%. Chronic nasopharyngitis prevails in the structure of respiratory diseases – a third of children had more than 8 episodes of acute respiratory diseases per year (see Fig.1).

The third place was shared by diseases of the endocrine system, eating disorders and metabolic disorders, and diseases of the digestive system – in every fourth child (see Fig.1). Thyroid pathology and overeating (12.5% each) prevailed in the structure of endocrine pathology in every fourth child. Dental caries prevailed among diseases of the digestive system (in every sixth child), chronic gastritis and biliary dyskinesia were observed in 5% of children (see Fig.1).

Diseases of the musculoskeletal system and connective tissue (6.5%) and diseases of the nervous system (5.5%) ranked fourth in the structure of general somatic pathology and occurred in every sixth child (see Fig.1).

Occasionally, there were diseases of the blood, hematopoietic organs and individual disorders involving the immune mechanism in the form of hemangioma and melanoform nevus – 2% of the total nosological structure (see Fig.1).

The total pathological lesion was 2,700% – 108 nosological forms per 40 children. Thus, each child, on average, had 3 somatic diseases (see Fig.1).

The level of Zinc and Copper in urine did not differ from normal parameters (see Table 4).

Conclusions:

The results of our study revealed a high pathological involvement in primary school children – on average, each child had 3 nosological forms of somatic diseases against the background of normal zinc and copper content

In our opinion, in children of primary school age with increased pathological lesions, the mechanisms of regulation of zinc and copper metabolism are preserved and compensated. However, increased physical activity should be taken into account, taking into account the increased metabolism associated with the processes of growth and development of the child's body, and monitoring of these essential trace elements should be carried out to prevent their imbalance and deficiency conditions.

List of literature

1.Shantyr I. I., Yakovleva M. V., Vlasenko M. A. Zinc deficiency conditions of residents of St. Petersburg. Preventive and clinical medicine. 2015. 4 (57). 12-16.

2.Devakurmar D., Stocks J., Ayres J., Kirkby J., Yadav S., Saville N., Devereux G., Wells J., Manandhar D., Costello A., Osrin D. Effects of antenatal multiple micronutrient supplementation on lung function in mid- childhood: follow- up of a double- blind randomized controlled trial in Nepal. Eur Respir. 2015. 45. 1566-1575. DOI: 10.1183/09031936.00188914

3.Legonkova T.I. Shtykova O.N., Stepina T.G., Voitenkova O.V., Stolyarova L.A., Sarmanova L.V., Matveeva E.V. Clinical manifestations of connective tissue dysplasia in adolescents with Zinc deficiency. Smolensk medical almanac. 2019. 4. 20- 23.

4.Pogorelova T. N., Linde V. A., Gunko V. O., Selyutina S. N. Disbalance of metal-containing proteins and free metal ions in amniotic fluid during fetal growth retardation. Biomedical chemistry. 2016. 62. 1. 69-72.

5.Hasanato R. Alterations in serum levels of copper, zinc, and selenium among children with sickle cells anemia. Turkish Journal of Medical Sciences. 2019. 49. 1287- 1291. Doi:10.3906/sag-1812.http://Journals.tubitak.gov.tr/medical/

6.Vasilienko E.M., Bakanov M.I., Spitchac T.V. Zinc and copper blood plasma and erythrocyte value in adolescent with the different types of pathology.

7.Fedor M., Urban B., Socha K., Sorocczynska J., Kretowska M., Borawska M., Bakunowicz- Lazarczyk A. Concentration of Zinc, Copper, Selenium, Manganese, and Cu/Zn Ratio in Hair of Children and Adolescents with Myopia. Hindawi Journal of Ophthalmology. Vol. 2019. ID 56438-48,7 pages, https:// doLorg/10.1155/2019/5643848

8.Shantyr I. I., Yakovleva M. V., Vlasenko M. A. Zinc deficiency conditions of residents of St. Petersburg. Preventive and clinical medicine. 2015. 4 (57). 12-16.

9. Nenartovich I.A. Malnutrition prevention among vegeterians. Medical business. № 4 (83). 2022. 38. / www.lech-delo.

10. Studenikin V.M., Tursunkhuzhaeva S.Sh., Shelkovsky V.I. Zinc in neuropediatrics and neurodetology. Attending physician No.01, 2012. 12.

11. Perekotiy E.V., Evstafieva I.A., Evstafieva E.V. Comparative analysis of the copper content in the body and its significance for the functional state of the cardiovascular system of children with different amounts of motor activity. Tauride Medical and Biological Bulletin. 2013. Vol. 16, №4 (64). 117.

12. Melnichenko G.A. Encyclopedia of clinical laboratory tests. Ed. prof. N. W. Titsa. - M .: Labinform, 1997 (translation, edited by V.V. Menshikov). Problems of Endocrinology. 1999;45(1):55-55. (In Russ.). 320. 521. https://doi.org/10.14341/probl11709

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CLIMATE CHANGE AND HEAT WAVES AS A RISK FACTOR FOR PUBLIC HEALTH

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Abstract. *The World Health Organization (WHO) has identified climate change as one of the greatest health challenges of the 21st century. As a mountainous country with arid climatic conditions, Armenia is vulnerable to global climate change. The most dangerous trends associated with climate change are observed in the city of Yerevan. The aim of this work was to study the hygienic peculiarities of climate changes in the RA and their influence on the health status of the population in Yerevan. Our research showed that in the territory of the RA, climate indices calculated at different altitudes indicate trends of increase in ambient air temperature due to climate change. The statistically significant non-seasonal increase in mortality is observed in the summer months in the city of Yerevan during prolonged heat wave days. According to the study, there is a statistically significant increase in mortality from all causes, when the number of heat wave days reaches 10 or more days per month. When periods of intense heat last up to 15 or more days, there is a statistically significant increase in*

mortality from diseases of the respiratory system. During the summer months, each additional heat wave daycan increase the average monthly mortality from all causes by 6.5%, and from respiratory diseases by 24%. The regression equations elaborated by us make possible to predict the monthly mortality of the population, conditioned by temperature factor in the future. These patterns give an opportunity for the medical prediction of the possible impact of climate changes on the health of the population, for early awareness and for the implementation of appropriate preventive measures.

Keywords: *climate indices, heat waves, mortality rates, seasonality of mortality.*

Introduction

Today noncommunicable diseases (NCDs) are the largest and fastest growing health burden. Prevention and control of these diseases are a major development imperative for the 21st century *[WHO, 2023]*. A range of other risk factors for noncommunicable diseases are even more strongly linked to environmental exposures and climate change *[Campbell-Lendrum D, Prüss-Ustün A, 2019]*.

Climate change is one of the greatest health challenges of the 21st century. As climatic conditions change, we are witnessing more frequent and intensifying weather and climate events, such as storms, extreme heat, floods, droughts, and wildfires. These weather and climate hazards affect health both directly and indirectly, increasing the risk of deaths, NCDs, the emergence and spread of infectious diseases, and health emergencies. All aspects of health are affected by climate change: from clean air, water and soil to food systems and livelihoods *[WHO, 2023]*. These changes undermine many of the natural systems that underpin *human* civilization and have the potential to reverse the progress in health and development achieved in recent decades *[Frumkin H, Haines A, 2019]*.

The impact of climate change is primarily due to anomalous high temperature days and the rise of heat waves. The 2018 report of the Lancet Countdown on health and climate change estimates, that vulnerability to extremes of heat has steadily risen since 1990 in every region, with 157 million more people exposed to heat wave events in 2017, compared with 2000 *[Watts Net al., 2018]*. While societies are adapted to local climates across the world, heatwaves represent a real risk to vulnerable populations and significant increases in the risks of extreme heat are projected under all scenarios of climate change *[Patz JA et al., 2005]*. The Sixth Assessment Report of the IPCC (Intergovernmental Panel on Climate Change) estimates, that vulnerability of ecosystems and people to climate change differs substantially among and within regions. 3.3 to 3.6 billion people live in contexts that are highly vulnerable to climate change *[Pörtner H.-O. et al. 2022]*.

The effects of climate change are felt today, and future projections represent an unacceptably high and potentially catastrophic risk to human health. The 2015

Lancet Commission on Health and Climate Change emphasized, that tackling climate change could be the greatest global health opportunity of the 21st century *[Watts N et al., 2015]*.

Armenia, as a mountainous country with a dry climate, with its entire territory and vulnerable ecosystems, is considered the most sensitive country to climate change. According to the results of the investigation conducted from 1929 until 2018, in the Republic of Armenia (RA), the average annual temperature increased by 1.39 ^{0}C, while the annual precipitation decreased by 13 %. It should be also noted that in the last century, extremely hot summers have been observed in the country over the past 20 year. Changes in winter temperatures have a completely different picture, the trend of temperature increase is very insignificant - 0.4^{0}C *[Melkonyan H. A. et al., 2019, Fourth National Communication on Climate Change, 2020]*.

The aim of this work is to study the hygienic peculiarities of climate changes in the RA and their influence on the health status of the population in Yerevan.

Material and methods

To assess the characteristics of climate change in the RA and its possible impact on public health, we used data from various climate indices of the Hydrometeorological Service of the Ministry of Emergency Situations of the RA.These indices were calculated for 1935-2017, based on data from 45 weather stations operating throughout the territory of the RA *[Melkonyan H et al., 2019]*. From the calculated indices, we selected the following four, which are most characteristic in terms of hygienic assessment of the potential impact of climate on public health: summer days (SU25), the number of days in a year, when the daily maximum temperature exceeds 25°C; cold days (FDO), the number of days in a year when the daily minimum temperature is below 0°C; tropical nights (TR20), the number of days in a year when the daily minimum temperature exceeds 20°C); consecutive dry days (CDD) maximum consecutive days without precipitation.

In this work, we also used data on the number of heat wave days for 1966-2023, and data on the monthly number of these days (during summer months) for 1966–2023 calculated for the city of Yerevan by the Hydrometeorological Service of the Ministry of Emergency Situations of the RA. Heat waves were defined as cases where the maximum air temperature exceeds the average norm by more than 5 °C for 5or more consecutive days *[Zakaryan N et al., 2018]*.

The monthly rates of the mortality from all causes (I00-Y89), included mortality of diseases of the blood circulatory system(I00-I99) and the respiratory system(J00-J99) of the population of the city of Yerevan for 2004-2020 were calculated, according to the data of the National Statistical Service of RA. The data of last years were not included, conditioned by Coronavirus pandemy.

The Excel program and SPSS statistical package were used for processing and analyzing of the collected data. To summarize the data descriptive statistics were

calculated. The evaluation of associations between the variables under scrutiny was conducted using correlation and regression analyses. ANOVA test was performed for multiple comparisons with the Dunnett's test for pairwise comparison of control group with others.

During data processing, the monthly mortality rates per 100,000 population were determined. Subsequently, a Spearman correlation analysis was used to assess the correlation between the mortality rates and the days of heat waves. The statistical significance of the correlation coefficient was evaluated based on p-value ($p<0.05$).

To assess the significance of differences in monthly mortality rates depending on heat wave days, an ANOVA test was applied during which the Fisher criterion was calculated. After the ANOVA test, the Dunnett's test was employed for pairwise comparisons of monthly mortality rates against the rate obtained for the control gradation. The results were considered statistically significant at a significance level of $p<0.05$.

Following this, a regression analysis was conducted, wherein regression coefficients were calculated, and the corresponding regression equations were constructed. The statistical significance of the regression equations was appraised by considering the coefficient of determination (R^2) and p-value ($P < 0.05$).

Results

At the beginning of the work, we considered the changes in the above-mentioned climate indices in relation to the regions of Armenia. Our research showed that in the territory of the RA, climate indices calculated at different altitudes indicate trends of increase in ambient air temperature due to climate change: summer days (SU25) increased in all the settlements of the Republic of Armenia from 1.3 to 5.8 days in 10 years; warm nights also increased, and cold days decreased by 1.4–3.4 days.

Table 1

Average annual values and changes in climate indices in Yerevan for 1951-2018

Climate indices	SU25	TR20	FD0	CDD
Average annual values	130	34	106	44
Changes of indices	19	21,1	4.5	6.6

Of particular interest are the calculated values of climate indices for the city of Yerevan. As can be seen from Table 1, the average annual number of summer and cold days in Yerevan is 130 and 106, respectively. The increase in the number of tropical nights (TR20) is the highest- 21.1 days unlike the rest of the country.

As can be seen from Figure 1, the number of heat wave days during summer months has increased significantly over the past 20 years in Yerevan. The maxi-

mum duration of heat waves was recorded in 2006 and 2015 amounting to 32 and 31 days, respectively. Compared with the previous decades (starting from 1966), the number of heat wave days in Yerevan increased by 8 days per year in 2003-2023. Thus, the most dangerous trends associated with climate change are observed in Yerevan. For this reason, to assess the potential impact of climate change on public health, we chose Yerevan, where 1/3 of the country's population lives.

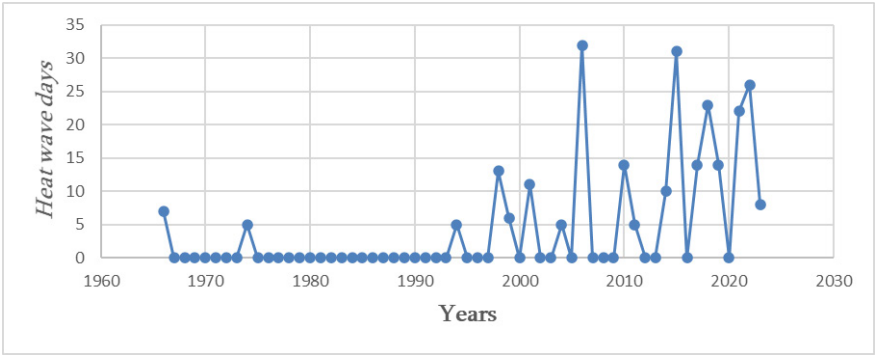

Figure 1. *The number of heat wave days per year in Yerevan for 1966-2023 during summer months*

To assess the potential impact of climate change on public health, the seasonality of population mortality should be determined beforehand. In our previous works we have addressed this issue and discovered that mortality from all causes, including diseases of the blood circulatory system and the respiratory system, was higher in winter and spring months in Yerevan *[Kotanyan A.O. 2015]*. Then we continued to study the dynamics of mortality rates during warm period (May-September). No significant correlation was observed during this period, so further statistical analysis was conducted between the monthly mortality rates and the duration of heat waves in summer period (June-August). For all causes of death, including diseases of the respiratory system, statistically significant correlation coefficients were recorded (Table 2). It should be noted that in the case of respiratory diseases, the relationship was more pronounced in July and August. So, the statistically significant non-seasonal increase in mortality is observed in the summer months in the city of Yerevan during prolonged heat wave days.

Table 2

Correlation coefficients between mortality rates in Yerevan and the number of heat wave days

Period	Mortality		
	From all causes of death	**From blood circulation system diseases**	**From diseases of the respiratory system**
May, June, July, August,September, October	0.16	-0.05	0.19
June, July, August	0.53*	0.19	0.375**
July, August	0.52*	0.18	0.515*

Correlation coefficients are statistically significant, $P < 0.01$

****Correlation coefficients are statistically significant, $P < 0.05$***

The subsequent ANOVA test confirmed that the differences between mortality rates for various gradations of heat wave days are statistically significant (P <0.05). Statistically significant differences between the average mortality rates have been revealed by the method of multiple comparison by Dunnett's indices conducted after the ANOVA test. It should be noted that the mortality rate for those months when waves were not recorded was taken as the control group. As a result, it was found out that a statistically significant increase in mortality from all causes is especially observed at the 3rd and 4th gradations of heat waves listed in Table 3, as compared with the 1st (when waves were not recorded). That is, there is a statistically significant increase in mortality from all causes when the number of heat wave days reaches 10 or more days per month. When periods of intense heat last up to 15 or more days, there is a statistically significant increase in mortality from diseases of the respiratory system.

Table 3

The average mortality rates in Yerevan for different gradations of heat wave days in June, July, and August

Heat wave days and average mortality rates	From all causes of death				From diseases of the respiratory system			
Gradations	1	2	3	4	1	2	3	4
Monthly amounts of heat wave days	0	5	10	15	0	5	10	15
Average mortality rates per a population of 100.000	60.61	64.92	69.85	70.16	4.14	4.67	5.33	6.57

Then, based on the above mentioned data (table 3), a regression analysis was performed.We found reliable linear relationships between the average mortality rates from all causes, including diseases of the respiratory system, and the number of heat wave days (R^2=0.913, P<0.05 and R^2=0.959, P<0.05 respectively).

In order to predict mortality, for these two cases the regression equations were calculated:

$\mathbf{Y_{total}=0.67x+61.35}$ in the summer months,

Yrespir**.=0.159x+ 3.98** in July and August,

where x- is the number of heat wave days, and y- is the average monthly mortality.

As can be seen from the regression equations, each additional heat day in the summer months can increase the average monthly mortality from all causes by 6.5%, and from respiratory diseases by 24%.

We have made a regression curve between the average monthly mortality rates of the population from all causes and the days of heat waves, which also proves that as the days of heat waves increase, so do the mortality rates (Fig. 2).

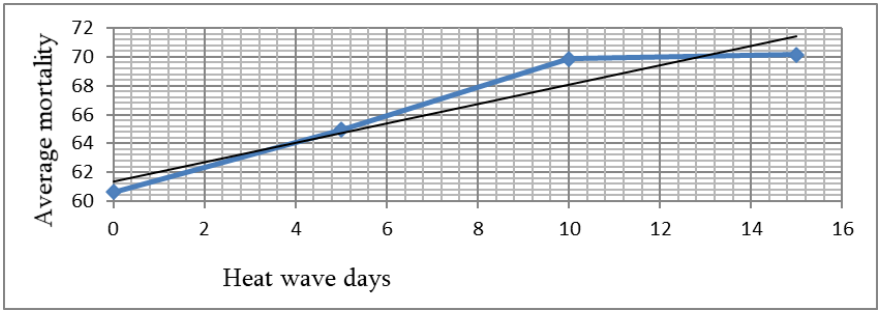

Figure 2. *Average monthly mortality regression curves during heat wave days*

Discussion

The IPCC Special Report on Extreme Events concludes that it is highly likely that there has been an overall decrease in the number of cold days and nights, and an overall increase in the number of warm days and nights, at the global scale *[Smith K.R. et al. 2014]*. Such trends are also observed in Armenia: summer days (SU25) increased in all the settlements of the Republic of Armenia from 1.3 to 5.8 days in 10 years; warm nights also increased, and cold days decreased by 1.4–3.4 days. From the point of view of heatwave impacts on health, according to the 2015 Lancet Commission on Health and Climate Change, minimum daily night temperatures, as well as the degree and duration of their deviations from the norm are important *[Watts N. et al., 2015]*. In this regard, the city of Yerevan stands out: here, as already noted above, the increase of the number of tropical nights (TR20)

is the highest, as compared to the other places in the RA. In addition, the effect of heat on mortality rates in large cities is much more pronounced than in other, smaller, cities *[Revich B.A., 2011]*.

According to our analysis, seasonal changes are observed in the mortality rate in Yerevan, and that rate is higher in winter months. This regularity, namely, the increase of death cases in winter-time, has also been established in other studies; however, it is not easy. Most winter-related deaths are cardiovascular, yet the link between temperature and cardiovascular mortality rates is weak to determine the mechanisms that are responsible for this *[Watts N. et al., 2015, Ebi K, Mills D., 2013]*. According to a number of authors, the anthropogenic climate changes can partly be recompensed by the reduction of added mortality (especially in countries with moderate climates and warm winters), observed in winter-time; however, on a global scale, these reductions are not essential as compared to the heat-related increase of mortality rates *[Staddon P et al.,2014; Gasparrini A. et al., 2017]*.

In Seoul, Korea, the added effect of heat wave on mortality was evaluated after adjusting for intra-seasonal trends. The cumulative relative risk of the added wave effect on mortality depending on wave definition was 3.7-14.8 % *[Lee WK et al., 2016]*. Revich B.A. (2011) studied the mortality of the population of European Russia in extremely hot weather conditions, with air temperature exceeding the average norm by more than 5 °C for over 1.5 months. Subsequent analysis showed that cumulative excess mortality in July and August 2010 was 54.000 as compared to the same period of 2009.

The results of our study show that the duration of heat waves is also important because statistically significant increase in mortality from all causes is recorded in cases, when the number of heat wave days reaches 10 or more days per month. When periods of intense heat last up to 15 or more days, there is a statistically significant increase in mortality from diseases of the respiratory system. According to the results of our study, each additional heat day in the summer months can increase the average monthly mortality from all causes by 6.5%, and from respiratory diseases by 24%. However, it should be noted, that in the case of respiratory diseases, the relationship was more pronounced in July and August. The highest air temperature values are recorded in these months, so it must be assumed that the intensity of heat waves is also important.

Conclusion

Our research showed that, climate indices calculated at different altitudes in the territory of the RA indicate trends of increase in ambient air temperature due to climate change. A statistically significant increase in mortality is observed in the summer months in the city of Yerevan during prolonged heat wave days. Each additional heat wave dayin the summer months can increase the average monthly mortality from all causes by 6.5%, and from respiratory diseases by 24%. The

regression equations elaborated by us make possible to predict the monthly mortality of the population, conditioned by temperature factor in the future. These patterns give an opportunity for the medical prediction of the possible impact of climate changes on the health of the population, for early awareness and for the implementation of appropriate preventive measures.

References

1.Campbell-Lendrum D, Prüss-Ustün A (2019). Climate change, air pollution and noncommunicable diseases. Bull World Health Organ. 1; 97(2): 160–161. doi:10.1007/s11524-007-9170-x

2. Ebi K, Mills D. (2013). Winter mortality in a warming climate: a reassessment. Wiley Interdiscip Rev Clim Change. 4(3): 203–212.doi.org/10.1002/wcc.211

3. Fourth National Communication on Climate Change under the United Nations Framework Convention on Climate Change, (published in Armenian), 2020, 84-153,Yerevan, UNDP Armenia, http://nature-ic.am/.

4. Frumkin H., Haines A. (2019). Global Environmental Change and Noncommunicable Disease Risks. Annu. Rev. Public Health. 40:261-282. doi. org/10.1146/annurev-publhealth-040218-043706

5. Gasparrini A, Guo Y, Sera F, Vicedo-Cabrera AM, Huber V et al. (2017). Projections of temperature related excess mortality under climate change scenarios. Lancet Planet Health. 1(9): e360-e367. doi: 10.1016/S2542-5196(17)30156-0

6. Kotanyan A.O. (2015). Medical and ecological problems of environmental natural factors on territory of RA [Published in Armenian]. Dissertation of Doctor of Medical Sciences. Yerevan. 232 P.

7. Lee WK, Lee HA, Lim YH, Park H. (2016). Added effect of heat wave on mortality in Seoul, Korea.Int J Biometeorol. 60(5):719-726.doi: 10.1007/s00484-015-1067-x

8. Melkonyan H. A., Khalatyan Y.S., Gevorgyan A.M., Petrosyan Z.S., Astsatryan G.V., Sahakyan V.G., Mirzoyan A.A. (2019). [Climate extreme assessment in the territory of Armenia]. [Published in Armenian]. Crisis management and technologies, scientific journal, MES of RA. Erevan. №1(14):147-155.

9. Patz JA, Campbell-Lendrum D, Holloway T, Foley JA. (2005). Impact of regional climate change on human health. Nature. 438: 310–317. doi:10.1038/ nature04188

10. Pörtner H.-O., Roberts D.C., Tignor M. et al. (2022). Summary for Policymakers. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001.

11. Revich B.A. (2011). Heat as a risk factor for public health. Russian Pulmonology. (In Russ.). (4):34-37. https://doi.org/10.18093/0869-0189-2011-0-4-34-37

12. Smith K.R., A. Woodward, D. Campbell-Lendrum, D.D. Chadee, Y. Honda, Q. Liu, J.M. Olwoch, Revich B. and Sauerborn R. (2014). Human health: impacts, adaptation, and co-benefits. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK, and New York, NY, USA: Cambridge University Press : 709-754.

13. Staddon P, Montgomery H, Depledge M. (2014). Climate warming will not decrease winter mortality. NatureClimChange. 4(3):190–194. DOI: http://dx.doi.org/10.1038/nclimate2121

14. Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W et al. (2015). Health and climate change: policy responses to protect public health. Lancet. 7;386(10006): 1861-1914.doi: 10.1016/S0140-6736(15)60854-6

15. Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Belesova K, Berry H et al. (2018). The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come Lancet. 8;392(10163):2479-2514. doi: 10.1016/S0140-6736(18)32594-7. Epub 2018 Nov 28

16. WHO. (2023). World health statistics 2023: monitoring health for the SDGs, Sustainable Development Goals, p.10-31. https://reliefweb.int/report/world/world-health-statistics-2023-monitoring-health-sdgs-sustainable-development-goals

17. Zakaryan N. B., Vardanyan T. G., Melkonyan H.A. (2018). Assessment of bioclimatic indices affecting human health in Yerevan. [Published in Armenian]. Proceedings of the Yerevan State University. Geology and geography. Yerevan. 2018; 52.2: 102-108.

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POSTOPERATIVE PERIOD IN SMOKING PATIENTS - WHAT TO EXPECT

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Abstract. *Smoking patients create problems for the anesthesiologist both in the perioperative and postoperative periods. What are the most common problems? Objective: to find out the most common complications of the postoperative period in smoking patients. Material and methods. 368 patients of both sexes were examined, including 186 non-smokers and 182 smokers. The condition of patients in the postoperative period was assessed by symptoms and recovery awakening scales: Aldrete Score, PARS, QoR-15. It was found that the leading disorders in smoking patients limiting their recovery in the postoperative period are: bronchopulmonary complications, cardiovascular disorders, cholinergic syndrome, difficult to relieve postoperative pain syndrome.*

Keywords: *smoking, postoperative period, complications.*

According to UNESCO, from 15 to 48% of males and females belong to the group of smokers. According to the Centers for Disease Control and Prevention, approximately 30.8 million adults smoke in the United States, and smokers make up a significant proportion of surgical patients [Lan Chi Tran, Atkin S., 2023]. . In 2016, under the leadership of the Ministry of Health of the Russian Federation, a representative epidemiological study, the Global Adult Tobacco Survey, was conducted. According to the study, 30.5% (36.4 million) of all adults regularly used tobacco in any form (49.8% among men and 14.5% among women).

Smoking patients are a problem not only during anesthesia, but also in the postoperative period, but in the literature on this issue there are only isolated studies [Magomedov M.A., Zabolotskikh I.B., 2010],

Objective of the study: to find out the most common complications of the postoperative period in smoking patients.

Material and methods of research. The patients under study were divided into 2 groups: Group 1 of patients – non-smokers - 189 people; Group 1 of patients – smokers (experience more than 5 years, consume at least 20 cigarettes per day) - 186 people.

The characteristics of the patients are presented in Table 1.

Table 1

Characteristics of the compared groups of patients

Patient characteristics	**Non-smoking patients**	**Smoking patients**
Number of patients (%)	186 (27)	182 (26)
Age (years)	50,2	54,4
Body mass index (kg/m^{-2})	27 (24-33)	28 (24-34)
Gender Male Female	 114 72	 121 61
Anesthesia Total intravenous anesthesia Inhalation anesthesia	 79 107	 84 98
Nature of operations Elective Emergency	 154 32	 159 23
Types of operations (non-cardiology patients) Plastic surgery General surgery Orthopedics	 36 75 75	 30 80 72
ASA I II	 116 70	 121 61
Lung diseases COPD compensated outside exacerbation Bronchial asthma (outside attacks)	 11 6	 14 5
Coronary syndrome (no changes on ECG)	12	9
Operations under general anesthesia in anamnesis	9	10

At the end of the operation and the decision to extubate at TOF values < 0.75, atropine was administered intravenously at a dose of 10 mcg/kg of body weight to prevent vago-mimetic effects - bradycardia, bronchospasm, and then after 5 minutes neostigmine was injected intravenously at a dose of 50 mcg/kg of body weight.

To assess the postoperative period (1st and 3rd days), the following scales were used:

- Aldrete Score awakening scale
- PARS anesthesia recovery scale
- QoR-15 (Quality of Recovery) scale for the quality of recovery after surgery and anesthesia

The obtained study parameters were statistically processed using parametric and nonparametric analysis methods. The accumulation, adjustment, systematization of the initial information and visualization of the obtained results were carried out in Microsoft Office Excel 2016 spreadsheets. Statistical analysis was performed using the STATISTICA 10.0 program (developer StatScoft.Inc). To compare independent populations in cases where there were no signs of normal data distribution, the Mann-Whitney U-test was used. The data are presented as a median with an interquartile range (IQR). To test the difference between two compared paired samples, the Wilcoxon W-test was used.

Results and discussion. The patients' condition on the first day was assessed using scales 6-8 hours after the end of anesthesia. The results, assessed in points, are given in Table 2.

Table 2

The condition of patients, assessed using scales on the first day

Scales used	Non-smoking patients (n=189)	Smoking patients (n-186)	p
Aldrete	7,3 (6,9-8,0)	6,3 (6,0-6,9)	<0,0431
PARS	10,2 (9,9-10,8)	7,8 (7,0-8,4)	<0,0086
QoR-15	27,4 (27,0-28,2)	20,1 (19,8-20,5)	<0/0326

Note: the results in the table are presented in the dimension: Median (IQR).

The post-anesthesia condition of patients, assessed using generally accepted scales, shows that in the first day (6-8 hours after the end of anesthesia) recovery was better in the group of non-smoking patients, which is confirmed by statistical calculations.

An analysis of symptoms and parameters that characterize the presence of syndromic disorders occurring in patients of both groups in the first day of the post-anesthesia period was carried out (Table 3).

Table 3

Syndromic disorders in patients of both groups on the 1st day after anesthesia

№№	Assessed parameters	Number of non-smoking patients (%)	Number of smoking patients smoking (%)	p
		Total number of patients=189	Total number of patients=186	
1	Vomiting, nausea	48 (25,4)	9 (4,8)	<0,0016
2	Difficulty breathing, feeling of lack of air	11 (5,8)	23 (12,4)	<0,0086
3	Pain in the heart area	3 (1,6)	7 (3,8)	<0,0322
4	Heart rhythm disturbances: - bradycardia - tachycardia - tachyarrhythmia	 1 (0,5) 3 (1,5) 1 (0,5)	 26 (14,0)) 4 (2,2) 4 (2,2)	 <0,0003 <0,0445 <0,0235
5	Reintubation of the trachea	2 (1,1)	5 (2,7)	<0,0454
6	Supply of humidified oxygen up to 5 l/min	157 (83,0)	93 (50,0)	<0,0321
7	Supply of humidified oxygen> 5 l/min	4 (2,2)	86 (46,2)	<0,0009
8	Laryngotracheitis	0	0	
9	Broncho-pneumonia	0	0	
10	Difficult to relieve pain in the area of the surgical wound	11 (5,8)	38 (20,4)	<0,0031
11	Severe muscle tremors	6 (3,3)	21 (11,3)	<0,0064
12	Absence of gas discharge	180 (95,2)	186(100)	>0,0865

As can be seen from the data presented in Table 3, in the first day of the post-anesthesia period, bronchopulmonary disorders prevail in smoking patients compared to the group of non-smoking patients: difficulty breathing, the need for oxygen insufflation, including high volumes - more than 5 l / min to achieve arterial blood hemoglobin oxygen saturation (pulse oximetry method) of more than 92%. The development of acute respiratory failure due to residual curarization required repeated tracheal intubation in smokers 2.5 times more often than in non-smokers. Smoking patients were much more likely to have various heart rhythm disorders. In the group of smoking patients, severe muscle tremors were recorded 3.5 times more often, as a manifestation of cholinergic syndrome. Only a few individuals in both groups complained of pain in the heart, but this symptom was also noted 2.5 times more often in smoking patients. Hard-to-relieve postoperative pain syndrome was more frequent in smoking patients.

Vomiting and nausea were less common in smoking patients, which is associated with the chronic emetogenic effect of nicotine [Pogodin A.M., Shifman E.M., 2012].

On the third day of the postoperative and postanesthesia period, the condition of patients, assessed by scales, is presented in Table 4.

Table 4

Condition of patients, assessed by scales on day 3

Scales used	Non-smoking patients (n=174)	Smoking patients (n=172)	p
PARS	12,5 (12,1-13,0)	12,3 (12,1-12,9)	>0,2311
QoR-15	72,0 (69,0-78,0)	61,0 (56,0-64,0)	<0,0453
Mortality [number of patients, %]	0	1 (0,6)	

Note: the decrease in the number of patients in the groups is due to the transfer of some patients to specialized departments, mortality

According to the PARS anesthesia recovery scale, on the third day of the postoperative period, there were no differences between the two groups of compared patients, i.e., the recovery from anesthesia in both groups was almost equal, which indicates complete awakening from anesthesia.

The quality of recovery of patients according to the QoR-15 scale, assessed by three criteria on a 10-point visual analogue scale, was statistically significantly lower in the group of smoking patients, which indicated a slower quality of recovery mainly due to reduced mental functions: quality of sleep, food intake, communication with relatives, good general health, performing hygienic procedures without outside help, a feeling of annoyance or depression. In the group of smoking patients, 1 patient with pulmonary embolism syndrome died.

An analysis of symptoms and parameters that characterize the presence of syndromic disorders occurring in patients of both groups on the third day of the postanesthesia period was carried out (Table 5).

Table 5

Syndromic disorders in patients of both groups on the 3rd day after anesthesia

№№	Estimated parameters	Number of non-smoking patients (%)	Number of smoking patients smoking (%)	p
		Total number of patients=174	**Total number of patients=172**	
1	Vomiting, nausea	2 (1,1)	1 (0,6)	<0,0459
2	Difficulty breathing, feeling of lack of air	1 (0,6)	2 (1,1)	<0,0454

3	Pain in the heart area	1 (0,6)	3 (1,7)	<0,0321
4	Heart rhythm disturbances: -bradycardia -tachycardia -tachyarrhythmia	 0 2 (1,1) 1 (1,1)	 11 (6,4) 2 (1,2) 5 (2,9)	
4	Reintubation of the trachea	0	0	<0,0454
5	Supply of humidified oxygen up to 5 l/min	18 (10,3)	31 (18,0)	<0,0421
6	Supply of humidified oxygen> 5 l/min	0	8 (4,7)	-
7	Laryngotracheitis	2 (1,1)	4 (2,2)	
8	Broncho-pneumonia	0	0	
9	Difficult to relieve pain in the area of the surgical wound	1 (0,6)	3 (1,7)	<0,0301
10	Severe muscle tremors	0	0	-
11	Absence of gas discharge	16 (9,2)	27 (15,7)	<0,0342

Complications such as nausea and vomiting, difficulty breathing and a feeling of shortness of breath were observed in single patients in both groups.

Pain in the heart area was noted 3 times more often by patients in the smoking group.

The supply of humidified oxygen, including in large volumes (> 5 l / min) to maintain the saturation of hemoglobin with oxygen in arterial blood within 92-93%, was recorded more often in the smoking group. Also, difficult to relieve pain was 1.8 times more often in the smoking group. The symptom of lack of gas passage was recorded 1.7 times more often in smoking patients. The presence of all the listed symptoms limited the quality of recovery of smoking patients, assessed by the somatic section of the QoR-15 scale.

Based on the obtained results, it can be concluded that in smoking patients after surgical interventions under general anesthesia, in a higher percentage of cases, various negative aspects are observed that limit the quality of recovery after surgery and anesthesia. The most common symptoms of respiratory dysfunction are those caused by chronic changes in the lung tissue due to long-term exposure of the nicotine to the macrophage system of the lung tissue, which leads to a decrease in the expression of proinflammatory cytokines [Kotani N. et al., 2000; Dhilton N.K. et al., 2009].

The second most common are cardiovascular disorders in the form of pain in the heart, and heart rhythm disturbances. Carboxyhemoglobin, which significantly increases in the blood of smokers, binds to cytochrome oxidase and myoglobin,

thereby inactivating cardiac mitochondrial enzymes that reduce the intracellular level of O2, thereby increasing myocardial and tissue hypoxia. Myocardial hypoxia causes a decrease in inotropy and an increase in cases of cardiac arrhythmia in non-cardiac surgery patients [Hollenberg M. et al., 1992].

Next in frequency in smokers is cholinergic syndrome, which manifests itself in the form of muscle tremors immediately after anesthesia, bradycardia, and slow gas passage

In fourth place is the syndrome of difficult-to-stop postoperative pain.

Thus, in the postoperative period in smoking patients, the doctor faces a number of problems: dysfunction of the bronchopulmonary system, cardiovascular system, the need for increased consumption of opioids to relieve postoperative pain syndrome, which worsens the quality of patient recovery, requires more careful monitoring, increases the need for patients to stay in the anesthesia and intensive care unit and in the clinic.

References

1. Lan Chi Tran, Susan Atkin. Cigarette Smoking and Anesthesia. Open Anesthesia. 2023;05(10):20-34

2. Magomedov M.A., Zabolotskikh I.B. Myoplegia. Practical Medicine. 2010: 222 p.

3. Pogodin A.M., Shifman E.M. Smoking as a risk factor for intraoperative nausea and vomiting during cesarean section under spinal anesthesia. Regional anesthesia and treatment of acute pain. 2012; 1: 11-15

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OF EARTHQUAKE CONSEQUENCES TOWARDS ANALYZING THE RESULTS OF EARTHQUAKE IMPACTS

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Abstract. *the article deals with the issues related to engineering analysis of earthquake consequences on the example of Turkey, Japan and the Philippines in the period from 1983 to 2024. The authors touch upon the issues of using geographic information systems to collect data on the speed and directions of tectonic plate motion in the regions under consideration, as well as the use of GIS in the preparation of seismic microzonation maps.*

Keywords: *earthquakes, analysis, tectonic plates, microseismic zoning, geographic information systems.*

Among the most dangerous natural disasters (floods, tsunamis, fires, droughts, and others), earthquakes occupy one of the first places in terms of the amount of damage caused (Fig. 1), both in the socio-economic sphere and in terms of the number of human casualties.

Figure 1. *Number of deaths from earthquakes in the world from 1983 to 2024 (https://ourworldindata.org/grapher/number-of-deaths-from-natural-disasters?time=1983..latest&facet=none, accessed 22.08. 2024)*

Today it is impossible to accurately predict the occurrence of earthquakes, however, based on data collected from the operation of seismological stations located around the world and geographic information satellite systems (GIS), seismic events are predicted with a high degree of probability in the medium and long term (from several months to several years).

In addition, the use of satellite systems makes it possible to monitor the movement of tectonic plates of the earth's crust, which have a certain impact on the landscape, ecosystem and populated areas in earthquake-prone regions of the globe.

However, it is worth noting that according to engineering analysis of the consequences of earthquakes, the main damage is the destruction of buildings of varying degrees and human casualties.

For a more detailed analysis, consider data on earthquakes that occurred over the past 40 years in Turkey, Japan and the Philippines.

Based on the available data provided by the United States Geological Survey (USGS) and taking into account incoming information from geographic information systems, it is possible to observe and predict the direction and speed of movement of tectonic plates, including for the countries under consideration.

Thus, Turkey is located on four plates - Anatolian, African, Arabian and Eurasian, of which the Anatolian Plate is the most active. The speed of its movement per year is 20 mm. Less active are the African and Eurasian plates, whose movement speed is 5 mm per year.

From Figure 2 it can be seen that the Anatolian Plate, on which most of Turkey is located, is moving in a westerly direction. The African and Arabian plates are moving in a northerly direction. The Eurasian plate is relatively stable.

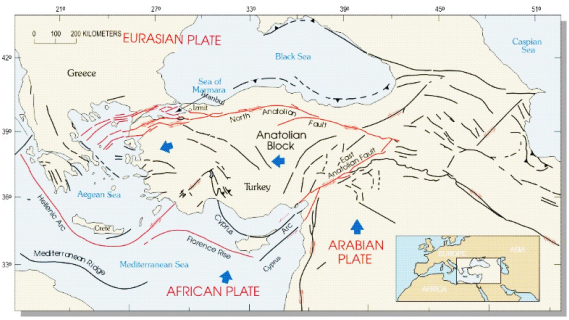


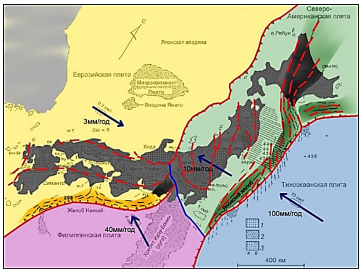
Figure 2. *Tectonic map of Turkey with the direction of plate movement (https://web.archive.org/web/20101228194237/http://neic.usgs.gov/neis/eq_depot/2003/eq_030501/neic_tgac_maps.html, accessed 13.07 .2024)*

Japan is also located on four plates (Eurasian, North American, Pacific and Philippine). The most active of them is the Pacific Plate, whose movement speed is 100 mm per year. The next fastest moving rate is the Philippine Plate - 40 mm per year. Less active plates are the North American and Eurasian plates, with movement speeds of 10 and 3 mm per year, respectively.

Three of the four plates - the North American, Pacific and Philippine plates - move in a westerly direction, and the Eurasian plate moves in an easterly direction. However, due to its speed of movement, the Pacific Plate, according to available data, goes under the North American Plate, forming the Japan Trench (Fig. 3a).

The Philippines lies on the Eurasian, Philippine Maritime, and Indo-Australian plates. The tectonics of the Philippines is based on the subduction of tectonic plates, forming the following ocean basins: the Philippine Trench and the Manila Trench (Fig. 3b).

a



b

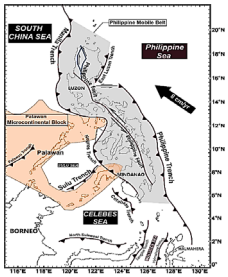


Figure 3a. *Tectonic map of Japan with the direction of plate movement (https://gallery.ru/watch?ph=Bdu-c1neD, accessed 07/13/2024)*

Figure 3b. *Tectonic map of the Philippines with the direction of plate movement (https://en.wikipedia.org/wiki/Subduction_tectonics_of_the_Philippines, accessed 07/13/2024)*

As noted earlier, earthquakes are accompanied by the destruction of buildings and, unfortunately, loss of life. This is confirmed by the analysis of data presented in various scientific and technical sources [1-22], which were analyzed by the authors of the article and compiled into tables, according to which diagrams were compiled on the number of human casualties and the number of destroyed and damaged buildings in the regions under consideration (Fig. 5 -8).

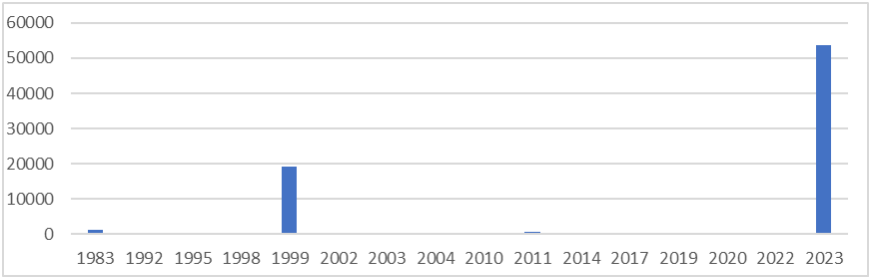


Figure 5. *Death toll from earthquakes in Turkey from 1983 to 2024*

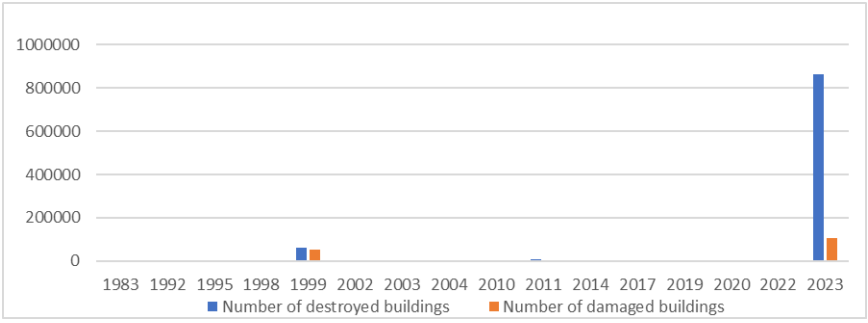


Figure 6. *Number of destroyed and damaged buildings from earthquakes in Turkey from 1983 to 2023*

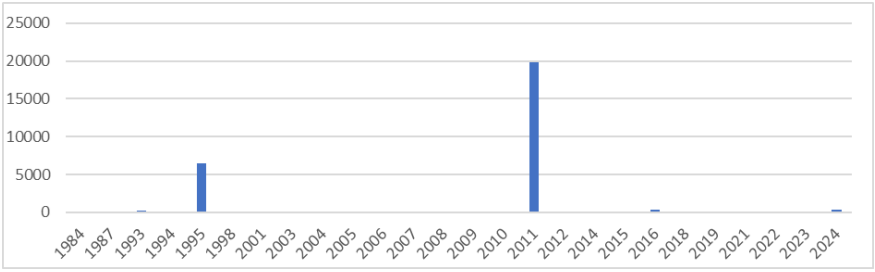


Figure 7. *Death toll from earthquakes in Japan from 1984 to 2024*

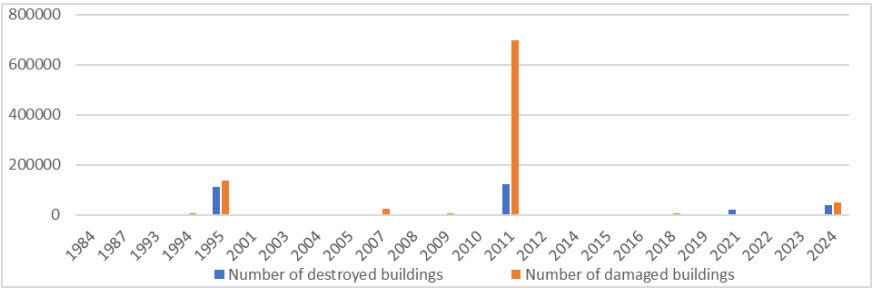


Figure 8. *Number of destroyed and damaged buildings from earthquakes in Japan from 1984 to 2024*

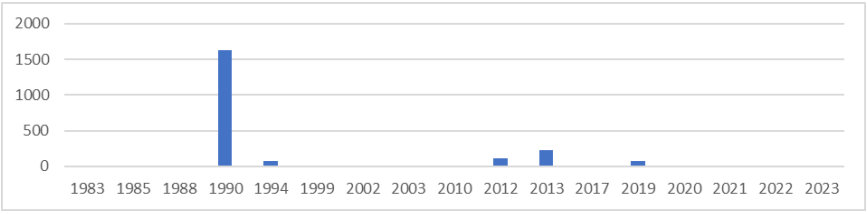


Figure 9. *Death toll from earthquakes in the Philippines from 1983 to 2023*

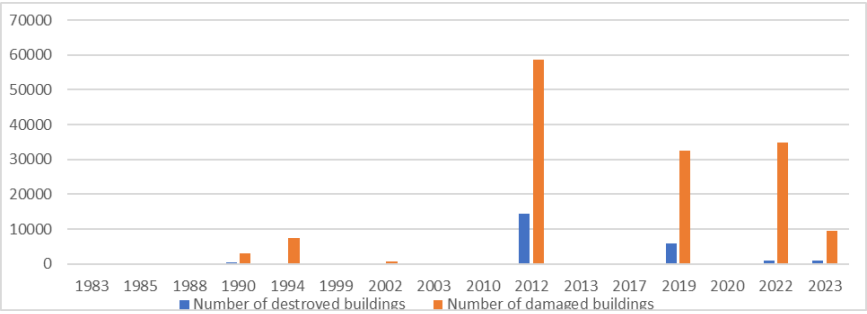


Figure 10. *Number of destroyed and damaged buildings from earthquakes in the Philippines from 1983 to 2023*

Based on the results of the above diagrams, we can conclude the following.

1. The main reason for the destruction or damage of buildings in Turkey is non-compliance with building design standards and the use of low-quality materials in the construction of buildings. In 2007, Turkey introduced a building code regarding earthquakes. Despite this, the quality and method of construction of buildings by private contractors did not change, which resulted in a huge number of casualties.

The most striking example of non-compliance with the building code is the earthquake that occurred in 2023.

2. In Japan, the main cause of destruction or damage to buildings is landslides and tsunamis. Therefore, even after the great Khasha earthquake, buildings built according to the old building design standards remained without any damage. After the great Khasha earthquake, the last changes to date were made.

3. In the Philippines, most of the destroyed or damaged buildings are associated with non-compliance with building standards during the construction of buildings, space-planning solutions and the quality of the materials used. Many buildings from the 18th and 19th centuries were also destroyed.

Thus, summing up the above, we can conclude that construction design standards in earthquake-prone regions must be updated in a timely manner and implemented by contractors when constructing buildings. High-quality building materials must also be used. For existing buildings built according to old building codes, measures must be taken to demolish or increase their seismic resistance. In addition, functional zoning and space-planning decisions must be made in such a way that evacuation routes for people from buildings are provided, and food supplies are provided in case of emergencies.

It is also worth noting that the introduction of geographic information satellite systems (GIS) into the design practice will significantly facilitate and speed up the compilation of seismic microzoning (SMR) maps [23].

References

1. Boğaziçi University Kandilli Observatory and National Earthquake Monitoring Center of the Institute of Earthquake Research (NEMC): official website. – Updated throughout the day. – URL: http://www.koeri.boun.edu.tr/sismo/2/deprem-bilgileri/buyuk-depremler/ (access date: 08/23/2024). – Text: electronic.

2. United States Geological Survey (USGS): official website. – Updated throughout the day. – URL: https://web.archive.org/web/20111024044059/http://www.usgs.gov/ (access date: 08/23/2024). – Text: electronic.

3. NOAA National Centers for Environmental Information: Official website. – Updated throughout the day. – URL: https://www.ngdc.noaa.gov/hazel/view/hazards/earthquake/event-more-info/5397 (access date: 08/23/2024). – Text: electronic.

4. University of Colorado Boulder. Disaster Center: William A. Mitchell "Response to a Disastrous Earthquake in a Context of Political Instability (Dinar, Turkey, October 1, 1995)": [website] - Updated throughout the day. – URL: https://web.archive.org/web/20080627011402/http://www.colorado.edu/hazards/research/qr/qr83/qr83.html (access date: 08/23/2024). – Text: electronic.

5. Seismological Observatory, University of Brasilia: Vasile I. MARZA "On the death toll of the 1999 izmit (Turkey) major earthquake": [website] – Updated throughout the day. – URL: https://web.archive.org/web/20080409044047/http://www.esc-web.org/papers/potsdam_2004/ss_1_marza.pdf (access date: 08/23/2024). – Text: electronic.

6. Burhan Ozbilici; Susan Fraser (8 March 2010). "Survivors tremble in Turkey after earthquake kills 51 people" https://web.archive.org/web/20100311213254/http://www.chron.com/disp/story.mpl/ap/top/all /6903556.html (date of access: 08/23/2024). – Text: electronic.

7. Sage Jourlnal Erdik Mustafa, M.EERI: "Report on the earthquake in Turkey on October 30, 1983": [website] – Updated throughout the day. – URL: https://journals.sagepub.com/doi/abs/10.1193/1.1585261?journalCode=eqsa (access date: 08/23/2024). – Text: electronic.

8. Journal of Earthquake Engineering. Ratier E.M.; Stewart JP; Baturai M.B.; Bray JD; Bardet J.P. (2006). "Strong ground vibrations and damage patterns resulting from the 1999 Duzce earthquake in Turkey": [website] – Updated within 24 hours. – URL: https://escholarship.org/content/qt84v1r3t8/qt84v1r3t8.pdf (access date: 08/23/2024). – Text: electronic.

9. The guardian: "Greece and Turkey struggle after earthquake that kills two": [website] – Updated throughout the day. – URL: https://www.theguardian.com/world/2017/jul/22/greece-turkey-struggle-aftermath-earthquake-two-dead-kos (accessed 08/23/2024). – Text: electronic.

10.Special report on the earthquake. Earthquake Research Mechanical Engineering Institute. Erdik, M.; Sesetyan, K.; Demircioglu, M.B.; Chelep, W.; Biro, Y.; Ukcan, E. "Preliminary observations of the Sultandagi, Turkey, earthquake of February 3, 2002": [website] – Updated throughout the day. – URL: https://www.eeri.org/lfe/pdf/Turkey_Sultandagi_Insert_May02.pdf (access date: 08/23/2024). – Text: electronic.

11.Haber Turk "1 person killed and 43 injured in Istanbul earthquake": official website. – Updated throughout the day. – URL: https://www.haberturk.com/son-dakika-istanbul-da-depremde-43-kisi-yaralandi-2525701 (access date: 08/23/2024). – Text: electronic.

12.CNN "Earthquake in Turkey is one of the deadliest in this century": official website. – Updated throughout the day. – URL: https://edition.cnn.com/2023/02/07/middleeast/earthquake-turkey-syria-why-deadly-intl/index.html (access date: 08/23/2024). – Text: electronic.

13.Associated Press: "4 people injured in Philippines earthquake": official website. – Updated throughout the day. – URL: https://apnews.com/article/278e9f4888af935ccd3a9cd2b2cc5037 (access date: 08/23/2024). – Text: electronic.

14.Department of Science and Technology PHIVOLCS: "Earthquake of February 08, 1990 in Bohol Province": official website. – Updated throughout the day. – URL: https://www.phivolcs.dost.gov.ph/index.php/17-earthquake/35-1990-february-08-bohol-earthquake (accessed: 08/23/2024). – Text: electronic.

15.Department of Science and Technology PHIVOLCS: "June 14, 1990 Ms7.1 earthquake in Panay": official website. – Updated throughout the day. – URL: https://en.wikipedia.org/wiki/1990_Panay_earthquake (access date: 08/23/2024). – Text: electronic.

16.INQUIRER.NET: "Lessons from the 1990 Luzon earthquake": official website. – Updated throughout the day. – URL: https://newsinfo.inquirer.net/1307403/lessons-from-1990-luzon-quake (access date: 08/23/2024). – Text: electronic.

17.Inquirer News Service. Aquiles Z. Zonio: "12 dead in the Mindanao earthquake": [website] – Updated throughout the day. – URL: https://web.archive.org/web/20020417105350/http://www.inq7.net/nat/2002/mar/07/nat_3-2.htm (access date: 08/23/2024). – Text: electronic.

18.Philippine Daily Inquirer. Santos, Matikas: "Earthquake magnitude 7.6; 1 dead, child injured": official website. – Updated throughout the day. – URL: https://newsinfo.inquirer.net/261678/7-6-quake-jolts-ph-1-dead-child-hurt (access date: 08/23/2024). – Text: electronic.

19.https://newsinfo.inquirer.net/871543/surigao-quake-survivors-refuse-to-go-home "Surigao earthquake survivors refuse to go home": official website. – Updated throughout the day. – URL: https://newsinfo.inquirer.net/871543/surigao-quake-survivors-refuse-to-go-home (access date: 08/23/2024). – Text: electronic.

20.Philippine Daily Inquirer. Nathan Alcantara, Neil Arvin Mercado: "9 dead, 60 injured in Batanes earthquake": official website. – Updated throughout the day. – URL: https://newsinfo.inquirer.net/1146879/4-dead-19-hurt-in-batanes-quake (access date: 08/23/2024). – Text: electronic.

21.Philippine Daily Inquirer. Katrina Hallar: "36 people were injured as a result of the 6.6 magnitude earthquake in Masbate": official website. – Updated throughout the day. – URL: https://newsinfo.inquirer.net/1323475/36-injured-from-6-6-magnitude-masbate-earthquake \ (access date: 08/23/2024). – Text: electronic.

22.Philippine news agency. Alexander Lopez: "Falling coconuts as a result of a strong earthquake killed a man in the city of Tandag": official website. – Updated throughout the day. – URL: https://www.pna.gov.ph/articles/1150324 (access date: 08/23/2024). – Text: electronic.

23.Bodyakin, E. V. Development of automation elements for seismic microzoning using GIS technologies / E. V. Bodyakin. — Text: immediate // Young scientist. - 2015. - No. 11 (91). — P. 15-19. — URL: https://moluch.ru/archive/91/19479/ (access date: 08/23/2024). – Text: electronic.

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METABOLISM AND IMMUNE STATUS OF CROSS-BREED AND PURE-BREED RAMS ON FATTING

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Abstract. *In the article the purpose, which was developed to evaluate the breeds of Soviet Merinos and Edilbaevskaya in comparison with their F1 crosses with rams, the Texel breed for the activation of metabolic processes by studying reference hematological indicators, such as a tool for the diagnosis and prevention of many diseases, body resistance, as well as predicting the productivity of animals, In this case, fattening rams.*

Keywords: *Texel sales, Soviet Merino, Edilbaevskaya, F1 crossbred rams, fattening, productivity, metabolism, immunity.*

Introduction: Modern methods of developing composite breeds are based on a wealth of knowledge and creative skills passed down from breeder to breeder over centuries, as well as on the application of quantitative genetic principles that have demonstrated tremendous success in the development of hybrid breeds.

The most important characteristic of sheep is their ability to produce a wide variety of commodities while adapting to extreme agro-ecological zones that differ in climate, diet, management, disease, culture and religious rituals. This aspect of

sheep has likely been responsible for the development of more breeds and landraces than any other domesticated animal species [1, 2, 3, 4].

However, in the modern world, due to certain circumstances, farm gate prices for lamb and wool have not increased in line with production costs, so producers have been forced to increase the productivity of the animal to remain profitable, at least in developing countries. This has led to the widespread use of Merino breeds for increased wool mass and meat breeds for improved weaning and finishing weights of lambs, a trend that has been ongoing for the past 30 years or more [5, 6, 7].

The advantage of the first generation as a result of crossing two or more breeds, relative to the original breed, is well known, however, the available sources do not contain the results of studies on crossing Texel rams with Soviet Merino and Edilbaevskaya ewes in order to increase the meat productivity of F1 crossbreeds. Hybridization promotes the activation of metabolic processes in the body of crossbreed animals and, ultimately, prolongs the specified productivity.

The aim of our research was to study metabolic processes in the body by studying reference hematological values as a tool for diagnosing and preventing many diseases, body resistance, and predicting the productivity of animals, in this case, fattening rams of the original breeds and their crossbreeds.

Material and methods of research. Experimental studies on the study of productivity and metabolic processes in the body of sheep of the Soviet Merino and Edilbaevskaya breeds and their crossbreeds (F1) with Texel rams were carried out in the collective farm of the peasant farm of B. N. Gekhaev (p. Savdya, Zavetinsky district, Rostov region).

To carry out the experiment, four groups of ewes with 40 heads each were formed: Group I - ewes and rams of the Soviet Merino (SM) breed were used in the crossing, Group II - ewes of the Soviet Merino (SM) breed and rams of the Texel (T) breed were used in the crossing, Group III - ewes and rams of the Edilbaev breed (E) were used in the crossing, Group IV - ewes of the Edilbaev breed (E) and rams of the Texel (T) breed were used in the crossing.

The mating age of the ewes varied from 14 to 18 months. After lambing of the ewes, four groups of rams of 20 heads each were formed from the resulting offspring of the corresponding groups for fattening and further research. Fattening was carried out until the animals were 8 months old.

In the blood obtained from the jugular vein of experimental animals (aged 8 months) in the morning hours of the day, indicators characterizing natural resistance and immune status, as well as protein, carbohydrate and fat metabolism of the body were determined on Micro CC-20 Plus (V) and Biochem Sa (USA) analyzers, using diagnostic kits. The digital values of the obtained data were processed by the method of variation statistics using the ONLYOFFICE computer programs.

Research results and their discussion.

Hematological reference values are a useful tool for the diagnosis and prevention of many diseases, resistance, and predicting animal productivity [8, 9, 10, 11].

The changes in the morphological composition of the blood of purebred and crossbred rams that we recorded during the experiment are shown in Table 1.

Table 1

Morphological parameters of the blood of experimental rams (n=5)

Studied parameters	Group/genotype			
	I SM	II ½T + ½SM	III E	IV ½T + ½E
Erythrocytes, 10^{12}/l	7,93±0,31	9,38±0,29*	8,42±0,28	10,09±0,36**
Leukocytes, 10^{9} /l	10,58±0,33	10,91±0,22	12,22±0,24	12,85±0,29
Hematocrit, %	22,09±0,63	25,18±0,52**	22,84±1,03	28,21±1,15**
Hemoglobin, g/l	97,35±3,27	113,94±3,59**	107,14±3,76	126,53±3,25**
Lymphocytes, %	52,43±1,08	57,69±1,13*	53,13±1,15	59,55±1,21**

The ascertaining conclusion is the activation of oxidation-reduction processes in the blood of crossbred rams of both the Soviet Merino and Edilbaevskaya breeds. The dominance of the content of erythrocytes, hematocrit and hemoglobin was noted in animals of group II (½T + ½SM) compared to rams of group I (SM) by 18.28 ($P < 0.05$), 3.09 ($P < 0.01$) and 17.04% ($P < 0.01$), and in crossbred rams of group IV (½T + ½E) relative to group III (E), similar indicators increased by 19.83 ($P < 0.01$), 5.37 ($P < 0.01$) and 18.10% ($P < 0.01$).

Blood components that provide humoral immunity of animals at a high level prevailed in crossbred rams over purebred ones: by 3.12 and 5.16% in the number of leukocytes, by 5.26 ($P<0.05$) and 6.42% ($P<0.01$) in the level of lymphocytes.

When studying interbreeding of sheep, in order to increase the meat productivity of crossbred animals, a change in the protein composition of their blood serum was recorded (Figure1).

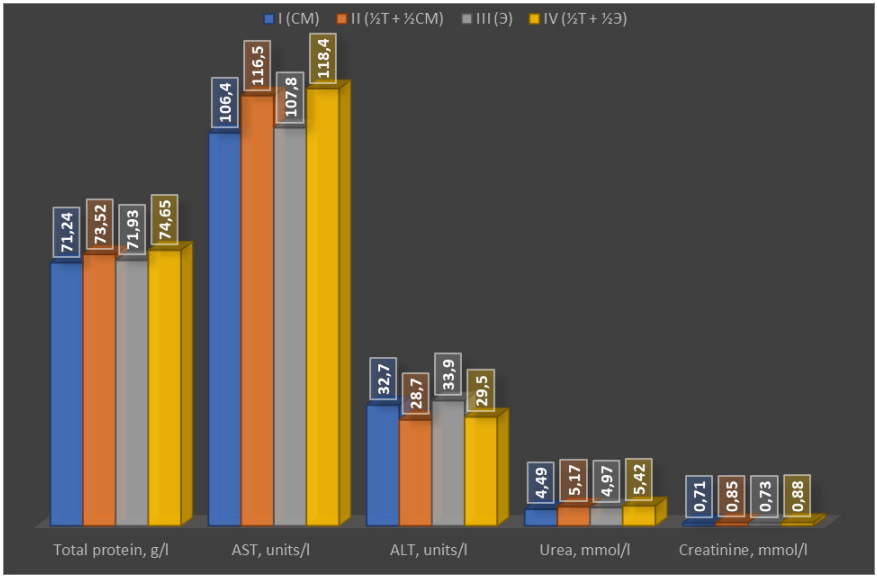

Figure 1. *Abstract values characterizing protein metabolism in the blood serum of experimental rams*

The level of protein metabolism in crossbred rams (F1) exceeded that of purebreds in terms of total protein content by 3.20 ($P<0.05$) and 3.78% ($P<0.01$). High protein metabolism is also confirmed by the indicators of transamination enzymes: AST activity in the blood serum of crossbred animals of group II exceeded that of purebreds of group I by 9.49% ($P<0.05$), similarly in crossbred rams of group IV – by 9.83% ($P<0.01$) higher than in purebreds of group III. A decrease in ALT activity in the blood serum of crossbreds relative to purebreds by 13.94 ($P<0.05$) and 14.92% ($P<0.05$) affects the physiological status of the liver. The reference values of urea and creatinine also differed between crossbred and purebred animals, in favor of crossbred animals, but within the limits of statistical error.

Some changes in the carbohydrate-lipid metabolism indices were observed in the experimental animals (Figure 2).

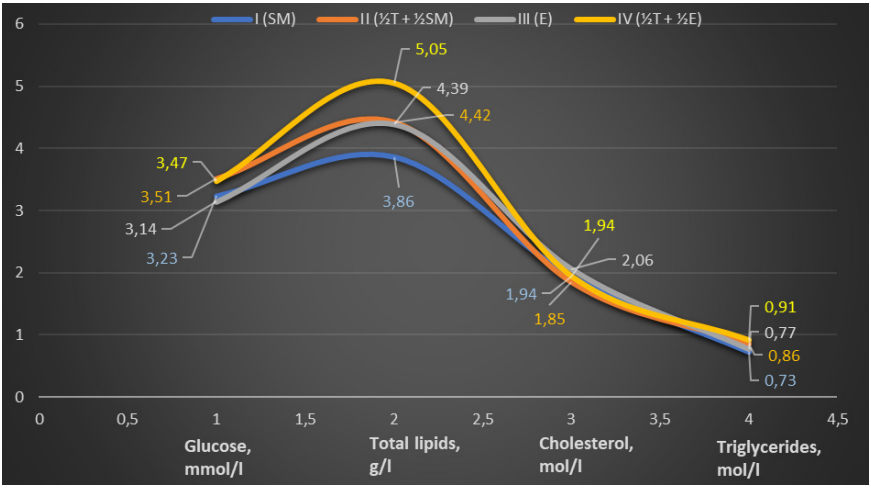

Figure 2. *Reference values characterizing carbohydrate-fat metabolism in the blood serum of experimental rams*

The level of glucose in the blood serum, which participated in metabolic processes, was at the level of reference values in our studies, but in crossbred rams (½T + ½SM) it exceeded purebred (SM) by 8.67% ($P<0.05$), and in the genotype (½T + ½E) the increase was 10.51% ($P<0.01$) against the background of purebred (E). Total lipids were also activated in crossbred animals by 14.51 ($P<0.01$) and 15.03% ($P<0.01$) compared to purebred. The content of triglycerides, the function of which is to provide energy for the processes occurring in the body, also increased in Group II relative to Group I - by 17.81% ($P < 0.01$), in Group IV relative to Group III - by 18.18% ($P < 0.05$).

Based on this, we can conclude that interbreeding had a significant impact on all types of metabolism (protein, lipid, carbohydrate) in the body of crossbred rams.

The parameters characterizing the immunity of animals include, first of all, natural resistance, the indicators of which we studied in a comparative aspect between purebred and crossbred rams (Figure 3).

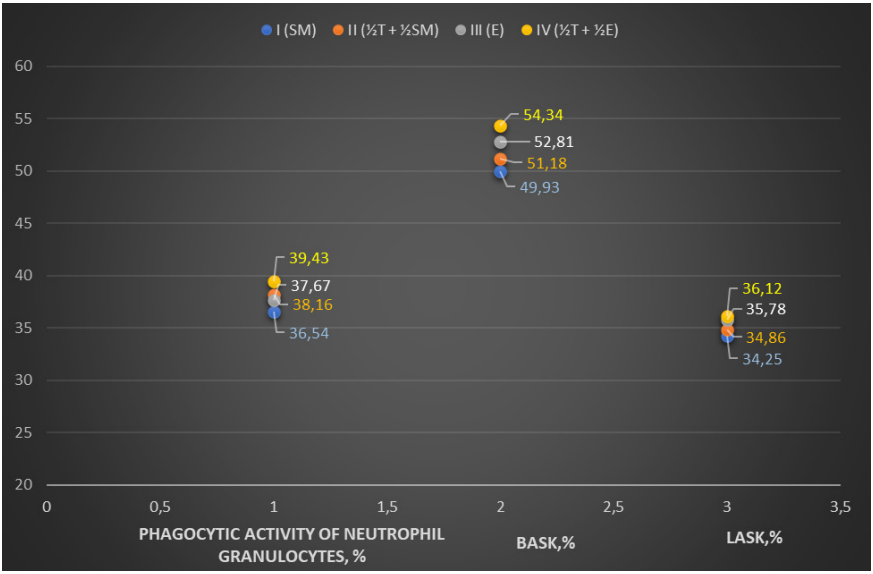

Figure 3. *Natural resistance of rams (8 months old)*

It was found that the highest phagocytic activity was demonstrated by the rams of group IV, obtained from crossing Texel rams and Edilbaevskaya ewes, which exceeded this indicator of Edilbaevskaya rams by 1.76% ($P<0.05$). It should be emphasized that the phagocytic activity of the rams of group II, obtained from crossing Texel rams with Soviet Merino ewes, also exceeded this indicator of their peers of the Soviet Merino breed by 1.59% ($P<0.05$). The difference in bactericidal (BASK) and lysozyme (LASK) activities in all experimental groups was within the limits of statistical error.

A wider range of studies of the immune system by determining the immunocompetent cells of different genotypes in the blood serum of experimental rams made it possible to establish the growth of T- and B-lymphocytes in crossbred animals against the background of purebred animals (Figure 4).

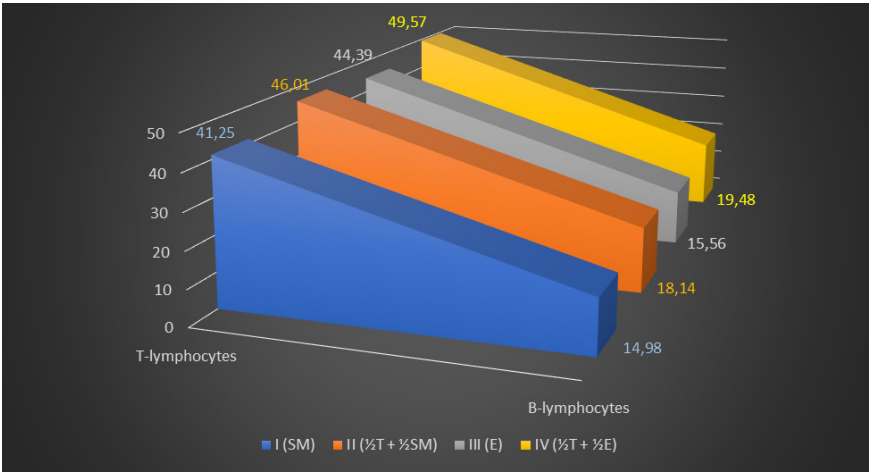

Figure 4. *Content of T- and B-lymphocytes in the blood serum of rams, %*

Cellular immunity increased in crossbred rams (½T + ½SM) due to the growth of T-lymphocytes by 4.76% (P<0.05), B-lymphocytes – by 3.16% (P<0.05) relative to purebred (SM), and in crossbred rams (½T + ½E) the growth was 5.18 (P<0.01) and 3.92% (P<0.01), respectively, compared to purebred (E).

Activation of metabolic processes in the body of crossbred animals when compared to purebred animals also had a positive effect on live weight gain during the fattening period. By the end of fattening, the live weight of the crossbred rams was higher than that of their peers of the original breeds by 3.44 (7.12%; P <0.01) and 4.25 kg (8.66%; P <0.01).

Conclusion. The study of the results of crossing the Soviet Merino and Edilbaevskaya breeds with Texel rams, with the aim of improving the meat productivity of the offspring, showed that the crossbred rams showed a significant activation of all types of metabolism (protein, lipid, carbohydrate), an increase in humoral and cellular immunity, natural resistance in general, and, as a result, meat productivity exceeded the original breeds. At the same time, the best meat productivity was demonstrated by half-blooded rams (½T + ½E).

List of references

1. Arilov, A.N. Growth and exterior indicators of Dorper rams during the adaptation period in the Republic of Kalmykia /A.N. Arilov, V.A. Pogodaev, B.K. Aduchiev, N.V. Sergeeva - Text: direct // Zootechnics. - 2017. - No. 7 (17). - pp. 28-32.

2. Gorlov, I.F. Characteristics of the state of sheep farming in Russia and the Rostov region and prospects for the development of the industry /Gorlov I.F., Slozhenkina M.I., Koshchaev A.G., Aboneev V.V., Kolosov Yu.A. - Text: direct // Polythematic network electronic scientific journal of the Kuban State Agrarian University. 2020. No. 157. pp. 392-410.

3. Gagloev, A.Ch. Genetic and statistical parameters of purebred and crossbred sheep / A.Ch. Gagloev, A.N. Negreeva // Bulletin of Omsk State Agrarian University. - 2017. - No. 2 (26). - P. 19- 27.

4. Burfening P.J. et al. Crossbreeding boosts range lamb production. - Montana Agric. Exper. Sta Res Rep, 2017. No. 134. - P. 33-35.

5. Kolosov, Yu.A. Using the potential of intensive sheep breeds to increase sheep production: monograph / Yu.A. Kolosov, A.S. Degtyar, V.V. Aboneev, V.V. Marchenko, V.N. Vasilenko, V.Ya. Kavardakov, A.F. Kaidakov; general editorship of Yu.A. Kolosova. - Persianovsky: Donskoy GAU, 2020. - 234 p.

6. Slana O., Jakubec V. Anakysis of meat efficiency of lambs from three-breed cjmmercial crossing. Sci. Agr., Bohemoslov, 2018, v. 10, №3, -P. 205 - 214.

7. Abdildenov, K.A. Weight growth, shear and wool properties of ewes of meat merinos of different origins /K.A. Abdildenov // Sheep, goats, wool business. - 2016. - № 4. - P. 43-44.

8. Munoz M, Garcia-Erce JA and Remacha AF (2010). Disorders of iron metabolism. Part II: iron deficiency and iron overload. J. Clin. Pathol., 64: 287-296.

9. Lushnikov V.P., Biochemical blood parameters of sheep of different breeds raised in different natural and climatic zones /V.P. Lushnikov, I.A. Sazonova, S.V. Shpul // Sheep, goats, wool business. - 2013. - No. 4. - P. 17-19.

10.Fedorov, V.Kh. Productivity and resistance of Soviet Merino and Edilbaevskaya sheep when crossed with Texel rams / Fedorov V.Kh., Fedyuk V.V., Zasemchuk I.V., Gekhaev R.N. // Bulletin of the Don State Agrarian University. 2022. No. 2 (44). P. 53-63.

11.Molchanov, A. V. Hematological parameters of purebred and crossbred rams of the Edilbaev breed / A. V. Molchanov, K. A. Egorova, V. V. Svetlov // Agrarian scientific journal. - 2022, No. 4. - P. 61-63.

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