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IN KARAKALPAKSTAN**

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ФАН ВА ТАЪЛИМ**

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ИЛИМ ҲАМ ТӘЛИМ**

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**ECOLOGICAL ROLE AND IMPORTANCE OF WASP (INSECTA: HYMONOPTERA) IN NATURE**

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**Summary;** *The article discusses the ecological role and significance of the wasp (INSECTA: HYMONOPTERA) in nature. Detachment Hymenoptera order is one of the largest orders of insects and is actively involved in the cycle of substances, playing a global planetary role in nature.*

**Keywords:** *circulation of substances, order, suborder, class, family, fauna, yeast. Insects are a class of invertebrates arthropods. Together with millipedes, they belong to the tracheal subtype. About 1 million species of insects are known. Possess the greatest diversity among all other animals on Earth [2].*

Insects actively participating in the cycle of substances, insects play a global planetary role in nature. The order Hymenoptera is one of the largest orders of insects, which includes 155 thousand species from 9100 genera. They are combined into 2 suborders, 28 superfamilies, more than 100 families (89 recent and 37 extinct). The famous Swedish naturalist Karl Linnaeus first combined insects with membranous wings, including bees, wasps and ants called Hymenoptera [3]. The common wasp (Latin *Vespula vulgaris*) is a species of hymenoptera insects. Creates some of the largest pillars of any true wasp.

Currently, there are many different types of wasps, but they all, in one way or another, belong to one of two main categories: solitary and social wasps. Thus, representatives of solitary wasps usually lead a solitary life and often do not build nests. In addition, all adult solitary wasps are capable of reproduction. Unlike single ones, social wasps live in families of up to several thousand individuals: they build fairly strong nests, but only the uterus and males are capable of reproducing, while the rest of the family consists of sterile female worker wasps. However, only about 1000 wasp species are social and form colonies. The largest of them is the Asian giant hornet, which is up to 5 cm long. The rest of the wasp species are solitary. Many species of wasps lay their eggs in other insects or spiders, and the hatched larvae are devoured by their host. Other species feed their larvae with chewed insects and spiders. A growing colony of wasps can destroy 1 kg of insects (this is about 100,000 individuals) on an area of 185 m<sup>2</sup> [1].

The larvae, in turn, secrete a sweet substance that adult wasps eat. When wasps grow into adult insects, they switch to a diet of flower nectar and other sugary liquids. The pest control service they provide to mankind is so valuable that parasite wasps are specially released into gardens and fields. Flexible body structure, powerful jaws, venom-equipped sting.

Wasps play a significant role in nature, destroying garden pests.

The insect drives the pest out of the ground and injects its poison through the sting. The wasp lays its egg in a paralyzed victim. Medvedka acts as an incubator for the development of offspring [1].

We must not forget that the function of the wasp in nature is also in the pollination of plants, flowers, which is important for them, it is important for development and reproduction.

As a result of many years of research, it was revealed that wasp venom is capable of destroying cancer cells without affecting tissue health. The reason for this phenomenal action lies in the special structure of the protein, which, interacting with the fats of cancer cells, converts them into it into a liquid substance [4].

Without knowing it, wasps indirectly protect other insects. Hunting abilities, aggressive disposition, deadly sting force other representatives of the fauna to refrain from contact with the striped predator. The benefits and role of wasps in nature should not be underestimated. Urban individuals regulate the number of flies, carrying millions of dangerous bacteria on their paws. In household plots, they help get rid of garden pests without resorting to the use of chemicals. A wasp attacks a person only when it feels an outgoing threat. By their nature, these creatures are predators. That is why they destroy other insects that are inferior to them in size.

Conceived, they attack a variety of parasites, which bring substantial benefits to people, as well as their homes [1].

Wasps play an unexpected role in the survival of wild yeast.

Researchers at the University of Florence believe wasps are good candidates for this because they eat berries and grapes during the summer months. Yeast survives in the digestive tract of wasps during wintering and is passed on to the next generation when the larvae feed. Wasps can transmit yeast strains almost indefinitely.

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**Rezyume:** *Maqolada ari (INSECTA: HYMONOPTERA) ning tabiatdagi ekologik roli va ahamiyati muhokama qilinadi. Otryad Hymenoptera tartibi hasharotlarning eng katta buyurtmalaridan biri bo'lib, tabiatda global sayyora rolini o'ynaydigan moddalar aylanishida faol ishtirok etadi.*

**Резюме:** *В статье рассматривается экологическая роль и значение пчел (INSECTA: HYMONOPTERA) в природе. Отряд Hymenoptera является одним из крупнейших отрядов насекомых и активно участвует в обмене веществ, играющих в природе роль глобальной планеты.*

**Kalit so'zlar:** *moddalar aylanishi, tartib, turkum, sinf, oila, hayvonot dunyosi, xamirturush. Hasharotlar - bo'g'im oyoqlilar umurtqasizlar sinfi. Millipedlar bilan birgalikda ular traxeyaning pastki turiga kiradi. Hasharotlarning 1 millionga yaqin turi ma'lum. Yerdagi barcha hayvonlar orasida eng katta xilma-xillikka ega [2].*

**Ключевые слова:** *метаболизм, отряд, категория, класс, семейство, фауна, дрожжи. Насекомые — класс членистоногих и беспозвоночных. Вместе с многоножками они относятся к низшему типу трахей. Известно около 1 млн видов насекомых. Он имеет наибольшее разнообразие среди всех животных на земле.*

UDC 502.313

## THE IMPACT OF THE ARAL SEA ECOLOGICAL PROBLEM ON THE ECOSYSTEM

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**Summary:** *This article provides a wide range of information about the Aral Sea tragedy, one of the current global problems, and its impact on the ecosystem. Along with the analysis of this problem, specific aspects of its impact on the life of society and the development of nature are shown. The specific features of ecosystem development are analyzed in depth.*

**Keywords:** *Aral problem, integration, global, human and nature, drought, arid climate, climate change, chronic diseases, Amudarya, Syrdarya, water pollution, dioxin, human lifestyle, targeted projects, international cooperation.*

It is no secret that today, armed with the achievements of modern science and technology, a person's attitude to the world is undergoing dramatic changes. Influence on the natural center, its destruction, use of resources in each case is carried out at a specific national level, but these processes are integrated and ultimately affect the regional, global ecological balance. Environmental problems have long gone beyond the regional framework, which has become a big problem for all mankind. Man and nature interact with each other in accordance with certain rules, the violation of which inevitably leads to environmental problems. The Aral Sea problem is one of them.

The Aral Sea problem is one of the most acute global problems, especially in the context of current environmental problems. This is because the consequences of the excessive anthropogenic impact on nature due to the mismatch between the relationship between man and nature show that it goes beyond the boundaries of the "human-nature" system[1,22]. The problem of the Aral Sea was the result of constant disregard for the laws of nature. Access to settlements, arable lands, industrial enterprises, etc. in all regions of Central Asia. The reason for this catastrophe is the intensive construction of water supply systems for water supply.

The measures taken by the states along the Aral Sea and the international community to restore the ecological and socio-economic situation in the region provide an opportunity to reflect on the improvement of the microclimate in the Aral Sea basin.

Scientists usually point out that the Aral Sea catastrophe is the result of a political system that is appropriate for developing countries. This is true on the one hand, but such problems also occur in developed countries. Take the Solton Sea in the United States as an example. The cause of such environmental problems is not only related to the level of development of the state, but also to other factors. The Aral problem is not a local or regional problem, but a global problem. But it is our country that is suffering the most from the problem. Therefore, the Aral Sea problem is considered a prerequisite for our country.

UN Secretary-General Pan Gi-Moon said: "When I saw the consequences of the environmental crisis in the region, I was convinced that the environmental situation in the Aral Sea region is bad. This is a warning to all mankind. This global problem must be solved together by all countries". Today, UN Secretary General Antonio Guterres called the Aral Sea problem a "Symbol of the loss of humanity."

In fact, the Aral Sea has suffered significantly (more than 69.79 thousand square kilometers). In the mid-1960s, the Aral Sea served as a reservoir to regulate climate change and to mitigate the effects of climate change in the Central Asian region. The air masses entering the region from the west are hot, and in summer the Aral Sea cools down. Due to this temperature

regime, in the autumn-winter period, the air flows over the Tien Shan and Pamir mountains in the form of precipitation, forming the reservoirs of snow and glaciers. The Aral Sea was divided into a backbone and a dome in 1989 as a result of the lowering and drying of the water table.

Today, the volume of waste in the Aral Sea is less than 10% compared to 1960. The volume of water has decreased by 40 times. On September 19, 2017, the President of the Republic of Uzbekistan Shavkat Mirziyoyev addressed the 72nd session of the United Nations General Assembly on this issue: "I have a map of the Aral Sea disaster. I think the explanations are redundant here. Today, the planning of the consequences of the destruction of the sea requires the active integration of international efforts"[2.]. In fact, the Aral Sea problem has become a global problem.

With the drying up of the Aral Sea, it has had a significant impact on global climate change in the region. Especially in the 1980s, these global warming processes doubled. In general, it can be said that as a result of climate change in the region, the following is observed:

- the increase in the intensity of the arid climate has led to an increase in pollution in the plains and foothills.
- extreme conditions, droughts and water shortages, etc.

As a result of climate change, the structure of atmospheric precipitation throughout the Central Asian region is also changing[3.84]. At the same time, precipitation begins to decline during the warm season, which leads to a decrease in the volume of the Pamir and Tien Shan glaciers (this figure is 0.2% to 1% per year).

The results of Uzhydromet's forecasts show that by 2050 the river flow on the banks of the Amudarya will decrease by 10-15%, and the Syrdarya by 2-5%. Drought processes increase by 25-40%, which leads to a sharp increase in demand for water and an increase in water scarcity. If the demand for water is not met, it could lead to crop failure, which will increase population and pose a serious threat to food security and impede sustainable development.

The depletion of water and the removal of large amounts of salt and dust from the dried seabed have led to an increase in a number of diseases among the population of the Aral Sea, such as anemia, liver, kidney, blood, respiratory and gastrointestinal diseases. These diseases are especially dangerous for children. Its negative effects were strong. The Republic of Karakalpakstan has five times more dioxins in the blood of hundreds of women and in breast milk than in Europe. According to global health experts, 25% of diseases are caused by environmental pollution.

In general, to date, the country has adopted a number of government resolutions on the creation of green forests in the dry areas of the Aral Sea[4]. In fact, one of the most important tasks today is to reduce the dangerous impact of the Aral Sea catastrophe on the lives and lifestyles of millions of people in the Aral Sea region, in particular, through the implementation of well-thought-out, targeted projects. At the same time, it should be noted that the solution of the Aral Sea problem is not limited to one state, and therefore the participation of the international community is very important.

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8. [www.biodiv.org](http://www.biodiv.org) Biodiversity
9. [www.carec.kz](http://www.carec.kz) Intermediate Asian ecological regional ecological interval

**Rezyume:** Bu maqolada hozirgi kundagi global muammolarning biri bo'lgan Orol fojiiyasi va uning ekotizimga tasiri haqida ma'lumotlar keng turda keltirilgan. Bu muammoni tahlil qilish bilan birga jamiyat hayoti va tabiyat rivojlanishiga tasirining o'ziga hos jixatlari ko'rsatilgan. Ekotizim rivojlanishining o'ziga hos xususiyatlari chuqur tahlil qilingan.

**Резюме:** Эта статья предоставляет широкий спектр информации о трагедии Аральского моря, одной из текущих глобальных проблем и ее влиянии на экосистему. Наряду с анализом данной проблемы показаны особенности ее влияния на жизнь общества и развитие природы. Подробно проанализированы особенности развития экосистемы.

**Kalit so'zlar:** Orol muammosi, integratsiya, global, inson va tabiyat, qurg'oqchilik, qurug' klimat, klimat o'zgarishi, surunkali kasalliklar, amudaryo, sirdaryo, suvning ifloslanishi, dioksin, insonlarning turmush tarzi, maqsadli loyhalar, xalqaroлик hamkorlik.

**Ключевые слова:** Аральская проблема, интеграция, глобальная, человек и природа, засуха, засушливый климат, изменение климата, хронические заболевания, Амударья, Сырдарья, загрязнение воды, диоксин, образ жизни человека, целевые проекты, международное сотрудничество.



## INTERACTION OF PHENOLOGY AND BIOLOGY OF SOME LANDSCAPE TREES IN NUKUS

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**Summary:** Phenological observations are important not only in determining the duration of different phases, but also in determining the durability, productivity, landscape of plants, as well as their vital processes

**Keywords:** phenology, plants, budding, leaf formation, stem growth and flowering, climates, the annual natural environment is divided into four seasons: spring, summer, autumn and winter.

PHENOLOGY (Greek phainomal - phenomena and logos-science) - a system of knowledge about seasonal phenomena in nature, their onset and the factors that determine these periods. The term "phenology" was coined by the Belgian botanist Sh. Morran proposed in 1853 [7,10]. Phenological observations are important not only in determining the duration of different phases, but also in determining the durability, productivity, landscape of plants, as well as their vital processes [4]. Tours from different geographical locations begin the growing season in a certain sequence, which depends on the arrival of spring. Climatic and climatic conditions affect the seasonal growth rate of arboreal plants. Spring events in plants are closely related to temperature. Summer phenological phases are mainly dependent on environmental conditions, heat and humidity. The onset of autumn events is mainly determined by the light level of the plants, the decrease in the length of the day and the decrease in temperature [1,8,9].

### Research materials and methods

Phenological observations are one of the most convenient and effective methods in the study of both natural and introduced plants [2,3].

We selected eight species of woody plants as the object of study - *Fraxinus excelsior* L., *Fraxinus pennsylvanica* Marshall, *Salix alba* L., *Salix babylonica* L., *Populus alba* L., *Ulmus pumila* L., *Maclura pomifera* (b. Cat). .

The purpose of choosing these tours is to use the city of Nukus for landscaping and environmental research. *Juniperus communis* is currently widely used in the country, mainly in landscaping. *Salix alba* is an ornamental tree that is resistant to drought, heat, cold and salinity. *Maclura pomifera* (Raf.) C.K.Schneid - can grow in saline soils. For this reason, due to its drought tolerance, this species is widely used in forest reclamation and landscaping. As a result of our research, the morphological and phenological structure, ornamentation, leaf formation, stem growth, budding, and duration of vegetation of ornamental trees have been observed in eight species of ornamental trees, as well as other morphological and biological features.

### Results and their discussions

In temperate climates, the annual natural environment is divided into four seasons: spring, summer, autumn and winter.

In the spring, the following phenological phases were observed in deciduous plants: budding, leaf formation, stem growth and flowering. The onset of phenophases in plants in spring is determined by the temperature factor (Table 1).

**Table 1 Annual air temperature change, ° C**

Years	Thoughts												Average annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Nukus hydrometeorological data													
2015	-3	-0,8	4,1	15,1	21,8	32,7	28,8	25,2	19,2	9,7	2,9	1,5	12,8
2016	-2,7	-1,4	3,6	14,3	22,2	31,6	30,1	24	20,5	10,2	3,5	-1,1	12,6
2017	-2,1	-2,6	5,3	14,2	22,5	29,5	29,3	26,4	20,2	10,7	5,9	-5,4	12,6
2018	-4,7	-3,2	6,8	13,5	21,5	31,6	30,7	24,9	18,5	11,7	1,1	-2,6	11,9
2019	0,4	0,1	8,8	14,1	23,1	27,6	30,3	24,7	18,6	11,9	-0,4	0,2	13,3
2020	3,1	-0,5	8,5	14,5	23,8	27,6	29,3	25,2	17,7	10,4	0,6	0,6	14,5
2020	0,1	4,2	9,6	16,3	30	31,1	30,2	26,6	15,1	11,9	1,6	1	15,8

During the experimental years, the average monthly temperature was +12.8 ° C in 2015 and +15.8 ° C in 2020. The highest annual average temperature was observed in 2020. The coldest temperature was recorded in 2018. This, in turn, is due to a sharp drop in temperature in January and February. Winter in and around Nukus usually begins on the third decade of November. The coldest month is January, with some literature reporting a temperature of 15-20 degrees Celsius. During our research, -4.7 ° C was observed in 2018. The highest temperature in Nukus is observed in July. During these years, the high temperature was observed around + 27.6-32.7 ° C. The sharp drop in temperature will begin in the second decade of October.

The tournament will take place in 5-6 years. Its virginil period lasts 4-7 years, respectively. It was noted that all the objects of the next study were deciduous trees (Table 2).

**Table 2 Phenology of ornamental trees in Nukus (2015-2020)**

№	Plant name	Jacket fold	The opening of the bud	Leaf writing	Stem growth		Bunch	Flowering			Fruit ripening			Treasury		Vegetation duration, (days)
					Start	Finally		Start	Finally	Finally	Start	Finally	Finally	Start	Finally	
1	<i>Fraxinus excelsior</i> L.	4.03	11.03	25.03	15.03	1.06	4.04	13.04	26.04	11.05	13.09	21.09	5.10	23.09	24.10	210-230
2	<i>Fraxinus pennsylvanica</i> Marshall	12.03	27.03	4.04	28.03	07.06	10.04	19.04	03.05	19.05	20.09	02.10	17.10	28.09	29.10	225-240
3	<i>Salix alba</i> L.	26.02	11.03	18.03	14.03	5.06	22.03	02.04	17.04	04.05	15.08	21.08	03.09	30.08	28.09	190-210
4	<i>Salix babylonica</i> L.	06.03	12.03	24.03	29.03	10.05	30.03	09.04	24.04	08.05	19.08	26.08	07.09	14.09	05.10	218-237
5	<i>Populus alba</i>	20.03	3.04	4.04	20.03	5.06	2.03	5.04	13.04	2.05	22.07	03.08	19.08	29.08	27.09	190-205
6	<i>Ulmus pumila</i>	14.03	23.03	17.04	21.03	20.04	7.04	14.04	20.04	1.05	24.06	28.06	4.07	07.09	25.09	180-195
7	<i>Maclura pomifera</i> (Raf.) C.K.Schneid	19.03.	27.03	06.04	25.03	24.05	20.04	29.04	14.05	27.05	25.09	04.10	22.10	27.10	12.11	220-238
8	<i>Catalpa bignonioides</i> Walt.	13.03	19.03	02.04	16.03	30.05	15.06	24.06	02.07.	15.07	25.08	14.09	27.09	13.10	04.11	230-245

The results of seasonal growth and development of members of the genus *Fraxinus* indicate that on the date of *Fraxinus excelsior* L. 04.03, the species *Fraxinus pennsylvanica* began to appear a little later (12.03). The growth of the stems of the two rounds was observed from March to the first decade of July. The flowering stage of the species is observed in April-March. It takes some time for the fruits to ripen. In these rounds, the ripening of fruits began in the second decade of September (13.09-20.09). At the end of September, there is a shedding of leaves. The duration of vegetation in the first round is 210-230 days (24.10), in the case of *Fraxinus pennsylvanica* it is 225-240 days (02.11).

*Salix* (Tol) - members of the genus begin their vegetation at different times. During the study, *Salix alba* began its growing season in Nukus on February 26 and *Salix babylonica* on March 6. The budding of the species usually occurs from 22.03 to 30.03. The ripening of fruits in the rounds is observed from 15.08 to 19.08. The duration of the growing season is 190-237 days.

Most species of the genus *Populus* grow upright. In the city of Nukus, *Populus alba* begins its growing season during the warmer days of spring. The bulging of the jackets is observed in the second decade of March. Rising temperatures have a positive effect on the growth and development of plants. In Nukus, flowering occurs in the first decade of April (April 9). Fruit ripening was observed in July (22.07). The fruits of the plant germinate in August and begin to shed their seeds almost one after another. The total duration of the growing season is 190-205 days.

The jackets of the *Ulmus* family stand upright on a branch. In Nukus, *Ulmus pumila* began its growing season in the second decade of March (March 14). Growth of the plant takes place in March-April. The plant blooms before the leaves fall and is pollinated by wind. Flowers develop from the side buds of last year's branches. The flowering of the plant lasts from the 2nd of April to the beginning of May. Fruiting of the tournament will begin in the 3rd decade of June. The duration of the growing season is 180-195 days.

*Maclura pomifera* (Raf.) C.K.Schneid - Nukus is one of the most suitable plants for the conditions. Studies have shown that the plant begins its vegetation in the second decade of March. During this period, the average temperature in Nukus was + 3.6-9.6 ° C. Stem growth lasts until March and April (25.03-24.05).

The flowering period begins in April, the main part of which takes place in May (29.04-27.05). The fruits ripen from the 3rd decade of September to the 22nd of October. The total duration of the growing season is 220-238 days (05.11-12.11). At that time, the temperature in Nukus was around -0.4 to + 5.9 degrees Celsius. That is, the temperature, which is characteristic of the winter months, prevailed.

*Catalpa bignoniodes* is a partially low-stemmed and branched tree. It was noted that in the conditions of Nukus, the plant begins its vegetation in the second decade of March. The growth of the stem was observed from March to the end of May. Flowering begins in the third decade of June (24.06) and lasts for about 3 weeks (15.07). The duration of the general vegetation of the plant is 230-245 days. The fruits ripen in late September.

At a temperature of + 4-9 ° C, ornamental plants began to grow. In Nukus, the vegetation period of the tours is 180-195 days for *Ulmus pumila* and 190-245 days for other tours. The duration of the growing season has been observed to vary depending on important external factors.

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[http://rp.ru/Архив\\_погоды\\_в\\_Арзамасе](http://rp.ru/Архив_погоды_в_Арзамасе)

**Rezyume:** *Mazkur maqolada o'simliklarning fenologik kuzatuvlar nafaqat turli bosqichlarning davomiyligini aniqlash, balki o'simliklarning mustahkamligi, hosildorligi, landshaftini va ularning hayotiy jarayonlarini aniqlash uchun ham muhimdir.*

**Резюме:** *В данной статье фенологические наблюдения важны не только для определения продолжительности разных фаз, но и для определения стойкости, урожайности, ландшафта растений, а также процессов их жизнедеятельности.*

**Kalit so'zlar:** *shahrini ko'kalamzorlashtirish, fenologik va biologik belgilari, mevalarning yetilishi.*

**Ключевые слова:** *озеленение города, фенологические и биологические признаки, созревание плодов.*

**ON NON-STANDARD METHODS FOR SOLVING THE CAUCHY PROBLEM  
FOR THE WAVE EQUATION AND THE HEAT EQUATION**

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**Summary:** The Cauchy problem is considered for the wave equation and for the heat equation. Obtained in a non-standard way for solving these problems.

**Keywords:** The Cauchy problem, the wave equation, the heat equation, the Laplace operator, an eigenfunction of operator, D'Alembert formula, inhomogeneous equation, the Poisson formula.

**Lemma – 1.** If in the Cauchy problem for the heat equation the initial function is given in the form of separable variables, i.e.

$$\begin{cases} u_t = a^2 \Delta u, & (x, y) \in \mathbb{R}^2, \quad t > 0, \\ u|_{t=0} = \varphi_1(x) \cdot \varphi_2(y), \end{cases}$$

then the solution to this problem can be defined as

$$u(x, y, t) = u_1(x, t) \cdot u_2(y, t),$$

where  $u_1 = u_1(x, t)$  and  $u_2 = u_2(y, t)$  are solutions to the following problems

$$\begin{cases} u_t = a^2 u_{xx}, & u_t = a^2 u_{yy}, \\ u|_{t=0} = \varphi_1(x), & u|_{t=0} = \varphi_2(y). \end{cases}$$

**Proof.** Considering that the function  $u_1(x, t)$  depends only on the variable  $x$ , and  $u_2(y, t)$  depends only from a variable  $y$ , then we can write the equalities

$$(u_1)'_t = a^2 (u_1)''_{xx}, \quad (u_2)'_t = a^2 (u_2)''_{yy}.$$

Hence, it follows that the function  $u(x, y, t) = u_1(x, t) \cdot u_2(y, t)$  satisfies the initial condition. Really,

$$u|_{t=0} = u_1|_{t=0} \cdot u_2|_{t=0} = \varphi_1(x) \cdot \varphi_2(y).$$

Function  $u(x, y, t) = u_1(x, t) \cdot u_2(y, t)$  also satisfies the heat equation, i.e.

$$\begin{aligned} u_t &= (u_1 \cdot u_2)'_t = (u_1)'_t \cdot u_2 + u_1 (u_2)'_t = \\ &= a^2 (u_1)''_{xx} \cdot u_2 + u_1 \cdot a^2 (u_2)''_{yy} = a^2 \cdot [(u_1 \cdot u_2)''_{xx} + (u_1 \cdot u_2)''_{yy}] = \\ &= a^2 \Delta(u_1 \cdot u_2) = a^2 \Delta u. \end{aligned}$$

**Example - 1.** Find a solution to the Cauchy problem for the wave equation.

$$\begin{cases} u_{tt} = \Delta u + e^t(x^2 - z^2 + x - 2y + 3z), & (x, y, z) \in \mathbb{R}^3, \quad t > 0, \\ u|_{t=0} = \sqrt[3]{x - 2y + 3z}, & u_t|_{t=0} = x^2 y z. \end{cases}$$

**Solution.** Solution  $u = u(x, y, z, t)$  we are looking for this problem in the form of the sum of three functions  $u = u_1 + u_2 + u_3$ . Here  $\Delta \equiv \Delta_{xx} + \Delta_{yy} + \Delta_{zz}$  and

$$\begin{cases} (u_1)_{tt} = \Delta u_1 + e^t(x^2 - z^2 + x - 2y + 3z), \\ u_1|_{t=0} = 0, & (u_1)_t|_{t=0} = 0, \end{cases} \quad (1)$$

$$\begin{cases} (u_2)_{tt} = \Delta u_2, \\ u_2|_{t=0} = \sqrt[3]{x-2y+3z}, \quad (u_2)_t|_{t=0} = 0, \end{cases} \quad (2)$$

$$\begin{cases} (u_3)_{tt} = \Delta u_3, \\ u_3|_{t=0} = 0, \quad (u_3)_t|_{t=0} = x^2 y z. \end{cases} \quad (3)$$

First, we find a solution to problem (1), for this we find out that the function

$$g(x, y, z) = x^2 - z^2 + x - 2y + 3z$$

is an eigenfunction of the Laplace operator. Really,

$$\Delta g(x, y, z) = \Delta(x^2 - z^2 + x - 2y + 3z) = 2 - 2 = 0 \equiv 0 \cdot g(x, y, z).$$

Hence, the solution to the inhomogeneous equation will be sought in the form  $u_1(x, y, z, t) = f(t) g(x, y, z)$ , i.e.

$$\begin{aligned} & \begin{cases} f''(t) g(x, y, z) = f(t) \cdot 0 \cdot g(x, y, z) + e^t \cdot g(x, y, z), \\ f(0) \cdot g(x, y, z) = 0, \quad f'(0) \cdot g(x, y, z) = 0 \end{cases} \Rightarrow \\ & \Rightarrow \begin{cases} f''(t) = e^t, \\ f(0) = 0, \quad f'(0) = 0 \end{cases} \Rightarrow f(t) = e^t - t - 1. \end{aligned}$$

Then

$$u_1(x, y, z, t) = (e^t - t - 1)(x^2 - z^2 + x - 2y + 3z).$$

Now we will find a solution to problem (2). Note that in this problem the variables  $x$ ,  $y$  and  $z$  the initial functions are linearly related, therefore, introducing a new variable  $\xi = x - 2y + 3z$  we transform this problem to a similar problem of dimension  $n = 1$ . Further, using the d'Alembert formula, we can easily write out a particular solution, i.e.

$$\begin{aligned} u_2(x, y, z, t) = v(\xi, t) & \Rightarrow (u_2)_{tt} = v_{tt}, \\ (u_2)_x = v_\xi \cdot \xi_x = 1 \cdot v_\xi, \quad (u_2)_{xx} = 1 \cdot v_{\xi\xi} \cdot \xi_x = 1^2 \cdot v_{\xi\xi}, \\ (u_2)_y = v_\xi \cdot \xi_y = (-2) \cdot v_\xi, \quad (u_2)_{yy} = (-2) \cdot v_{\xi\xi} \cdot \xi_y = (-2)^2 v_{\xi\xi}, \\ (u_2)_z = v_\xi \cdot \xi_z = 3 \cdot v_\xi, \quad (u_2)_{zz} = 3 \cdot v_{\xi\xi} \cdot \xi_z = 3^2 v_{\xi\xi}, \\ \Delta u_2 &= (1^2 + (-2)^2 + 3^2) v_{\xi\xi} = 14 v_{\xi\xi}, \\ (u_2)|_{t=0} = v|_{t=0} &= \sqrt[3]{\xi}, \quad (u_2)_t|_{t=0} = v_t|_{t=0} = 0. \end{aligned}$$

As a result, the solution to the following problem

$$\begin{cases} v_{tt} = 14 v_{\xi\xi}, \quad \xi \in \mathbb{R}^1, \quad t > 0, \\ v|_{t=0} = \sqrt[3]{\xi}, \quad v_t|_{t=0} = 0 \end{cases}$$

written by the d'Alembert formula

$$v(\xi, t) = \frac{1}{2} \left( \sqrt[3]{\xi - t\sqrt{14}} + \sqrt[3]{\xi + t\sqrt{14}} \right).$$

Then

$$u_2(x, y, z, t) = \frac{1}{2} \left( \sqrt[3]{x - 2y + 3z - t\sqrt{14}} + \sqrt[3]{x - 2y + 3z + t\sqrt{14}} \right).$$

We will seek a solution to problem (3) in the form of a series, i.e.

$$u_3(x, y, z, t) = \sum_{n=0}^{\infty} \frac{(a^2)^n t^{2n}}{(2n)!} \Delta^n \varphi(x, y, z) + \sum_{n=0}^{\infty} \frac{(a^2)^n t^{2n+1}}{(2n+1)!} \Delta^n \psi(x, y, z).$$

Since, in our case,

$$\begin{aligned} \varphi(x, y, z) &= 0, \quad \psi(x, y, z) = x^2 y z \quad \text{and} \\ \Delta^0 \psi(x, y, z) &= \psi(x, y, z) = x^2 y z, \quad \Delta \psi(x, y, z) = 2 y z, \\ \Delta^2 \psi(x, y, z) &= \Delta(\Delta \psi(x, y, z)) = 0 \end{aligned}$$

That's why

$$u_3(x, y, z, t) = t x^2 y z + \frac{1}{3} t^3 y z.$$

Finally substituting the found values of the function  $u_1(x, y, z, t)$ ,  $u_2(x, y, z, t)$ ,  $u_3(x, y, z, t)$  into the sum, we obtain the solution of the Cauchy problem for the wave equation ( $n = 3$ ).

**Example – 2.** Find a solution to the Cauchy problem for the equation

$$\begin{cases} u_t = \frac{1}{2} \Delta u + e^{-7t} \cos(x + 2y + 3z), & (x, y, z) \in \mathbb{R}^3, \quad t > 0, \\ u|_{t=0} = y \sin x \cos y e^{-x^2} \end{cases}$$

thermal conductivity.

**Solution.** And in this example the solution is  $u(x, y, z, t)$  for this problem we will seek in the form of the sum  $u = u_1 + u_2$  two functions. Then

$$\begin{cases} (u_1)_t = \frac{1}{2} \Delta u_1 + e^{-7t} \cos(x + 2y + 3z), \\ u_1|_{t=0} = 0, \end{cases} \quad (4)$$

$$\begin{cases} (u_2)_t = \frac{1}{2} \Delta u_2, \\ u_2|_{t=0} = y \sin x \cos y e^{-x^2}. \end{cases} \quad (5)$$

Note that in problem (4) the equality

$$\Delta \cos(x + 2y + 3z) \equiv (-14) \cdot \cos(x + 2y + 3z),$$

those. the function is a proper function of the Laplace operator. Therefore, we seek a particular solution of the inhomogeneous equation in the form

$$u_1 = f(t) \cos(x + 2y + 3z).$$

Further, regarding the functions  $f(t)$  we get the following Cauchy problem:

$$\begin{cases} f'(t) + 7f(t) = e^{-7t}, \\ f(0) = 0 \end{cases} \Rightarrow f(t) = t e^{-7t}.$$

Eventually

$$u_1(x, y, z, t) = t e^{-7t} \cos(x + 2y + 3z).$$

We divide the search for a solution to problem (5) by the statement of Lemma–1 into three

components: 
$$\begin{cases} v_t = \frac{1}{2} v_{xx}, \\ v|_{t=0} = \sin x, \end{cases} \quad \begin{cases} w_t = \frac{1}{2} w_{yy}, \\ w|_{t=0} = y \cos y, \end{cases} \quad \begin{cases} g_t = \frac{1}{2} g_{zz}, \\ g|_{t=0} = e^{-x^2}. \end{cases}$$



Here functions  $v(x, t)$  and  $w(y, t)$  defined as the following series:

$$v(x, t) = \sum_{n=0}^{\infty} \frac{(1/2)^n t^n}{n!} \Delta^n \sin x, \quad w(y, t) = \sum_{n=0}^{\infty} \frac{(1/2)^n t^n}{n!} \Delta^n (y \cos y).$$

Given fairness

$$\begin{aligned} \Delta^0 \sin x &= \sin x, \quad \Delta \sin x = -\sin x, \quad \dots, \quad \Delta^n \sin x = (-1)^n \sin x, \\ \Delta^0 (y \cos y) &= y \cos y, \quad \Delta (y \cos y) = (\cos y - y \sin y)'_y = -\sin y - \sin y - y \cos y = \\ &= -2 \sin y - y \cos y, \quad \Delta^2 (y \cos y) = \Delta(-2 \sin y - y \cos y) = -2 \Delta(\sin y) - \Delta(y \cos y) = \\ &= 2 \sin y - (-2 \sin y - y \cos y) = 4 \sin y + y \cos y, \quad \dots, \\ \Delta^n (y \cos y) &= (-1)^n 2n \sin y + (-1)^n y \cos y \end{aligned}$$

recurrent formulas, we get

$$\begin{aligned} v(x, t) &= \sin x \sum_{n=0}^{\infty} \frac{(-t/2)^n}{n!} = e^{-t/2} \sin x, \\ w(y, t) &= \sum_{n=0}^{\infty} \frac{(1/2)^n t^n}{n!} [(-1)^n 2n \sin y + (-1)^n y \cos y] = \\ &= 2 \sin y \sum_{n=1}^{\infty} \frac{(-t/2)^n}{(n-1)!} + y \cos y \sum_{n=0}^{\infty} \frac{(-t/2)^n}{n!} = -t e^{-t/2} \sin y + e^{-t/2} y \cos y, \\ w(y, t) &= e^{-t/2} (y \cos y - t \sin y). \end{aligned}$$

In the last problem, the function  $g(z, t)$  is found from the standard Poisson formula.

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**Rezyume:** To'lqin tarqalishi va issiqlik o'tkazuvchanlik tenglamalari uchun Koshi masalasi qaralgan. Ushbu masalalarning yechimlari nostandart usullarda topilgan.

**Резюме:** Рассматривается задача Коши для волнового уравнения и для уравнения теплопроводности. Получены нестандартным способом решения указанных задач.

**Kalit so'zlar:** Koshi masalasi, to'lqin tarqalish tenglamasi, issiqlik o'tkazuvchanlik tenglamasi, Laplas operatori, operatorning xos funksiyasi, Dаламбер formulasi, birjinsli bo'lmagan tenglama, Puasson formulasi

**Ключевые слова:** задача Коши, волновое уравнение, уравнение теплопроводности, оператор Лапласа, собственная функция оператора, формула Даламбера, неоднородное уравнение, формула Пуассона.

## MACROZOOBENTHOS OF LAKES OF UZBEKISTAN

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**Summary:** Species composition of macrozoobenthos of 6 lakes from different regions (north, center, south) of the republic have been studied. Total 111 species of bottom animals have been recorded. List of dominant species is presented. Using coefficient of Sørensen-Czekanowski similarity of species composition of macrozoobenthos of the lakes studied have been determined.

**Keywords:** macrozoobenthos, lakes, species composition, fauna similarity, Uzbekistan.

### Introduction

The biological productivity of water bodies is determined by the vital activity of hydrobionts, one of the most important link of which in aquatic ecosystem of water bodies is the aquatic bottom fauna (zoobenthos). Benthic animals enter into various, primarily trophic, connections with organisms of practically all ecotopes of water bodies. The most important role of macrozoobenthos organisms play as elements of the fish food. Such important commercial fish species as the carp, crucian carp, bream, roach, black amur, and also such Red Data Book species as barbell, shovel-noses, white-eye bream feed largely on aquatic benthic fauna [5]. In the waterbodies of Uzbekistan and throughout Central Asia, the bottom fauna makes up the bulk of the forage base of most commercial fish species.

In Uzbekistan the macrozoobenthos of lakes was studied by A.M. Mukhamediev [6], S. Embergenov [2, etc.], B. Bekmurzaev [1, etc.] and other. However, most of these works date back to the 1960-1970s. Also, there are practically no generalizing and comparative works.

### Material and methods

The material is collected seasonally (spring, summer, autumn) during 2000-2018 using Petersen's dredging and is processed according to conventional methods [9-12]. Identification of hydrobionts led by modern guides [7, 8, 13, etc.]. To assess the similarities and differences in the species composition of the macrozoobenthos of lakes, the Sørensen-Czekanowski formula was used:

$$K = \frac{2C}{A+B} \times 100\%$$

where A and B are number of species in two compared lakes, C is the number of species common to this pair, K is the coefficient of similarity of the species composition.

Seven lakes from different (south, north, west, east, center) regions of the republic were studied: Sarykamysh (Karakalpakstan), Western Karateren (Wetland Sudochie, Karakalpakstan), Ullishorkul (Khorezm viloyat = province), Karakir (Bukhara viloyat), Tuzkan (Jizzakh viloyat), Sarykamysh (Fergana viloyat) (fig. 1).



Fig. 1. Location of the lakes studied. 1: Sarykamysh, 2: Western Karateren, 3: Ullishorkul, 4: Karakir, 5: Tuzkan, 6: Sarykamysh, 7: Sichankul

### Results and discussion

As can be seen from the table 1, the studied lakes of different areas, depths, water salinity, with different soils. The only freshwater lake is Sarykamysch in the Fergana Valley. The rest of the lakes are ckish. Table 1.

**Main abiotic parameters of the studied lakes**

Lakes	Area, 10 <sup>3</sup> ha	Maximal depths, m	Dominant depths, m	Salinity, g/l	Soils
Sarykamysch (Karakalpakstan)	387.5	40.0	5.0-7.0	11.0- 13.0	silt and sand
West Karateren	0.4	1.7	0.8-1.2	4.0-6.0	gray silt
Tuzkan	700.0	20.0	12.0	10.0	gray silt
Sarykamysch (Fergana viloyat)	26.2	7.0	3.0	0.8	gray and black silts
Ullishorkul	1.8	4.5	1.5	5.8	gray silt
Karakir	26.2	5.0	1.5-2.0	10.7	sand
Sichankul	7.5	20.0	9.0	7.0	sand

A total of 187 species of bottom animals were observed, the most diverse was the benthos of freshwater lake Sarykamysch (Fergana viloyat), the least - in brackish lakes (tables 2, 3). As in most of lakes in Central Asia, chironomids were most diverse (86 species = almost half of all species of macrozoobenthos) (table 3). Other groups are represented by a much smaller number of species: Odonata – 15 species, Coleoptera – 7, Diptera (excluding chironomids) – 10, Mollusca – 12, Annelida – 10, Ephemeroptera – 11. The rest of the groups of organisms are represented by single species.

Table 2.

**Dominant species of macrozoobenthos of studied lakes (SKK – Sarykamysch, Karakalpakstan), KT – West Karateren, TZ – Tuzkan, SKF – Sarykamish (Fergana Valley), US – Ullishorkul, KK – Karakir, SI – Sichankul)**

Taxa / Lakes	SKK	KT	TZ	SKF	US	KK	SI
<b>ANNELIDA</b>							
Paranais simplex Hrabce	+	+	+	-	-	+	+
P. littoralis O.F. Müller	+	-	+	-	-	+	+
Tubifex sp.	-	+	-	+	+	-	-
Nereis diversicolor O.F. Müller	+	+	-	-	-	-	-
<b>MOLLUSCA</b>							
Colletopterum cyreum (Kobelt)	-	-	-	+	-	-	-
Corbicula fluminalis O.F.Müller	-	-	-	+	-	-	-
Physella acuta Draparnaud	-	+	+	+	-	-	+
Cerastoderma isthmicum Issel	+	-	-	-	-	-	-
Lymnaea truncatula O.F. Müller	-	+	+	+	-	-	-
Caspihydrobia conica Logvin. et Starobog.	-	+	-	-	-	-	-
<b>CRUSTACEA</b>							
Macrobrachium nipponense De Haan	+	+	+	+	+	+	+
Turkogammarus aralensis (Uljanin)	+	+	-	-	-	-	-

Mesomysis kowalevskii Czerniavsky	-	-	+	+	+	-	+
Paramysis lacustris (Czerniavsky)	+	+	-	+	+	-	+
INSECTA							
Anax imperator Leach	-	-	-	-	-	+	+
Cloen dipterum L.	-	-	+	+	+	+	-
Caenis macrura Stephens	-	+	+	+	+	-	-
Ecnomus tenellus Rambur	-	-	+	+	-	-	-
Chironomus salinarius Kieffer	+	+	+	-	+	+	+
Ch. Halophilus Kieffer	+	+	-	-	-	+	+
Ch. thummi Kieffer	+	+	+	+	+	+	-
Cricotopus tenellus Fabricius	-	-	-	+	-	-	-
C. silvestris (Fabricius)	-	+	+	+	+	+	+
Procladius ferrugineus Kieffer	+	+	+	+	+	+	-
Polypedilum aberrans Tschern.	+	+	-	+	+	-	+
Endochironomus tendens (Fabricius)	+	-	-	+	+	-	-
Glyptotendipes barbipes (Staeger)	-	-	-	+	-	-	-
G. glaucus (Meigen)	-	-	-	+	-	-	-
Total number of species	33	30	25	75	28	28	31
Lakes	SKK	KT	TZ	SKF	US	KK	SI

The remains of the Aral Sea aquatic fauna have been preserved in the lakes of Sarykamysh (Karakalpa kstan) and Western Karateren: polychaete *Nereis diversicolor*, mollusks *Cerastoderma isthmicum*, *Caspihydrobia* cf. *conica*, *Theodoxus pallasi*, amphipod *Turkogammarus aralensis* (included in the Red Data Book of the Republic of Uzbekistan [3]).

Table 3.

**Taxonomic diversity (number of species) of macrozoobenthos of the lakes studied (legend as in table 2)**

Taxa / Lakes	SKK	KT	TZ	SKF	US	KK	SI	Number of species / %
Annelida	5	4	3	6	4	4	5	10 / 5.3
Mollusca	3	1	1	7	1	1	1	12 / 6.4
Crustacea	2	1	1	1	1	1	3	5 / 2.7
Chironomidae	20	19	17	49	18	18	19	86 / 46.0
Other Diptera	5	5	4	5	9	5	5	15 / 8.0
Odonata	4	3	2	8	3	3	4	15 / 8.0
Coleoptera	1	2	2	3	1	1	2	7 / 3.7
Ephemeroptera	2	2	2	7	3	2	3	11 / 5.9
Trichoptera	1	2	1	4	2	1	2	6 / 3.2
Hemiptera	3	2	3	5	2	2	2	9 / 4.8
Plecoptera	2	2	2	4	3	3	2	7 / 3.7
Hydracarina	1	1	1	2	2	1	1	4 / 2.1
Total species	49	44	39	101	49	42	49	187

Comparison of the species composition of zoobenthos in the studied lakes revealed that the



species composition of brackish water lakes is the most similar. The species composition of the macrozoobenthos of the freshwater lake Sarykamysh of the Fergana Valley is sharply different from the species composition of the brackish lakes studied (table 4) and more similar to the bottom fauna of reservoirs [4]. Table 4.

**The similarity of the species composition of macrozoobenthos of the lakes studied according to the Sørensen-Czekanowski coefficient (legend as in table 2)**

Lakes	SKK	KT	TZ	KK	US	SKF	SI
Sarykamysh (Karakalpakstan)		80	75	69	77	20	77
Western Karateren	80		68	70	78	21	66
Tuzkan	75	68		75	71	18	70
Karakir	81	70	75		68	19	67
Ullishorkul	77	78	71	68		22	56
Sarykamysh (Fergana)	20	21	18	19	22		23
Sichankul	77	66	70	67	56	23	

As practical recommendations, it is possible to propose the introduction of some invertebrates of the Aral Sea fauna such as *Nereis diversicolor*, *Turkogammarus aralensis*, *Theodoxus pallasi*, and *Cerastoderma isthmicum* into the brackish-water lakes Ullishorkul, Karakir, Tuzkan, Sichankul, and other brackish waterbodies of the republic.

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**Rezyume:** Respublikamizning turli mintaqalaridan (shimoliy, markaz, janubiy) 6 ta ko'lining makrozoobentoslarining sifat tarkibi o'rganildi. Jami 111 turdagi tubsiz hayvonlar qayd etilgan. Dominant turlarning ro'yxati berilgan. Sorensen-kanovskiy koeffitsientidan foydalanib, o'rganilayotgan ko'llarning makrozoobentoslarining sifat tarkibining o'xshashligi aniqlandi.

**Резюме:** Изучен качественный состав макрозообентоса 6 озер из разных регионов (север, центр, юг) республики. Всего отмечен 111 вид донных животных. Приведен список доминирующих видов. При помощи коэффициента Сёрнсена-Чекановского определено сходство качественного состава макрозообентоса исследованных озер.

**Kalit soʻzlar:** makrozoobentos, ko'llar, tur tarkibi, faunasining o'xshashligi, O'zbekiston.

**Ключевые слова:** макрозообентос, озера, видовой состав, сходство фаун, Узбекистан.

## EXTREME POINTS OF THE ATOMIC STRONGLY FACIALLY SYMMETRIC SPACES

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**Summary:** *In this paper we show that any extreme point of an atomic strongly facially symmetric space is exposed if and only if any non-decomposable geometric tripotent is a minimal geometric tripotent.*

**Keywords:** *strongly facially symmetric space, symmetric face, geometric tripotent.*

**1. Introduction.** In the early 1980s, the development of the theory of JB\*-triples began in the works of Kaup; in many respects, these triples are parallel to the function-analytical aspects of the theory of operator algebras [1], [2]. The JB\*-triples that are characterized by holomorphic properties of their unit balls form a wide class of Banach spaces based on ternary algebraic structures, which contains C\*-algebras, Hilbert spaces, and spaces of rectangular matrices. Many axioms used by Alfsen and Schultz show that there are disordered analogs of JB\*-triples [3]. In 1989, the paper [4] of Friedman and Russo was published, in which facially symmetric spaces were introduced; the main purpose for introducing these spaces was a geometric characterization of the predual spaces of JB\*-triples admitting an algebraic structure. Many properties required in these characterizations are natural assumptions for state spaces of physical systems. These spaces are viewed as a geometric model for states in quantum mechanics.

It was proved in [5] that the predual space of a complex von Neumann algebra and of more general JB\*-triples is a neutral strongly facially symmetric space. In [6], a geometric characterization was given for complex Hilbert spaces and complex spin factors, and also a description of JBW\*-triples of ranks 1 and 2 and of Cartan factors of types 1 and 4 was presented. Later, Friedman and Russo [7] obtained a description of atomic facially symmetric spaces and showed that a neutral strongly facially symmetric space is isometrically isomorphic to the predual space of one of the Cartan factors of types 1-6. Neil and Russo [8] found geometric conditions under which a facially symmetric space is isometric to the predual space of a complex JBW\* triple. In [9], a complete description of strongly facially symmetric spaces that are isometrically isomorphic to the predual space of an atomic commutative von Neumann algebra was obtained. In [10], it was proved that the predual space of the real part of a von Neumann algebra is a strongly facially symmetric space if and only if this algebra is the direct sum of an Abelian algebra and an algebra of type  $I_2$ . In [11], it was proved that the predual space of a JBW-algebra is a strongly facially symmetric space if and only if the algebra is the direct sum of an Abelian algebra and an algebra of type  $I_2$ .

In present paper we show that any extreme point of an atomic strongly facially symmetric space is exposed if and only if any non-decomposable geometric tripotent is a minimal.

**2. Preliminaries.** Let  $Z$  be a real or complex normed space. We say that elements  $x, y \in Z$  are *orthogonal* and write  $f \diamond g$  if  $\|f + g\| = \|f - g\| = \|f\| + \|g\|$ . A face  $F$  of the unit ball  $Z_1 = \{f \in Z : \|f\| \leq 1\}$  is said to be *norm exposed* if  $F = F_u = \{f \in Z_1 : u(f) = 1\}$  for some  $u \in Z^*$  with  $\|u\| = 1$ . An element  $u \in Z^*$  is called a *projective unit* if  $\|u\| = 1$  and  $u(g) = 0$  for all  $g \in F_u^\diamond$  (see [12]).

**Definition 1** [12]. A norm exposed face  $F_u$  in  $Z$  is called a *symmetric face* if there exists a linear isometry  $S_u$  from  $Z$  to  $Z$  such that  $S_u^2 = I$  whose fixed point set coincides with the topological direct sum of the closure  $\overline{sp F_u}$  of the linear hull of the face  $F_u$  and its orthogonal complement  $F_u^\diamond$ , i.e., with  $(\overline{sp F_u}) \oplus F_u^\diamond$ .

**Definition 2** [12]. A space  $Z$  is said to be *weakly facially symmetric* (WFS) if each norm exposed face in  $Z_1$  is symmetric.

For each symmetric face  $F_u$ , contractive projections  $P_k(u)$ ,  $k = 0, 1, 2$ , on  $Z$  are defined as follows. First,  $P_1(u) = (I - S_u)/2$  is the projection onto the eigenspace corresponding to the eigenvalue  $-1$  of the symmetry  $S_u$ . Next,  $P_2(u)$  and  $P_0(u)$  are defined as projections of  $Z$  onto  $\overline{sp} F_u$  and  $F_u^\diamond$ , respectively. The projections  $P_k(u)$  are called the *geometric Peirce projections*. A projective unit  $u$  from  $Z^*$  is called a *geometric tripotent* if  $F_u$  is a symmetric face and  $S_u^* u = u$  for the symmetry  $S_u$  corresponding to  $F_u$ . By  $GU$  and  $SF$  we denote the sets of all geometric tripotents and symmetric faces, respectively; the correspondence  $GU \ni u \mapsto F_u \in SF$  is one-to-one (see [4, Proposition 1.6]).

A contractive projection  $Q$  on  $Z$  is said to be *neutral* if  $\|Qf\| = \|f\|$  implies  $Qf = f$  for each  $f \in Z$ . A space  $Z$  is said to be *neutral* if, for each symmetric face  $F_u$ , the projection  $P_2(u)$  corresponding to the symmetry  $S_u$  is neutral.

**Definition 3** [12]. A WFS space  $Z$  is said to be *strongly facially symmetric* (SFS) if, for each norm exposed face  $F_u$  of  $Z$  and each  $y \in Z^*$  satisfying the conditions  $\|y\| = 1$  and  $F_u \subset F_y$ , we have  $S_u^* y = y$ , where  $S_u$  is the symmetry corresponding to  $F_u$ .

In the neutral SFS space  $Z$  for  $f \neq 0$  by  $v_f$  denote a single geometric tripotent  $v$  for which  $\langle f, v \rangle = \|f\|$  and  $\langle v, \{f\}^\diamond \rangle = 0$ . If  $f, g \in Z$ , then  $f \diamond g$  if and only if  $v_f \diamond v_g$ .

A normed space is called *atomic*, if each symmetric face  $F_u$  of  $Z_1$  contains an extreme point.

Recall that a weakly facially symmetric space has the property (PE) if each extreme point of the unit ball is a norm exposed point [6].

A norm exposed face of a unit ball has the Jordan decomposition property if for every nonzero  $f \in sp_\square F_u$ , where  $sp_\square F_u$  is a real linear shell of  $F_u$ , there exist such  $g, h \in R^+ F_u$  that  $f = g - h$  and  $g \diamond h$ .

A strongly facially symmetric space has the property (JD) if every symmetric face has the Jordan decomposition property [9].

A geometric tripotent  $u$  is called *minimal* if  $\dim U_2(u) = 1$ . By  $M$  denote the set of all minimal geometric tripotents. In a weakly facially symmetric space for  $u \in M$  every face  $F_u$  is a singleton, that is, to each  $u \in M$  there corresponds a unique norm-exposed point of  $Z_1$  (see [6, Proposition 2.4]).

A geometric tripotent  $u$  is called *indecomposable* if for  $v \in GU$  from  $v \leq u$ , it follows  $v = u$ . By  $I$  we denote the set of all indecomposable geometric tripotents. Since every minimal geometric tripotent is indecomposable, it follows that  $M \subset I$ . Naturally, the question arises whether the reverse inclusion is true. But, in all the examples of SFS-spaces converse, the property  $M = I$  holds. In [6, proposition 2.9], a positive answer to this question is given in the special case when a neutral atomic strongly facially symmetric space has the property (PE). Further, in the case of neutral strongly facially symmetric spaces with the property (JD) is obtained in [9, proposition 2.2]. In [13] it was shown that a reflexive strongly facially symmetric space of rank 1 has the

property (PE) and  $M=I$ , and in [14] it was proved that every finite-dimensional real neutral strongly face symmetric space has the properties (PE),  $M=I$ , (JD).

The following Theorem is the main result of the paper.

**Theorem 1.** Let  $Z$  be an atomic neutral strongly facially symmetric space. Then the properties (PE) and  $M=I$  are equivalent.

In order to prove Theorem, the following Lemma is necessary.

**Lemma 2.** Let  $Z$  be a neutral strongly facially symmetric space and  $f \in Z_1$  be an extreme point. Then  $u_f$  is an indecomposable geometric tripotent.

**Proof.** Let  $f \in Z_1$  be an extreme point. According to [4, Theorem 4.3], it follows that there is the smallest norm exposed face  $F_u$  containing  $f$ , where  $u = u_f$ . We show that  $u$  is an indecomposable geometric tripotent.

Assume the opposite. Let  $u \in GU \setminus I$ , then there exists a geometric tripotent  $v$  such that  $v \leq u$  and  $v \neq u$ . Take  $f \in \overline{spF_v} \oplus F_v^\diamond$ . Then

$$f = \|P_2(v)f\| \frac{P_2(v)f}{\|P_2(v)f\|} + \|P_0(v)f\| \frac{P_0(v)f}{\|P_0(v)f\|}, \quad (1)$$

$$\|P_2(v)f\| + \|P_0(v)f\| = \|P_2(v)f + P_0(v)f\| = \|f\| = 1$$

Since  $f$  is an extreme point, by (1), it follows that  $f = P_2(v)f = P_0(v)f$ . This contradicts the fact that  $P_2(v)P_0(v) = 0$ . Therefore, either  $f = P_2(v)f$  or  $f = P_0(v)f$ .

Assume  $f = P_2(v)f$ . Then

$$1 = \langle f, u \rangle = \langle P_2(v)f, u \rangle = \langle f, P_2(v)^* u \rangle = \langle f, v \rangle.$$

Therefore,  $f \in F_v$ . This contradicts the fact that  $F_u$  is the smallest symmetric face containing  $f$ . So,  $f \neq P_2(v)f$ .

Let  $f = P_0(v)f$ . Then by [4, Theorem 4.2] we have

$$1 = \langle f, u \rangle = \langle P_0(v)f, u \rangle = \langle f, P_0(v)^*(v + u - v) \rangle = \langle f, u - v \rangle.$$

Thus,  $f \in F_{u-v}$ . This contradicts the fact that  $F_u$  is the smallest symmetric face containing  $f$ . So,  $f \neq P_0(v)f$ . Hence,  $f \notin \overline{spF_v} \oplus F_v^\diamond$ . Then  $f \in F_u \setminus \overline{spF_v} \oplus F_v^\diamond$ .

We define a functional  $x$  on the subspace  $\overline{sp\{f\}} \oplus \overline{spF_v} \oplus F_v^\diamond$  as follows:

$$x(\lambda f + g) = \lambda, \quad \lambda \in \mathbb{C}, \quad g \in \overline{spF_v} \oplus F_v^\diamond.$$

By the Hahn – Banach Theorem, we continue preserving the norm of the functional  $x$  on  $Z$ , which we also denote by  $x$ . Then

$$PxP=1, x(f)=1, x|_{\overline{spF_v \oplus F_v^\diamond}}=0. \quad (2)$$

Take tripotents  $w \in Z^*$  such that  $F_x = F_w$ . Then by virtue of (2) we have that

$$w(f)=1, w|_{\overline{spF_v \oplus F_v^\diamond}}=0. \quad (3)$$

Next, assume that  $F_u \cap F_w = F_u$ , then  $F_v \subset F_w$ , which contradicts (3). Assume that  $F_u \cap F_w \neq F_u$ . Then there exists a geometric tripotent  $e$  such that  $F_e = F_u \cap F_w$ . Since  $F_u \cap F_w \neq F_u$ , then  $e < u$ . Since  $f \in F_e$ , this contradicts the fact that  $F_u$  is the smallest norm exposed face containing  $f$ . So,  $u \in I$ . The Lemma is proved.

**Proof of Theorem 1.** If  $Z$  has the property (PE), then property  $M=I$  was obtained in [6, proposition 2.9].

Let  $M=I$  and  $f$  be an extreme point of the unit ball  $Z_1$ . According to Lemma 2, it follows that  $u_f \in I$ . Since by the assumption  $M=I$ , it follows that  $u_f \in M$ . Hence, by virtue of [6, proposition 2.4] for every  $u_f \in M$ , the face  $F$  consists of a single point, i.e.  $F_{u_f} = \{f\}$ . This means that  $f$  is a norm exposed point. The Theorem is proved.

From Theorem 1 and [9, proposition 2.2] we obtain the following result.

**Corollary 3.** If  $Z$  is an atomic neutral strongly facially symmetric space with the property (JD), then  $Z$  has the property  $M=I$  and (PE).

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***Rezyume:*** Mazkur maqolada atomik qirralari kuchli simmetrik fazolarda ixtiyoriy ekstremal nuqta bo'rittirilgan bo'lishi uchun ixtiyoriy yoyilmaydigan geometrik tripotenning minimalligi zarur va yetarli ekanligi isbotlangan.

***Резюме:*** В данной статье показано, что любая экстремальная точка атомического сильно гранево симметричного пространства является выставленной тогда и только тогда когда произвольный неразложимый геометрический трипотент является минимальным.

***Kalit so'zlar:*** Qirralari kuchli simmetrik fazo, simmetrik qirra, geometrik tripotent.

***Ключевые слова:*** Сильно гранево симметричное пространство, симметричная грань, геометрический трипотент.

**DIVERSITY AND PRACTICAL SIGNIFICANCE OF BLISTER BEETLES  
(COLEOPTERA: MELOIDAE) IN THE NATURAL AREAS OF NORTHWESTERN  
UZBEKISTAN**

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**Summary:** *This article describes the species composition and practical significance of the blister beetles in the natural areas of northeastern Uzbekistan. As a result of the research, it was found that the number of species of blister beetles in the studied areas is 7. Larvae of species of the family Meloidae feed on harmful locust eggs, reducing their number to 31.5%. In addition to being a pest of pasture and cultivated crops, beetle venom has a negative impact on humans and livestock. It has been studied that blister beetles can cause severe poisoning and even death of livestock when eaten with hay.*

**Keywords:** *Meloidae, fauna, species, cantharidin, entomophagous, Lower Amudarya biosphere reserve, locust, dominant species.*

**INTRODUCTION**

The global climate change and processes happening in natural landscapes in the world have a negative impact on insect biodiversity, which is increasing year by year. The biological diversity of insects is of paramount importance in ecological, genetic, social, economic, scientific, cultural, educational and aesthetic terms. More than 1.5 million species of insects are known on our planet and they are widespread in tropical climates. More than 16,000 species of insects are known in Uzbekistan (Azimov et al. 1993). The blister beetles we studied have the following classification [9].

Insecta: A class of insects

Coleoptera: An order of hard-winged insects

Polyphaga: suborder

Tenebrionoidea: main family

Meloidae Gyllenhaal, 1810: Blister beetles family

Meloidae includes a family of blister beetles consisting of four subfamilies, about 2,500 species belonging to 120 genera [1,2,3,4]. The lifestyle of some adults of the blister beetles is active at night, but most of them are active during the day. Because adults are colorful, they are usually conspicuous. Imagoes are phytophagous and feed on plants. Most adult representatives consume only parts of the flower, but some, especially *Mylabris*, also eat the leaves [5,6,7]. Some feed on cultivated crops. Species of the family Meloidae, often cause great damage to alfalfa, beets, potatoes, tomatoes and other crops. Because beetles move in groups, their attacks can have local devastating consequences.

It is also known from the common name of blister beetles that their hemolymph causes the formation of blisters when they come in contact with human skin. If the blisters are not large, they do not require any treatment other than first aid. Cantharidine taken orally or subcutaneously is highly toxic to mammals. The source of cantharidin is the most widely used species of the *Mylabris* and *Epicauta* genera. In adult beetles (by dry mass) the recorded content of cantharidine ranges from 1% to 5.4%.

Poisoning is associated with several species of blister beetles. If horse owners use alfalfa as a source of hay, blister beetles are considered a potential threat. Blister beetles rarely cause large amounts of poisoning from pastures where the spread of locust populations is observed.

**MATERIALS AND METHODS**

Experiments were conducted between 2020 and 2021 to determine if the Asian locust imagoes was infested with entomophages.

The Republic of Karakalpakstan has more than 3 million hectares of land where locusts can spread, and its geographical structure includes seasonal and stable lakes, tugai, shrubs and deserts.

There are about 100 species of locusts in the country, three of which are considered dangerous. Among them are swarms of Asian locusts, Italian prussians and large saxophone locusts.

Asian locusts are mainly stable and there are natural places of Asian locusts in the reed fields near the lakes in the Aral Sea region of the Republic: Sudoche, Khoja qaltiq, Maxpal, Talliq, Muynoq zaliv, Buzatov, Saribas, Tigrovoy khvost, Qaramush-1, va Qaramush-2, Biyabay, Maypost, Aqdarya, Jaltirbas, Seksen, Bayeke aydin, va 6-Qarauy, and in the reed fields around these lakes the larvae of Asian locusts are spreading every year.

The research was conducted based on the methods of Bondarenko (2010), Golub (2012) [2, 3, 4,5,10,12].

The collected materials were stored in plastic containers with 96% alcohol. MBS-109 binoculars, Motik V 1-220A -1, SZM-161-TL, P122 DISSECTING MICROSCOPE microscopes and Power Shot A 2500 Canon cameras were also used.

### OBTAINED RESULTS

Seven species of blister beetles belonging to the genera Mylabris FABRICIUS, 1775, Hycleus Latreille 1816, Epicauta Dejean, 1834 were identified in the areas we studied. Of these, Hycleus polymorphus was found only in the Kyzylkum region, and Hycleus atratus in the Ustyurt Plateau (Table 1).

**Table 1. Distribution of blister beetles in the natural areas of northwestern Uzbekistan**

№	Species	Natural areas			
		1	2	3	4
1.	(Pallas, 1781)	++	+	++	+
2.	Mylabris frolovi Germar, 1824	+	-	-	+
3.	Mylabris quadripunctata (Linnaeus, 1767)	-	+	-	+
4.	Mylabris crocata (Pallas, 1781)	+	-	+	+
5.	Hycleus atratus Pallas	-	++	-	-
6.	Hycleus polymorphus (Pallas, 1771)	+	-	-	-
7.	Epicauta erythrocephala (Pallas, 1776)	++	++	+	++
Total		5	4	3	5

**Note:** 1- Kyzylkum and Aralkum, 2- Lower Amudarya biosphere reserve, 3- Areas around the reeds and lakes, 4- Ustyurt plain.

“+” — rare, “++” — permanent species, “+++” — common species, “-” — not widespread.

Mylabris variabilis, Hycleus atratus, Epicauta erythrocephala species have been noted as common species. Hycleus polymorphus was first recorded for the fauna of Uzbekistan.

In addition, the larvae of some species of the Meloidae family, including the eggs of several harmful locust species, feed on them to a certain extent, reducing them naturally [8].

Research was conducted to collect Asian locust egg pods and determine if they were infested by entomophagous. During the study of the location where locusts lay their eggs, it was found that under natural conditions, some of the nests were destroyed by rodents or birds. They were found to find nests, dig them out of the ground, and finish eating the eggs. Of the 270 nests found, 4.8 percent were destroyed by wildlife (Table 2). A total of 8,973 live eggs of Asian locusts were found in a total of 270 nests collected and studied in the Aral Sea region. The density of the nests is 4.9 pcs/m<sup>2</sup>.

Despite chemical treatment against locusts, winter stocks of pests have been preserved. It is in these areas that large numbers of Asian locust nests have been found. The average density of nests in the surveyed areas was 4.9 per 1 sq/m<sup>2</sup>.

The number of collected nests was determined, and parasite-infected nests were isolated. They were observed under binoculars and the amount of infected eggs was determined. The number of live eggs is 11797. The average number of eggs in one nest is 43.7. The number of nests infected

with parasites was 79, which was 29.2% (Table 2).

**Table 2. Results of analysis of infestation of Asian locust's nests with entomophagous lesions**

№	Collected area, region	Number of nests, pieces					Live eggs, pieces
		Total	Infested by animals		Infested by pests		
			Pieces	%	Pieces	%	
1	Sudoche, Koja qoltiq	5	2		3		277
2	Qaramush-1, Qaramush -2	26	8		9		5506
3	Muynoq zaliv	12	-		4		524
4	Jaltirbas	7	3		13		2490
Total		70	13		79		11797

It was also noted that 4.8 percent of the eggs were destroyed by animals. Thus, the total damage to the nests was 33.8%.

Infestation of Italian Prussian beetles by larvae of blister beetles was also carried out in Bashirchiel, Kegeyli districts. The study area is 72,000 hectares. The choice of this particular area is due to the fact that the density of oasis locust imago in this area was higher than other areas, egg nests laid by locusts that did not die after chemical treatment and developed to the state of imago were studied. The first experimental area was chosen around Lake Dautkol. (Coordinates - 42°53'43.1"N, 59°21'09.6"E). The density of locust nests was observed at 15 per 10 sq.m. Infection of the natural population of oasis locust eggs with bristle beetles accounted for 32.8%.

According to the data obtained, a single species of the parasite-entomophagous was found in the collected nests and it was determined that it was a species of *Mylabris FABRICIUS*, 1775 and *Epicauta Dejean*, 1834 genus (Coleoptera: Meloidae).

Thus, the infestation of Asian locusts with bristle beetles was found to be 29.2%, and the infestation of eggs of the natural population of oasis locusts was up to 32.8%.

In short, the larvae of all bristle beetles are specialized predators. Larvae of species of the family Meloidae feed on harmful locust eggs, reducing them to 31.5%. In addition to being a pest of pasture and cultivated crops, beetle venom has a negative impact on humans and livestock. When fed with hay, bristle beetles can cause severe poisoning and even death of livestock.

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**Rezyume:** Ushbu maqolada O'zbekiston shimoli-sharqidagi tabiiy hududlarda qovuqli qo'ng'izlarning tur tarkibi va amaliy ahamiyati yoritilgan. Olib borilgan izlanishlar natijasida o'rganilayotgan hududlarda qabariq qo'ng'izlarning soni 7 tani tashkil etishi aniqlandi. Meloidae oilasiga mansub lichinkalar chigirtkaning zararli tuxumlari bilan oziqlanib, ularning sonini 31,5% ga kamaytirgan. Qo'ng'iz zahari yaylov va ekin ekinlarining zararkunandasi bo'lishidan tashqari, odamlar va chorva mollariga salbiy ta'sir ko'rsatadi. Qovuqli qo'ng'izlar pichan bilan iste'mol qilinganda og'ir zaharlanishga va hatto chorva mollarining nobud bo'lishiga olib kelishi o'rganilgan.

**Резюме:** В статье рассмотрен видовой состав и практическое значение жуков-нарывников в природных зонах северо-востока Узбекистана. В результате исследований установлено, что количество видов жуков-нарывников на исследованных участках составляет 7. Личинки видов семейства Meloidae питаются яйцами вредоносной саранчи, снижая их численность до 31,5%. Яд жука не только является вредителем пастбищ и сельскохозяйственных культур, но и оказывает негативное влияние на человека и домашний скот. Было изучено, что жуки-нарывники могут вызывать тяжелые отравления и даже гибель домашнего скота при употреблении в пищу с сеном.

**Kalit so'zlar:** Meloidalar, fauna, turlar, kantaridlar, entomofaglar, Quyi Amudaryo biosfera rezervati, chigirtkalar, dominant turlar.

**Ключевые слова:** Meloidae, фауна, виды, кантаридины, энтомофаги, Нижнеамударьинский биосферный заповедник, саранчовые, виды-доминанты.

**ISSUES OF CARDIOVASCULAR SYSTEM ADAPTATION TO PHYSICAL ACTIVITY  
OF STUDENTS LIVING IN THE REPUBLIC OF KARAKALPAKSTAN**

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**Summary:** *The article deals with the issues of research of functioning of the cardiovascular system among students which are engaged in sports in the conditions of Republic Karakalpakstan. It was found that the blood pressure of the students surveyed by us, engaged in various kinds of sports, irrespective of age and degree of training, was higher than the norm, probably due to the environmental and climatic conditions of the area of residence in the Republic of Karakalpakstan.*

**Keywords:** *South Aral Sea region, cardiovascular system, environmental conditions, dynamics, health.*

Nowadays, physical education and sport occupy one of the most important places in the life activities of young people, as the improvement of a person's high level of health depends on their active physical activity. An important role in sports physiology research is given to the adaptation of the cardiovascular system to various physical activities. The cardiovascular system is one of the most intensively working in the process of physical and emotional stress in people engaged in various sports.

Adaptation of the cardiovascular system to physical exertion is one of the central issues of the whole adaptation problem, as its ability to increase its function often becomes a component limiting the intensity and duration of adaptive reactions of the whole body. The efficiency of sports activities not only in cyclic but also in competitive sports is largely defined by the state of the autonomic nervous system, and mostly by the circulatory system [2, 6].

Information on the dynamics of physiological indicators during various physical activities is also of priority importance to evaluate the health of the young generation, their functional abilities, timely diagnosis of pre-pathological and pathological changes, both arising from sports activities and those not detected during the initial examination. The circulatory apparatus holds a special place in the whole system of oxygen transport from the environment to the operating muscles and organs due to the fact that it is the main limiting link of this system.

In the process of systematic sports training, functional adaptive changes in the cardiovascular system are developed, which are supported by morphological reconstruction of the circulatory apparatus and some internal organs. The complex structure-functional restructuring of the cardiovascular system provides its high performance, which allows the sportsman to perform intensive and long-lasting physical loads [1, 2, 6]. It should be highlighted that the structure of sinus rhythm contains information reflecting the state of adaptation and compensatory mechanisms of the whole organism. Our researches revealed that the maximum value is seen in athletes from northern regions at the age of 21 years ( $69,64 \pm 0,38$  beats/min), and the minimum value at the age of 19 years ( $66,15 \pm 0,78$  beats/min). At the age of 18 and 21 years ( $64,8 \pm 0,65$  and  $64,5 \pm 0,43$  beats/min), and the minimum at the age of 19 years ( $62,0 \pm 0,44$  beats/min) is also observed for athletes from the southern regions of Karakalpakstan. We also note that the identified minimum value corresponding to age 17 years (70.0 beats/min) and the maximum value in the older age group (20-22 years) (72-73 beats/min). It seems to us that, in this case, low HR values in athletes compared to those in students prevents myocardial wear and tear and has an important recreational value.

Blood pressure (BP) in student-athletes is an important integral index of the functional state of the cardiovascular system and is a relatively constant value. The study of blood pressure readings is important both for diagnosing the state of fitness and for diagnosing pre-pathological and pathological states of the athlete's body [1]. The magnitude of BP is determined by a large number of factors, among which the most important is the ratio of the minute volume of blood flow to the blood flow resistance at the level of the arterioles (peripheral resistance). It is known that the

normal range of variation for maximal pressure in athletes is 100-129 mmHg, for minimal pressure 60-79 mmHg. [3, 4, 8].

Age differences in the adaptation of the cardiovascular system to physical exertion in athletes may be apparent both in the frequency of response types and in the quantitative values within one response type (e.g. normotonic, i.e. lying within the physiological norm). In adult athletes, the heart adapts to exercise by increasing stroke volume at a lower heart rate. Considering the diastolic blood pressure (DB) parameters at rest and stress, it can be noted that there is a significant difference between the territories of the examined athletes. So, the athletes living in the northern regions all indicators are slightly lower than their counterparts from the southern regions in all age groups ( $p < 0.05$ ). The minimum values of DB (at rest) for all surveyed athletes refer to age 17-18 years, and the highest values - age 22 years, i.e. with increasing age the average index of DB (at rest) also increases.

Considering the average values of DB indicators under physical load conditions, it can be noted that here also the minimum values correspond to age 17-18 years, the maximum values correspond to age 22 years, both for athletes from northern and southern regions, and for students not engaged in sports. Thus, for young men from the northern regions, the minimum value of DB indicator under loading conditions at the age of 17 years is  $66.81 \pm 0.34$  mmHg, and the maximum value is  $68.79 \pm 0.28$  mmHg for the age of 22 years. For athletes from southern regions, the maximum level of DB under loading conditions is  $70.3 \pm 0.32$  mmHg at age 22 years, and the minimum level corresponds to  $68.01 \pm 0.51$  mmHg for age 17 years.

The analysis of changes in blood pressure in responding to physical activity in students aged 17-19 years showed an increase in BP of 21.3% compared to those in athletes. As for the second age group (20-22 years old), the increase in BP was 20.7%. The change in BP was less marked in both age groups of students.

Thus, according to the research data, the blood pressure of the students surveyed, engaged in various sports, regardless of age and degree of training, was higher than normal. Detected BP above 100 mmHg in students not engaged in sports in older age groups (20-22 years) can be considered as a risk factor for hypertension, caused, probably, by environmental-climatic conditions of the area of habitation in the Republic of Karakalpakstan.

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**Rezyume:** *Maqolada Qoraqalpog'iston Respublikasi sharoitida sport bilan shug'ullanuvchi talabalar o'rtasida yurak-qon tomir tizimining faoliyatini tadqiq qilish masalalari ko'rib chiqiladi. Biz ko'rikdan o'tkazgan, turli sport turlari bilan shug'ullanuvchi o'quvchilarning yoshi va tayyorgarlik darajasidan qat'i nazar, Qoraqalpog'iston Respublikasida yashash hududining ekologik-iqlim sharoiti bilan bog'liq bo'lgan qon bosimi me'yordan yuqori ekanligi aniqlandi.*

**Резюме:** *В статье рассматриваются вопросы исследований функционирования сердечно-сосудистой системы у студентов, занимающихся спортом в условиях Республики Каракалпакстан. Установлено, что у обследуемых нами студентов, занимающихся*



*различными видами спорта независимо от возраста и степени тренированности артериальное давление, было выше нормы, вероятно, это связано с эколого-климатическими условиями района проживания в Республике Каракалпакстан.*

***Kalit so'zlar:*** *Janubiy Orol bo'yi, yurak-qon tomir tizimi, ekologik sharoitlar, dinamika, salomatlik.*

***Ключевые слова:*** *Южное Приаралье, сердечно-сосудистая система, экологические условия, динамика, здоровье.*

UDC 517.95

# AN ALGORITHM FOR INVERSE BEAM VIBRATION PROBLEMS

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**Summary:** In this paper, we consider the solution of a fourth-order partial differential equation. The problem is inverse to these problems. Using the Sturm-Liouville problem for an unknown function, a solution is sought in the form of a Fourier series. The unknown coefficients of the Fourier series are found from the boundary conditions. The solution of inverse problems is found using the known functions by the comparison method in the form of a Fourier series.

**Keywords:** Separation of variables, fourth-order equations, inverse problem.

1<sup>0</sup>. The problem of vibration of a thin beam with a length  $l$ . The boom is rigidly sealed at both ends. Without getting into the mechanics of thin beams, we will assume that taking into account the bending resistance is reduced (to the place of the wave equation) to fourth-order equations in the region  $D = \{0 \leq x \leq l, t > 0\}$  [2]

$$\frac{\partial^2 u}{\partial t^2} = a^4 \frac{\partial^4 u}{\partial x^4} \quad (1)$$

With unknown initial conditions

$$u(x, 0) = f_1(x) \quad (0 < x < l) \quad (2)$$

$$u_t(x, 0) = f_2(x) \quad (0 < x < l) \quad (3)$$

and with known boundary conditions

$$u(0, t) = u_{xx}(0, t) = 0 \quad (t > 0) \quad (4)$$

$$u(l, t) = u_{xx}(l, t) = 0 \quad (t > 0) \quad (5)$$

In the area of  $D$ .

General solution of problem (1) - (5) using Fourier methods:

$$u(x, t) = X(x) \cdot T(t) \quad (6)$$

After separating the variables, we obtain the following Sturm-Liouville problems with respect to variables

$$X^{IV} - \lambda^4 \cdot X = 0 \quad (7)$$

$$X(0) = X(l) = 0 \quad (8)$$

$$X''(0) = X''(l) = 0 \quad (9)$$

The general solution of equation (7) has the form

$$X_\lambda(x) = a \cos \lambda x + b \sin \lambda x + c \cosh \lambda x + d \sinh \lambda x \quad (10)$$

Substitution into the boundary conditions (8) - (9), we obtain the unknown coefficients  $a, b, c, d$  as follows

$$\begin{cases} a + c = 0 \\ -a + c = 0 \end{cases} \Leftrightarrow \begin{cases} c = 0 \\ a = 0 \end{cases} \quad (11)$$

and

$$\begin{cases} b \sin \lambda l + d \sin \lambda l = 0 \\ -b \sin \lambda l + d \sin \lambda l = 0 \end{cases} \quad (12)$$

From here

$$b \neq 0, d = 0, \sin \lambda l = 0 \quad (13)$$

$$\lambda l = \pi k, k = 1, 2, 3, \dots; \quad \lambda_k = \frac{\pi k}{l} \quad (14)$$

Accordingly, own functions

$$X_k(x) = \sin \frac{\pi k}{l} x \quad (15)$$

For  $T_k(t)$  functions, we obtain the equations

$$T_k(t) + \left( \frac{\pi a k}{l} \right)^4 T_k(t) = 0 \quad (16)$$

The general solution (16) is found in the form

$$T_k(t) = a_k \cos \left( \frac{\pi a k}{l} \right)^2 t + b_k \sin \left( \frac{\pi a k}{l} \right)^2 t. \quad (17)$$

Substituting solutions (15) and (17) into (6), we obtain the general solution of equation (1) in the form:

$$u(x, t) = \sum_{k=0}^{\infty} \left[ a_k \cos \left( \frac{\pi a k}{l} \right)^2 t + b_k \sin \left( \frac{\pi a k}{l} \right)^2 t \right] \sin \frac{\pi k}{l} x \quad (18)$$

Where  $a_k, b_k$  unknown coefficients of series (18).

Let be given at the initial moment at  $t = t_0$  initial conditions of problem (1) - (5)

$$u(x, t_0) = \varphi(x) \quad (19)$$

$$u_t(x, t_0) = \psi(x) \quad (20)$$

Substitution of (18) into (19) - (20) gives the following systems for unknowns

$a_k, b_k$ : Arbitrary functions  $\varphi(x), \psi(x)$  twice continuously differentiable and satisfying boundary conditions  $\varphi(0) = \varphi(l) = 0, \psi(0) = \psi(l) = 0$  expands into a uniformly and absolutely convergent series in eigenfunctions  $\left\{ \sin \frac{\pi k}{l} x \right\}$ .

$$\begin{cases} \varphi(x) = \sum_{k=1}^{\infty} \left[ a_k \cos \left( \frac{\pi a k}{l} \right)^2 t_0 + b_k \sin \left( \frac{\pi a k}{l} \right)^2 t_0 \right] \sin \frac{\pi k}{l} x, \\ \psi(x) = \sum_{k=1}^{\infty} \left[ -a_k \sin \left( \frac{\pi a k}{l} \right)^2 t_0 + b_k \cos \left( \frac{\pi a k}{l} \right)^2 t_0 \right] \cdot \left( \frac{\pi a k}{l} \right)^2 \sin \frac{\pi k}{l} x \end{cases} \quad (21)$$

The determinant of system (21) is equal to +1; therefore, the system has a unique solution. Using Cramer's method, we find the unknown coefficients  $a_k, b_k$ :

$$a_k = \begin{vmatrix} \frac{2}{l} \int_0^l \varphi(x) \sin \frac{\pi k}{l} x dx & \sin\left(\frac{\pi k}{l}\right)^2 t_0 \\ \frac{2}{l} \int_0^l \psi(x) \sin \frac{\pi k}{l} x dx & \cos\left(\frac{\pi k}{l}\right)^2 t_0 \end{vmatrix}, \quad (22)$$

$$b_k = \begin{vmatrix} \cos\left(\frac{\pi k}{l}\right)^2 t_0 & \frac{2}{l} \int_0^l \varphi(x) \sin \frac{\pi k}{l} x dx \\ \sin\left(\frac{\pi k}{l}\right)^2 t_0 & \frac{2}{l} \int_0^l \psi(x) \sin \frac{\pi k}{l} x dx \end{vmatrix} \quad (23)$$

Unknown functions  $f_1(x), f_2(x)$  express in terms of the known functions  $\varphi(x), \psi(x)$ . From condition (2) we find

$$f_1(x) = \sum_{k=1}^{\infty} a_k \sin \frac{\pi k}{l} x,$$

$$f_2(x) = \sum_{k=1}^{\infty} \left(\frac{\pi k}{l}\right)^2 b_k \sin \frac{\pi k}{l} x.$$

<sup>20</sup>. We consider the problem of the vibration of a thin beam with a length equal to  $l$ . One end of the beam is rigidly fixed, and the other end is free. Such tasks are also solved by the above method.

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**Rezyume:** Bu maqolada to'rtinchi tartibli hususiy hosilali differensial tenglamani echish masalasi qarashtirilgan. Bu masala uchun teskari masala qo'yilgan. Noma'lum funksiya uchun Shturm-Luyivill masalasining echimin Fure qatorlari yordamida topiladi. Fure qatorining koeffitsientlari chegaraviy shartlaridan topiladi. Teskari masalaning echimi Fure qatori ko'rinishida solishtirish usuli yordamida topiladi.

**Резюме:** В настоящей работе рассматривается решение уравнения с частными производными четвертого порядка. Ставится обратная задача к этим задачам. С помощью задачи Штурма-Луивилля для неизвестной функции ищется решение в виде ряда Фурье. Неизвестные коэффициенты ряда Фурье находятся из граничных условий. Решение обратных задач находится, используя известные функции методом сравнения в виде ряда Фурье.

**Kalit so'zlar:** O'zgaruvchilarni ayirish usuli, to'rtinchi tartibli hususiy hosilali differensial tenglama, teskari masala.

**Ключевые слова:** Разделение переменных, уравнения четвертого порядка, обратная задача.

**ECOLOGICAL ANALYSIS OF THE DYNAMICS OF THE AREA AND RESOURCES OF  
MEDICINAL PLANTS IN THE SOUTHERN AREAL**

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**Summary:** *The article presents the results of a study on the study of the range of certain types of medicinal plants in the southern Aral Sea region. The distribution of medicinal plants in the natural complexes of the South Aral Sea region is very uneven, since there is a difference in the ecological conditions of the natural areas and the ecological types of the plants themselves.*

**Keywords:** *Southern Aral Sea region, medicinal plants, price complexes, raw materials, blanks, mapping*

### **1. Introduction**

In recent years, interest in medicinal plants has especially increased in connection with new methods of their use for treatment and methods of studying their exposure characteristics [3, 4]. Of interest is also the change in distribution areas in the new environmental conditions. Currently, there is a need to examine the modern resources of medicinal plant materials and their range in the Aral Sea region. In the region of the South Aral Sea region, the range of the resource potential of medicinal plants has not yet been studied. The development and propagation of new plant species in severe climatic conditions and on sandy soil is especially difficult and one of the main problems in the Central Asian region and, in particular, in the Republic of Karakalpakstan.

### **2. Results and discussion**

The Republic of Karakalpakstan is located in the northwestern part of Uzbekistan, covers an area of 165.5 thousand square kilometers, it borders on the Aral Sea in the north, Kazakhstan in the east and south, Uzbekistan in the southeast of Bukhara and Khorezm regions, and in the south with Turkmenistan. The climate in Karakalpakstan is sharply continental. It is characterized by a vegetative period of 170-200 days and refers to warm and very warm thermal zones. Thermal resources provide for the cultivation of grapes, rice, wheat corn and early ripening cotton varieties [9]. The main soils of Karakalpakstan are: gray-brown unsuitable for irrigated agriculture, with low fertility, meadow with a high degree of salinity [5]. The main feature of the soils of Karakalpakstan is the presence of a thin layer of fertile surface (0.15-0.35 m) and low humus content (0.5-0.8%), high carbonate content and gypsum content, a large amount of the presence of water-soluble salts [5]. According to the Ministry of Economy and Statistics of the Republic of Karakalpakstan, the total fund of irrigated lands is mainly saline soils, including: slightly saline -26.2%, medium-saline - 37.4%, highly saline -35.2%, very saline 1.2 %.

Flora of Karakalpakstan is represented by various ecological forms of plants: trees, shrubs and shrubs, shrubs and shrubs, perennial and annual grasses, prickly shrubs, plants with lush stems and leaves, stemless, leafless plants. Medicinal, fodder, fruit, tannin, dyeing, essential oil, technical, decorative, honey plants and other plants grow here [4]. A special place is taken by medicinal plants. They usually grow in already formed types of vegetation: steppes, meadow steppes, meadows, among shrubs, in floodplain forests. Observing the vegetation, it is possible to create an idea of the ecological situation by its condition, composition and appearance. A special role is

played by knowledge of the state of soil and vegetation cover. In the Aral Sea region, the vegetation cover is very diverse (Fig. 1).



**Figure 1: Resources of medicinal plants in the Southern Aral Sea**

The relief and the modern landscape structure of the Amu Darya delta was formed under the influence of various factors, the most important of which are geology, hydrological regime, climatic conditions and anthropogenic factors. The decrease in the Aral Sea level, the drying up of the Amudarya delta, the decrease in river runoff and the area of tugai and reed thickets led to the development of deflation in places where waterlogging processes previously prevailed. The main relief-forming process that prevails throughout the Aral Sea and the dried part of the seabed is eolian processes [8, 9]. Medicinal plants are natural complexes of various active chemicals (alkaloids, glycosides, flavonoids, essential oils, etc.) that have a complex multifaceted effect on the body. The use of herbal medicines in modern medicine not only remains stable, but also tends to increase [2]. Currently, drugs obtained from plants occupy an important place in the prevention and treatment of many diseases of the cardiovascular, nervous systems, kidneys, liver, gastrointestinal tract, and neoplasms [7]. They account for more than a third of manufactured drugs, and there is a tendency to increase demand for phytochemicals and increase their production. According to experts, about 360 species of medicinal plants are known in the Southern Aral Sea region. As a result of research, it was found that 160 species of medicinal plants grow in the floodplain and delta of the Amu Darya. The next natural region in the number of species of medicinal plants is the Ustyurt Plateau. 85 species of medicinal plants grow on the Ustyurt plateau [3]. It can also be noted that many medicinal plants are rare, but form large arrays, and some are ubiquitous, but their stocks of raw materials are very limited. The resources of medicinal plants growing in the territory of the South Aral Sea region are determined in two directions: 1) determination of resources in specific thickets, 2) in key areas, followed by extrapolation of the obtained data to the entire area of similar lands within the region, region or area. In practice, the need constantly arises for a prompt and reliable assessment of the availability of raw materials for new medical products under development, starting from the first stage of environmental exploration. The determination of resources on specific thickets is usually carried out during the harvesting of raw materials, when establishing stocks of rare plants and plants that do not have a clear phytocenotic confinement. The second method for determining the resources of medicinal plants in key areas is used for species with a clear confinement to certain plant divisions. It is at key sites that two indicators are established: 1) the supply of raw materials per unit area, 2) the ratio of the area occupied by the community to which the plant is associated with the total area of the "key site". The stocks of raw materials are calculated at registration sites, on model plants and projective cover.

The most complete description of the medicinal plant resources is offered to us by specially developed maps for the raw resources of medicinal plants, compiled on the basis of universal geobotanical maps that show the location of plant communities depending on the main factors of the geographical environment and the specifics of human economic activity. Resource maps compiled on the basis of vegetation maps are divided into two categories: maps of the distribution of medicinal plants and maps of available stocks. These two categories of maps have a certain independent value, while stock maps are necessarily based on distribution maps. *Salsola richteri* is an endemic plant in the sandy deserts of Central Asia; *Chenopodiaceae* is a member of the creeper family. Large shrub up to 3-5 m high with white-gray bark and thin branches. Young shoots are not hanging, which is a hallmark of *Salsola richteri*. The leaves are alternate, fleshy reaching 4-8 cm in length and 2 mm in width. The flowers are bisexual, single, very small, located in the axils of the upper leaves, regular, with a simple five-membered brown perianth [4]. *Salsola richteri* is



characterized by abundant fruiting. In Karakalpakstan, Richter hodgepodge is very widespread in the Karakalpak part of Kyzylkum, from the southern and northern regions of the republic. Basically, *Salsola richteri* grows on weakly sandy sands of the southern regions of the republic and on the tuberous sands of the northern regions. For medical purposes, the fruit of the hodgepodge is harvested after ripening, with an admixture of flowers and leaves. *Salsola richteri* is harvested from the end of September until the first decade of November. After severe frosts, the content of alkaloids in the feed decreases. According to specialists from the association with *Salsola richteri*, typical psammophytic communities of Kyzylkum that do not differ in the richness of the species composition, which can be explained by the mobility of the upper horizons of the soil substrate [2]. In the course of our research, we identified about 19 main massifs of *Salsola richteri* thickets with different areas, of which 16 massifs are suitable for industrial harvesting. Thus, our phytocenological assessment of the main types of medicinal plants in Karakalpakstan will serve as the basis for studying their resources and making recommendations on the rational use of their raw material stocks. The distribution of medicinal plants in the natural complexes of the South Aral Sea region is very uneven, since there is a difference in the environmental conditions of natural areas and the ecological types of plants themselves [8]. The ecological range of medicinal plants growth in the Southern Aral Sea region is very wide - from water-laden plants of lake ecosystems to typical desert plants. The new results obtained on the distribution of price complexes of some types of medicinal plants in the current new ecological conditions of the Aral Sea region will help to reuse different groups of medicinal plants.

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**Rezyume:** *Maqolada Orolbo'yi janubidagi ayrim turdagi dorivor o'simliklarning assortimentini o'rganish bo'yicha tadqiqot natijalari keltirilgan. Janubiy Orolbo'yi tabiiy majmualarida dorivor o'simliklarning tarqalishi juda notekis, chunki tabiiy hududlarning ekologik sharoitlari va o'simliklarning o'zlarining ekologik turlarida farq mavjud.*

**Резюме:** В статье представлены результаты исследования по изучению ареала отдельных видов лекарственных растений Южного Приаралья. Распространение лекарственных растений в природных комплексах Южного Приаралья весьма неравномерно, так как существует различие экологических условий природных территорий и экологических типов самих растений.

**Kalit so‘zlar:** Janubiy Orolbo‘yi, dorivor o‘simliklar, narx komplekslari, xomashyo, xaritalash

**Ключевые слова:** Южное Приаралье, лекарственные растения, ценовые комплексы, сырье, заготовки, картографирование.

**URGENT CENTRAL ASIAN WATER CHALLENGE: SUSTAINABLE WATER RESOURCES MANAGEMENT**

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**Summary:** *Central Asian (CA) specific climate and geographical location makes the water resources limitation for the region because all CA countries are land lacked and especially Uzbekistan is double land lacked country. They have to share many natural resources as water, air, wild animals and other. One of the most urgent challenges in the region is transboundary water resources management issue. The water resources management is one of the top issue and the agenda for cooperation in region ever since the countries gained their independence from the Soviet Union. From 1992 all Central Asian countries recognizing the importance of the issue, signed an agreement on joint management of the regional water resources. Establishing the Aral Safe Foundation one of the examples for sustaining development and managing natural resources in the region and it was agreed by the all newly established independent countries. Among many inherited from the Soviet planned economy period water resources management and rural economy is very important and has high priority for the development of all states in the region. Using ground waters and prolongation of water wells' life time is one of the proper way to decreasing water intake from main rivers in CA and save more water for the Aral Sea. This article devoted to the new method of water well rehabilitation and prolongation of their life time.*

**Keywords:** *water resources, transboundary, sustainable water resources, water wells, debit, clogging, rehabilitation, reagents selective action, carbon dioxide.*

**1. Introduction.** Uzbekistan and other Central Asian countries including Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan and Afghanistan are struggling to come to terms with an ecological disaster affecting the Aral Sea. The crisis has been brought about by the mismanagement of water resources from the Aral's main tributaries, the Amudarya and the Sirdarya Rivers. The primary source of quality drinking water in Uzbekistan and Central Asia is ground water, which accounts for between 85 and 90% of the general water budget. Agricultural irrigation systems have caused high pollution levels in the region's (unevenly distributed) surface waters. Historically water flow to the Aral Sea was 56 km<sup>3</sup> per year, which decreased to 47 km<sup>3</sup> between 1966 and 1970. Water flow plummeted to 2 km<sup>3</sup> between 1981 and 1983, and now stands at less than 1,8 km<sup>3</sup> [3,4].

A key question is how to balance social and economic development with natural resource protection. Central Asian Republics utilize the same watersheds and share many water management issues in common. It is clear that the region's existing multination and regional water management and environmental protection project are insufficient by themselves to meet the scale of the problem. Further multinational agreements and joint-state/joint-agency programs will undoubtedly be required [4].

The Central Asian region has been designated in recent years as an ecological and social disaster zone because of Aral Sea situation. Although water resources are not a new issue, this problem can be traced back to the beginning of civilization for a number of reasons. The beginning of irrigated agriculture in the region dates back to the 6th-7th centuries B.C. This time period coincides with a flourishing of the most ancient civilization where irrigation was a major decisive factor of historical and socio-economic development [1].

Today the Aral Sea and surrounding territories are world-known for ecological disasters attributed mainly to anthropogenesis factors. In recent years, Uzbekistan's control under multiple regimes and governments has made it difficult for central Asia to unite. The growth in water consumption is connected to cultivation of new irrigated territories, where mainly cotton and rice are grown. That issue combined with the increase in the population and employment in agriculture, the flow of water to the sea from the two major river systems -the Amu Darya and Syr Darya - completely stopped.

The improper use of the water taken from the Aral Sea has led to many consequences that the interstate commission is trying to resolve. Unfortunately since the departure of the USSR, central Asian economies have not been strong enough to rehabilitate the productivity of the territory. Large and ominous hardships fall onto the responsibility of the government. Socially these include protecting the population from adverse impacts of desertification, creating new workplaces and job markets and trying to improve the economic and social conditions by introducing new water efficient technology. Ecologically, each country must implement new plans for the restoration of flora and fauna diversity and the prevention of any further degradation of the Aral Sea [1].

**Methodology.** Main question is how to sustain a water using and management in this region? In particular, improving irrigation system efficiency, safe and an effective water supply development, waste water treatment and reusing, watershed management and others are critical needs throughout Uzbekistan and Central Asian region. An ecological disaster was set in motion in this region beginning in the 1950s, when water was diverted from the two rivers that flow into the Aral Sea but it was with the condition of turning Siberian rivers towards the Aral Sea [3]. For various reasons and on the initiative of the Ural branch of the Academy of Sciences of the Russian Federation (by that time it was the Soviet Union) stopped this started project, but water intake from Amu Darya and Syr Darya continued to grow cotton and other agricultural crops in the territory of CA. Now is almost 30 years as Soviet Union collapsed and all CA Republics became an independent new states. All situations are changed but water deficit and Aral Sea problem is still continuing and getting worst.

Today we need some new approaches to the water problem solving in this region and one of them is sustainable water management by using innovative technologies which allows to save more water in the rivers. In this article we offer one of them as an alternative approach to safe surface water in the Syr Darya and Amu Darya by using ground water technologies. Particularly we have developed a new water wells rehabilitation method for CA regions conditions. This alternative method allows prolongation a life time of the existing water wells by rehabilitation their debit.

**Research.** Increasing of water consumption by the population and industrial enterprises, the number and cost of water intake facilities increase accordingly. In order to stable provide water to consumers, additional wells are often used, the cost of which is quite high. There are significant reserves for improving the efficiency of the initial investments in existing water supply systems. In this regard, the issue of ensuring stable operation of water wells is very relevant, which will reduce the costs for the design and construction of new facilities and increase the fund-raising of invested funds. At the same time, stable operation of wells is often disrupted due to failure of water lifting equipment, peeling, clogging of filter and aquifer during drilling of well filters and filter zones with salt deposits, chemical or electro-chemical corrosion elements, deterioration of water quality, local or widespread reduction of water level in aquifer [2].

Operating practice shows that if a well has lost more than 25% of its original production rate for one or another reason, regeneration is expedient. One of the main reasons for reduction of well flow rate is clogging (colmatation) of the filter and the filter zone by salt deposits. Since colmatation is a multi-factor and complex physical-chemical and hydrogeological processes, the concretization of the main factors will allow to correctly determine the method of recovery of well productivity. Methods for the well flow recovery should facilitate removal of clogging deposits

from the filter outer surface and from the filter zone. During mechanical treatment of filters (cleaning with metal spars, scraper devices, swabbing, etc.) clogging deposits are broken only from filters and working columns. Treatment of wells by using reagent methods allows removal of salt deposits from the filter surface and at the filter zone. However, these methods do not always guarantee the desired effect, since the permeability of the reactant solutions are negligible in the colmatation of the filters and in the near filter zone with dense precipitates.

Using of impulsive methods can be effective only at the initial point in time of operation. At the same time, sediments are destroyed and dispersed, and complete removal of them during washing is impossible. Residual amount of salt deposits intensifies the process of repeated colmatation process. In addition, the application of this method is limited by the strength characteristics of the well elements (filters). Application of combined methods provides higher effect of well production recovery. In this case, the combination of impulsive and vibration techniques with reactant compensates for the disadvantages. As a result, removal of clogging deposits from the filter surface and near filter zones is improved. However, the use of the above-mentioned methods of recovery of the working elements of water intake structures fails to achieve the desired result due to complications arising in the recovery of well productivity, as each method is applicable in certain hydro geological conditions.

In this regard, research on new efficient methods of cleaning filters and near well filter space from sediments, improvement of existing methods and technical equipment for decolmatation and ensuring stable operation of water wells are urgently needed.

One of the promising method of cleaning filters and near filter zone from salt deposits, corrosion products and biological fouling is the method by using complex reagents and solid carbon dioxide [2]. In the practice of recovery of water wells high effect of filter cleaning and near filter zones is achieved at cyclic pressing of reagent solutions beyond the well contour. Compressed air or solid carbon dioxide is used to press solutions of reagents into the formation.

In this regard, we consider it useful to investigate the possibility of using complex reagents of selective action (RSA) to restore the yield of water wells. As an agent for pressing the solution of RSA behind the contours of the well filter in order to ensure cleaning of external walls of the filter and near filter space from clogging formations and corrosion products, it is proposed to use solid carbon dioxide. Complex studies of clogging deposits were carried out as a result chemical and mineralogical compositions were installed. clogging well deposits consisted mainly of salts and oxides of two and three valence metals (Ca, Mg, Zn, Fe, Si, Al, Mn, etc.). Reagents for their removal are selected on the basis of obtained results on deposit compositions. As reagents there are proposed RSA NTP and OEDP in the some proportion [2]. The choice of these RSA as complexing reagents is justified by taking into account their selective effect on metals contained in the colmatant composition.

Laboratory experiments carried out on the main factors affecting the effect of dissolution of the clogging deposition such as concentration, temperature of the solution and duration of treatment time, allowed to establish their optimal values. The adequacy of the main factors and the significance of the main hypothesis were tested by the method of planning the experiment. Corrosion activity of the proposed solution with respect to metal elements of the well is investigated [2].

The technology of treatment of water wells with application of reagents of selective action and solid carbon dioxide in production conditions is offered.

### **Conclusions**

1. Improving the situation in the region is possible by increasing water resources management efficiency with the main focus on ground waters. This option is more realistic by ground waters using and by prolongation water wells' life time because well operation and their stable debit and standard life time doesn't meet official standards.

2. Existing methods of recovery of well productivity justify themselves under specific hydro geological conditions only, but require improvement.
3. The efficiency of using combined methods shows higher results.
4. It has been found that the most respectful method for restoring the productivity of deep-water wells by cleaning filters and near filter zones from clogging deposits represented by mineral, chemical and biological products is the method using solid carbon dioxide as a homogeneous substance and together with RSA.

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**Rezyume:** *Markaziy Osiyoning (MO) iqlimi va geografik joylashuvi mintaqaning suv resurslarini cheklaydi, chunki suv resurslari barcha MO mamlakatlarida teng taqsimlanmagan. Mintaqadagi dolzarb muammolardan biri - bu transchegaraviy suv resurslarini boshqarishdir. Er usti suvlaridan foydalanish va quduqlarning xizmat qilish muddatini uzaytirish MOning asosiy daryolaridan suv olishni kamaytirish va Orol dengizi uchun suvni tejash usullaridan biridir. Ushbu maqola suv quduqlarining quvvatini qayta tiklash va xizmat muddatini uzaytirishning yangi usuliga bag'ishlangan.*

**Резюме:** *Климат и географическое положение в Центральной Азии (ЦА) ограничивают водные ресурсы региона, поскольку во всех странах ЦА не равномерно расположены водные ресурсы. Одной из неотложных проблем в регионе является проблема управления трансграничными водными ресурсами. Использование грунтовых вод и продление срока службы водозаборных скважин является одним из способов снижения забора воды из главных рек в ЦА и экономии воды для Аральского моря. Данная статья посвящена новому методу восстановления дебита водозаборных скважин и продлению их срока службы.*

**Kalit so'zlar:** *suv resurslari, transchegaraviy suv resurslari barqarorligi, suv quduqlari, debit, kol'matatsiya, qayta tiklash, maqsadli ta'sir ko'rsatish reagentlari, karbonat kislota.*

**Ключевые слова:** *водные ресурсы, трансграничные, устойчивость водных ресурсов, водяные скважины, дебит, кольматация, восстановление, реагенты селективного воздействия, углекислота.*

**STUDY OF THE POSSIBILITY OF USING MARSHALING TRACKS IN CONDITIONS OF A FIXED SCHEDULE OF FREIGHT TRAINS TRAFFIC**

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**Summary:** *The article discusses the ways of the optimal use of marshaling tracks in conditions of a fixed schedule for the freight trains schedule. Organizational measures are proposed to increase the processing capacity of marshaling tracks based on the development of software for a train departure timetable in order to form freight trains at a fixed schedule.*

**Keywords:** *specialization of marshaling tracks, fixed schedule, train formation, train departure timetable, mathematical model, computer program.*

**INTRODUCTION**

In world practice, there are two systems for implementing the train schedule at the existing irregularity of car traffic. One of them is a flexible schedule system, when trains accumulate to the maximum norm and leave at the nearest train schedule. At that, prompt cancellation and appointment of additional trains are allowed. With such a system, the irregularity of car traffic is realized due to the variable interval between trains. This system is used in the case of mass flow of trains and high capacity utilization. The main burden of managing the train traffic falls on the operational workers.

Another system is the train circulation according to a fixed schedule; it provides for the specialization of the train schedule according to the destinations of the formation plan and the daily departure of trains according to fixed schedule lines linked along the entire route of the train. In this case, the accumulation of trains does not take place up to the maximum norm, but up to a certain point in time, linked to the departure of the train according to the schedule. As a result, the average amount of trains decreases, and the train traffic increases accordingly. The car traffic irregularity is realized here due to the variable train set. The workload on operating personnel is decreasing, but the role of technology is increasing. This system is used when there are significant reserves in track development and throughput and when it is widespread abroad.

Each system has its advantages and shortcomings, but the indisputable merits of a fixed schedule are the streamlining of all operational work, and above all the work of locomotives and locomotive crews, stabilization of car flows, reduction of unproductive downtime and delays, the ability to determine a specific date of cargo arrival at the destination station, etc. In recent years, large-scale measures have been carried out on the CIS railways aimed at the transition to the train formation on fixed schedule lines [1-7]. However, a full transition to a fixed schedule has not been implemented. The reasons for this are the lack of reserves for track development and throughput, a possible decrease in the "average train weight" index (for which a bonus is paid), a low level of technological discipline, the desire to solve most of the transportation management issues by operational measures that do not always provide an optimal solution, and the rail traffic operators simply do not have a great desire to perform additional work on the transition to a fixed schedule in difficult transportation conditions. Thus, this issue has acquired a certain acuteness at present.

Correct determination of the point of train formation and departure from the station is of determinant importance for fulfilling the fixed schedule of freight trains traffic. It is necessary to choose such a time of train departure that at the beginning of its formation at the station, under all conditions, there is a sufficient number of cars for this destination. The regularity of train passage along the section and train circulation in a certain direction depends on the correct choice of points



of departure of freight trains. In addition, the correct designation of the departure point at a fixed schedule of freight trains is a determinant condition for reducing detention during car accumulation.

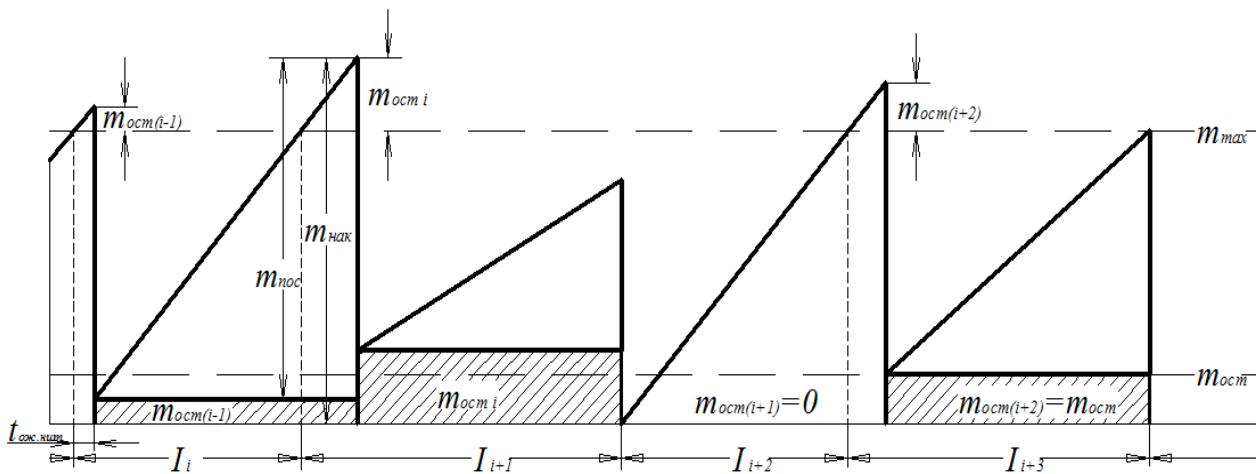
### MATHEMATICAL MODEL OF TRAIN FORMATION UNDER CONDITIONS OF A FIXED SCHEDULE OF FREIGHT TRAINS TRAFFIC

Since the train accumulation at a fixed schedule ends depending on the train departure timetable, to simulate the accumulation process, the values of  $m_i$  (the group of cars entering the accumulation track) are summed up until the arrival time of the last group of the corresponding lines. Therefore, at a fixed schedule, in order to establish the regularities of train formation, it is necessary to investigate the value of the accumulated trains per a schedule line. For this, under conditions of fluctuations in car traffic flow, it is necessary to justify the timetables of freight trains for individual destinations.

Since, under conditions of a fixed schedule, the accumulation of cars occurs at the calculated periodic time  $T$ , it is necessary to investigate the fluctuations in the number of cars arriving during these periods. Under the conditions of a fixed schedule, the duration of the calculation period is equal to the interval ( $I_{om}$ ) between the departure times of two trains of the same destination (Fig. 1), then

$$I_{om} = \frac{24}{N'_{cym}}, \text{ hour} \quad (1)$$

where  $N'_{cym}$  – daily traffic (number of lines in the schedule) of individual destinations of the sorting plan.



**Fig. 1. The process of car accumulation in a fixed schedule:**

$m_{noc..}$  - the number of wagons arriving in time  $I_{om}$ ;

$m_{oc.}$  - the number of residual cars after formation of trains;

$m_{нак.}$  - the number of accumulated cars per route schedule;

$m_{max.}$  - the maximum number of cars in the train;

$t_{ож.нум.}$  – the train waiting time for the route schedule, after the accumulation of  $m_{max.}$

In conditions of a fixed schedule, the determination of the amount of traffic in each destination is made by dividing the daily car flow  $U_{cym}$  by  $m_{max.}$  The result is designated as  $N_{cym}$ . Rounding  $N_{cym}$  upwards, we get the daily amount of traffic (the number of lines in the schedule) according to the destinations of the sorting plan  $N'_{cym}$ . The general amount of traffic on the section is found by summing  $N'_{cym}$  in certain destinations.

For example, the daily car flow in certain destinations is  $U_{cym} = 68$  cars, the maximum number of cars in a train is  $m_{max} = 71$  cars. The following number of cars is necessary to master the daily car flow:

$$N_{cym} = \frac{U_{cym}}{m_{max}} = \frac{68}{71} = 0,96 \text{ trains/day (tr/day)} \quad (2)$$

According to studies in [8-10], rounding  $N_{cym}$  upwards, the daily amount of traffic in the given destination is obtained  $N'_{cym}=1$  tr/day. In conditions of a fixed schedule for the freight trains traffic, it is necessary to appoint a departure time from the formation station. If,  $N'_{cym}=1$  tr/day, then during the day one line should be allocated for this destination at time  $T_{om}$ , where a large number of cars arrive [8-10].

Taking into account the above, a model for the car accumulation on the tracks of sorting yards was developed at a fixed schedule of freight trains traffic:

1. The current amount of groups of cars entering the accumulation track for the considered capacity of the average daily car flow of a certain destination of the sorting plan is modeled:

$$m_{ep1}, m_{ep2}, m_{ep3}, \dots, m_{epn}.$$

2. The values of  $m_{ep}$  are added up until the time point  $T_{om}$ .

3. The amount of accumulated trains at time point  $T_{om}$  is determined in the following order:

$$m_{нак}^i = m_{осм}^{j-1} + \sum m_{ep}^i \quad (3)$$

4. The amount of dispatched trains according to the  $i$ -th fixed schedule is determined in the following order:

$$m_{om}^i = \begin{cases} m_{max} & \text{если } m_{нак}^i > m_{max} \\ m_{нак}^i & \text{если } m_{нак}^i \leq m_{max} \end{cases} \quad (4)$$

5. The amount of the remaining cars of the  $i$ -th train is determined in the following order:

$$m_{осм}^i = \begin{cases} m_{нак}^i - m_{om}^i & \text{если } m_{нак}^i > m_{max} \\ 0 & \text{если } m_{нак}^i \leq m_{max} \end{cases} \quad (5)$$

With the above data, it is possible to determine the detention of cars under accumulation of the  $i$ -th train

$$B_H^i = \frac{I_i m_{om}^i}{2} + \frac{(I_{i-1} + I_i) m_{осм}^{i-1}}{2}, \text{ ваг-час} \quad (6)$$

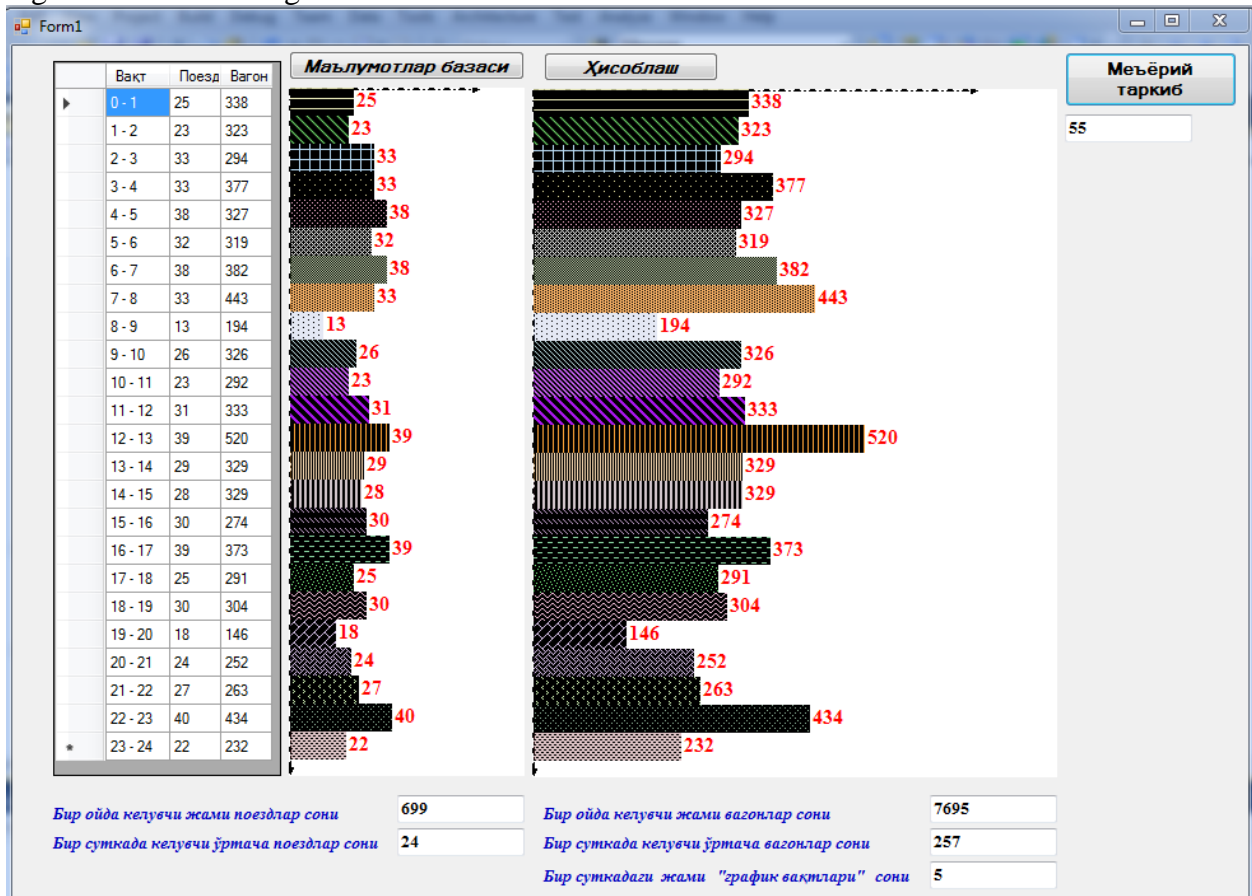
The average detention of one car under accumulation is

$$t_{нак}^i = \frac{B_H^i}{m_{нак}^i}, \text{ ваг-час.} \quad (7)$$

The optimal plan of train formation, calculated according to the proposed method, guarantees the minimum detention of cars, ensures the closedness of the daily schedule (determines the carry-over remaining cars), and establishes the procedure for processing trains arriving for disbanding. For stations with a large capacity, such calculations can be performed on a computer, since this technique allows the operations to be programmed.

## RESULTS AND DISCUSSION

To calculate the departure timetable under the conditions of a fixed schedule, a computer program was developed in the *Delphi 7* programming language. The work window of the developed program is shown in Fig. 2.



**Fig. 2. Work window of the computer program "Automation of the calculation of departure timetable in conditions of a fixed schedule using the intensity of train accumulation"**

This software is designed to calculate the following indices when forming trains on station tracks and determining the time of their departure according to a fixed schedule:

- the total number of trains arriving at the station per month, train;
- the total number of cars arriving at the station per month, car;
- the number of accumulated trains by the hour of the day, train;
- average number of trains arriving at the station per day, train;
- average number of cars arriving at the station per day, car;
- the number of cars accumulated by the hour of the day, car;
- the total number of "schedule lines" per day, pcs.

With the above indices of train formation, it is possible to build up the process of car accumulation. The model was developed using *Excel* standard software. After starting the model, the graph given in Table 1 was obtained. Table 1 shows the process of car accumulation on the track of a marshaling yard within 30 days for  $U_{cym.} = 68$  cars/day.

Table 1

**An example of a model of the car accumulation on tracks of a marshaling yard at a fixed schedule of freight trains traffic**

Date and time	$m_{noc.}, cars$	$m_{нак.}, cars$	$m_{ом.}, cars$	$m_{оом.}, cars$
---------------	------------------	------------------	-----------------	------------------

23.01.21 5:00	60	65	65	0
24.01.21 5:00	45	45	45	0
25.01.21 5:00	131	131	71	60
26.01.21 5:00	36	96	71	25
27.01.21 5:00	52	77	71	6
28.01.21 5:00	104	110	71	39
29.01.21 5:00	47	86	71	15
30.01.21 5:00	55	70	70	0
31.01.21 5:00	89	89	71	18
01.02.21 5:00	52	70	70	0
02.02.21 5:00	135	135	71	64
03.02.21 5:00	89	153	71	82
04.02.21 5:00	72	154	71	83
05.02.21 5:00	51	134	63	0
06.02.21 5:00	49	49	49	0
07.02.21 5:00	80	80	71	9
08.02.21 5:00	75	84	71	13
09.02.21 5:00	85	98	71	27
10.02.21 5:00	71	98	71	27
11.02.21 5:00	104	131	71	60
12.02.21 5:00	45	105	71	34
13.02.21 5:00	48	82	71	11
14.02.21 5:00	94	105	71	34
15.02.21 5:00	96	130	71	59
16.02.21 5:00	43	102	71	31
17.02.21 5:00	46	77	71	6
18.02.21 5:00	45	51	51	0
19.02.21 5:00	78	78	71	7
20.02.21 5:00	27	34	34	0
21.02.21 5:00	77	77	71	6
Average	68	93	67	24

The process of car accumulation on the tracks of a marshaling yard within 30 days at a fixed schedule of freight trains was modeled for other values of  $U_{cym}$ . As a result, the indices of train formation for a fixed schedule were determined (Table 2).

Table 2

**The average value of the accumulated train stock and the remaining cars, obtained from the results of the developed model of car accumulation on the tracks of the marshaling yards**

$N_0$	$U_{cym}, cars$	$m_{zp}, cars$	$m_{nak}, cars$		$m_{om}, cars$		$m_{ocm}, cars$	
			$ГГ^*$	$ТГ^{**}$	$ГГ$	$ТГ$	$ГГ$	$ТГ$
1	57	5	77	62	71	57	6	5
2	63	5	75	79	71	62	4	17
3	68	5	77	93	71	67	6	24

4	71	5	75	132	71	67	4	65
5	76	6	75	58	71	51	4	7
6	77	6	80	56	71	51	9	5
7	106	6	77	81	71	63	6	18
8	107	6	79	63	71	54	8	9
9	108	6	79	63	71	54	8	9
10	110	6	81	69	71	55	10	14
11	114	6	78	65	71	57	7	8
12	118	6	77	67	71	59	6	8
13	122	6	76	73	71	61	5	12
14	125	7	76	75	71	62	5	13
15	130	7	76	95	71	65	5	30
16	138	7	77	147	71	69	6	78
17	158	7	76	57	71	52	5	5
18	182	8	77	76	71	60	6	16
19	203	8	79	80	71	63	8	17

\*\*flexible schedule; \*\* fixed schedule

Table 3 shows the results of calculating the detention of cars under accumulation for  $U_{cym} = 68$  cars/day.

Based on the simulation results (Table 2), it is possible to draw conclusions about the quality of cars outbound from the station, the average train formation and the average number of remaining cars. In conditions of a fixed schedule for  $U_{cym} = 68$  cars/day, as seen from (Tables 1-3), the average train composition is 4 cars less than the maximum norm, the average remaining cars amounted to 24 cars and the average demurrage under accumulation was 14.42 hours. (2.93 hours more than at a flexible schedule). Formation plan with such a number of cars after train departure may not fit into the car accumulation track; this increases the demurrage of cars under accumulation. Therefore, in the process of calculating the train formation plan, it is advisable to provide for the possibility of an operational change in the specialization of marshaling tracks, in the cases when this will reduce the downtime of cars or shunting locomotive/hours.

Table 3

**The results of calculating the demurrage of car accumulation at a fixed schedule of freight trains traffic for  $U_{cym} = 68$  cars/day.**

Date and time	$m_{noc}, cars$	$m_{hak}, cars.$	$m_{om}, cars$	$m_{ocm}, cars$	$I_{om}, hour$	$B_{hak}, hour$	$t_{hak}, hour$
There were no cars left from the train on 01.22.21 at 5:00							
23.01.21 5:00	60	65	65	0	24	720	11.08
24.01.21 5:00	45	45	45	0	24	540	12.00
25.01.21 5:00	131	131	71	60	24	2292	17.50
26.01.21 5:00	36	96	71	25	24	1452	15.13
27.01.21 5:00	52	77	71	6	24	996	12.94
28.01.21 5:00	104	110	71	39	24	1788	16.25
29.01.21 5:00	47	86	71	15	24	1212	14.09
30.01.21 5:00	55	70	70	0	24	840	12.00
31.01.21 5:00	89	89	71	18	24	1284	14.43

01.02.21 5:00	52	70	70	0	24	840	12.00
02.02.21 5:00	135	135	71	64	24	2388	17.69
03.02.21 5:00	89	153	71	82	24	2820	18.43
04.02.21 5:00	72	154	71	83	24	2844	18.47
05.02.21 5:00	51	134	63	0	24	1608	12.00
06.02.21 5:00	49	49	49	0	24	588	12.00
07.02.21 5:00	80	80	71	9	24	1068	13.35
08.02.21 5:00	75	84	71	13	24	1164	13.86
09.02.21 5:00	85	98	71	27	24	1500	15.31
10.02.21 5:00	71	98	71	27	24	1500	15.31
11.02.21 5:00	104	131	71	60	24	2292	17.50
12.02.21 5:00	45	105	71	34	24	1668	15.89
13.02.21 5:00	48	82	71	11	24	1116	13.61
14.02.21 5:00	94	105	71	34	24	1668	15.89
15.02.21 5:00	96	130	71	59	24	2268	17.45
16.02.21 5:00	43	102	71	31	24	1596	15.65
17.02.21 5:00	46	77	71	6	24	996	12.94
18.02.21 5:00	45	51	51	0	24	612	12.00
19.02.21 5:00	78	78	71	7	24	1020	13.08
20.02.21 5:00	27	34	34	0	24	408	12.00
21.02.21 5:00	77	77	71	6	24	996	12.94
Average	68	93	67	24	24	1402.80	14.42

Example. Fig. 3 schematically shows the periods of accumulation of trains  $A'$  and  $A''$  on the 8<sup>th</sup> track and  $B'$  and  $B''$  on the 19<sup>th</sup> track of the marshaling yard. Let us assume that the 8<sup>th</sup> track has a reserve of useful length, which allows it to accommodate the number of cars longer than the length of the train  $A$  or  $B$ , which the 19<sup>th</sup> track does not have. The accumulation process shown in Fig. 1 corresponds to the most advantageous option of splitting up a train. The completion of the accumulation of train  $A'$  will occur at 4:45 pm, and the first car of train  $A''$  will arrive on the 8<sup>th</sup> track at 5:10 pm. For trains  $B'$  and  $B''$ , the closing and initial groups arrive at the same time at 4:50 pm. The time interval between the periods of train accumulation is for  $A$   $t_A^n = 25 \text{ min}$ , for  $B$   $t_B^n = 0$ .

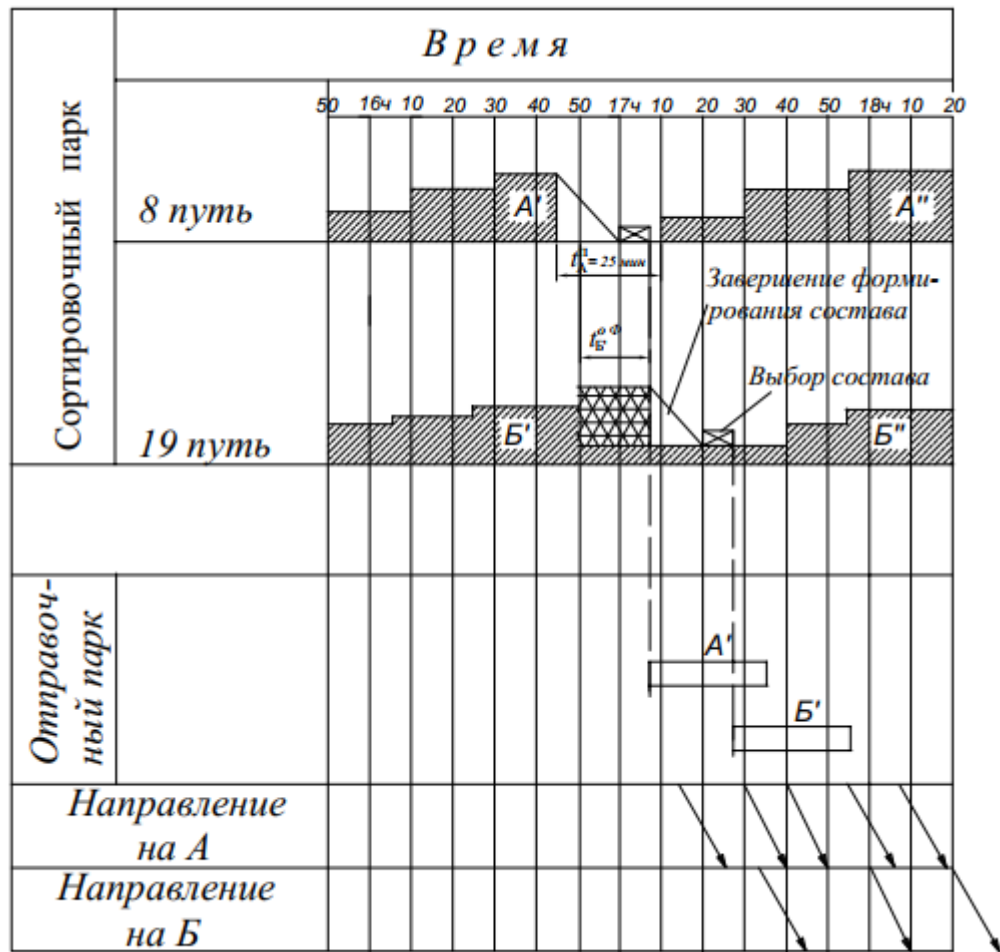


Fig. 3. The original schedule of car accumulation directed to A and B.

Time

8<sup>th</sup> track; 19<sup>th</sup> track

Sorting yard

Completion of train formation

Choice of train

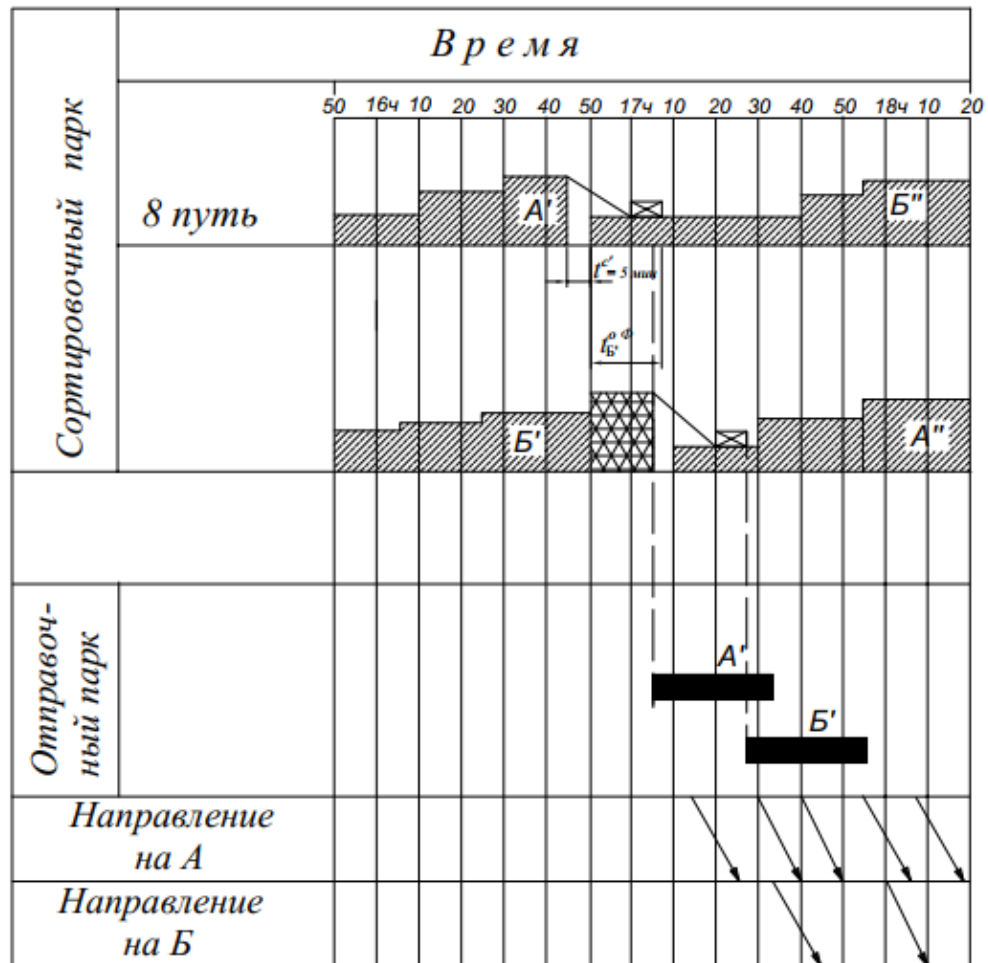
Departure siding

A direction; B direction

If train A' is immediately formed and put into the departure siding, and train B' is set up later (for example, detention for the train formation is  $t_{B'}^{o.\phi.} = 15 \text{ min.}$ ), then track 19 may be overcrowded until train B' departs. While maintaining the specialization of the tracks, this option of train formation cannot be realized. Instead, another, obviously worse, option will be accepted, in which, if there are cars in B direction at the station, the train for this destination will not be formed for the next line of schedule - at 18:00. There is no guarantee that this train will be ready for the next schedule line - at 18:20.

If the specialization of the sorting tracks is changed (Fig. 4), trains B' and A' will be ready for the nearest lines, which will reduce the car detention and allow more efficient use of the sorting tracks. At  $t_A^n = 0$  and  $t_B^n = 0$ , the specialization of the tracks should be changed according to the option with less re-processing of cars. In order to change the specialization of tracks, in calculating the accumulation of trains, it is necessary to take into account the number of cars sent to the

screening track, the moments of possible tracks overflow -  $t_{вмс}$  and the time of their release from the previous train -  $t_{осв}$ . Conditionally,  $t_{вмс}$  can be taken as coinciding with the end of the disbandment of the train, which arrives with the cars that overflow the sorting track.



**Fig. 2. Schedule of car accumulation destined to A and B after changing the specialization of marshaling tracks.**

*Time*

*8<sup>th</sup> track;*

*Sorting yard*

*Departure siding*

*A direction; B direction*

When establishing the priority of formation by calculation, the moments of trains backing out of the departure park  $t_i^p$  are determined. The rate of the backing out duration  $t_i^B$  of the train can be set. Hence, the time of clearing the marshaling track from the previous train is determined by the following formula  $t_{осв} = t_i^p - t_i^B$ .

Since the specialization of sorting tracks affects the car detention and the use of shunting locomotives, its expedient adjustment should be done to identify more appropriate options for the train formation plan as compared to the stable specialization.

In the coming years, in connection with the transition to a fixed schedule for the freight trains traffic, operations to eliminate the discrepancy, at individual stations, between the number of marshaling tracks and the number of destinations of optimal train formation plans will be completed, and in the future, a 15% reserve of marshaling tracks will be created. This will ensure



favorable conditions for the use of the principle of prompt change in the specialization of sorting tracks without re-sorting of cars.

### **CONCLUSIONS**

1. Automation of the marshaling yard control in conditions of a fixed schedule for the traffic of freight trains could be conducted by developing a computer program. This system will ensure that the station operates in an optimal mode.

2. To calculate an optimal departure timetable at a fixed schedule, computer software was developed in the *Delphi 7* programming language "Automation of the departure timetable calculation at a fixed schedule using the train accumulation rate".

3. The developed computer program will assist engineering and technical workers in drawing up a diagram of train and car flow by hours, and in the exact choice of the "departure time" of freight trains for individual destinations of the train formation plan at a fixed schedule.

4. The criterion for assessing the options for the train formation plan can be the minimum detention of cars at the station with the maximum use of its technical means, an increase in labor productivity and a decrease in production costs. At the same time, the operational specialization of sorting tracks should be applied.

5. The most advantageous option for train formation should be adjusted (i.e. re-calculated) in the cases when the corresponding departure plan cannot be implemented according to the operating conditions of the directions and the locomotive turnover schedule.

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***Rezyume:*** Maqolada yuk poyezdlari harakatining belgilangan jadvali sharoitida marshall yo'llaridan optimal foydalanish yo'llari ko'rib chiqiladi. Belgilangan jadval bo'yicha yuk poyezdlarini shakllantirish maqsadida poyezdlarning jo'nash jadvali bo'yicha dasturiy ta'minot

*ishlab chiqish asosida yo'llarni saralash quvvatini oshirish bo'yicha tashkiliy chora-tadbirlar taklif etilmoqda.*

**Резюме:** В статье рассматриваются пути оптимального использования сортировочных путей в условиях фиксированного расписания движения грузовых поездов. Предлагаются организационные мероприятия по увеличению пропускной способности сортировочных путей на основе разработки программного обеспечения расписания отправления поездов с целью формирования грузовых поездов по установленному расписанию.

**Kalit so'zlar:** yo'llarni saralash ixtisosligi, qat'iy belgilangan jadval, poezdlarni shakllantirish, poezdlar jo'nash jadvali, matematik model, kompyuter dasturi.

**Ключевые слова:** специализация сортировочных путей, фиксированное расписание, формирование поездов, расписание отправления поездов, математическая модель, программа для ЭВМ.

**THE EFFECT OF TEMPERATURE ON REINFORCED CONCRETE STRUCTURES.  
CALCULATION OF THE EFFECT OF STRUCTURES ON TEMPERATURE**

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***Summary.** In this article discussed the influence of temperature of iron – concrete construction. Also solidity of concrete and the influence of temperature to deformation. In the result of unequal get warming temperature is given.*

***Keywords:** temperature, humidity, reinforced concrete stress, structural elastic modulus, deformation, radiation.*

Concrete and reinforced concrete structures are one of the main materials in modern capital construction. Reinforced concrete structures account for more than 25% of the cost of materials in the construction of buildings and structures. The main reason for this is that concrete is a local material, and its raw material reserves are sufficient in the country. Concrete and reinforced concrete have a wide range of applications due to their important properties such as strength, cold resistance and long-term durability.

Concrete differs in its application: ordinary concrete for reinforced concrete structures (foundation, column, beam, wall, bridge and other types of structures); hydraulic concrete reservoirs, dams, sluices, canal surfaces, water supply and sewerage structures, etc.; barrier structures (lightweight concrete for building walls); Concrete for floor, sidewalk, highway, airfield runways; special purpose concrete (fire, acid resistant, radiation protection), etc.

Depending on the specified purpose, the concrete must meet the requirements. Concrete intended for simple reinforced concrete structures must have the required strength when compacted. For outdoor constructions, in addition to durability, they must also be cold-resistant. Concretes used for hydraulic structures must be high-density, waterproof, frost-resistant, sufficiently strong, shrinkable, resistant to the alkaline effects of filtered water. Concrete used for the walls of heated buildings, along with the strength of heat-insulating, Concrete used for the floor should not be made and have sufficient strength in bending, no

In the theory of concrete strength currently in use, its structure is not taken into account. The question of whether the strength of concrete depends on its structure has not yet been resolved. The solution of these problems is especially important for concrete used in Central Asian climates. Because concrete is in a state of additional stresses in dry and hot climates under the influence of heat and humidity (except under the influence of external forces). This situation is currently not sufficiently taken into account in accounting.

However, the deformation of concrete depends, on the one hand, on the composition, strength and density of concrete, elastic and plastic properties of aggregates and cement, on the other hand, stress conditions, the value and duration of the load and the amount of heat and moisture in climatic conditions.

Large amounts of penetration into the concrete and rapid changes in temperature on it create large internal stresses in it, resulting in small cracks in the concrete. These cracks have a great impact on the stiffness and crack resistance of the structure.

Deformation of concrete under the influence of temperature consists of two parts. [1]

1. The deformation changes in proportion to the change in temperature

$$\varepsilon_t = \alpha_t (t - t_0) = \alpha_t \Delta t \quad (1)$$

where  $\alpha_t$  is the coefficient of linear expansion of concrete under the influence of temperature;  
 $\Delta t$  is the difference formed by the change in ambient temperature, °C.

2. Internal voltage generated by temperature difference

$$\sigma_t = E_b \varepsilon_t = E_b \cdot \alpha_t \Delta t \quad (2)$$

where  $E_b$  is the modulus of elasticity of concrete.

Uneven heating of concrete from top to bottom on the cutting surface under the influence of heat creates a temperature difference (gradient) in the structure. This difference causes internal stresses to appear on the cutting surface.

During operation, the construction material absorbs different impacts and different loads. Effects can be with power tool (power equipment) and without power tool (non-violent).

Effects such as temperature, humidity, radiation, harmful environment are included without power tool, ie power independent.

It is a disadvantage that the theory of calculation of reinforced concrete structures can take into account all of these effects.

In order to carry out BCR (building codes and regulations) in the norms of design and construction works, it is necessary to take into account the effects of heat, dry air and strong solar radiation, which have a negative impact on the structural elements. The quality of design and construction work largely depends on the extent to which this problem is solved. The issue of taking into account the impact of climatic conditions on the performance of reinforced concrete structures is associated with the implementation of special measures and requires additional costs. The safe and long-term service life of reinforced concrete structures depends on the correct execution of calculations during the design process.

The climatic conditions of Central Asia differ from the European conditions with sharp fluctuations in air temperature and relative humidity during the day, month and season. [1]

The peculiarity of the Central Asian climate is that the daily, monthly and annual changes in air temperature and humidity are very large here. In these areas, in summer - June, July, August, the sunny surfaces of reinforced concrete structures heat up to 70 °C during the day and decrease to 20 °C at night. Relative humidity can drop to an average of 20-40% during the summer months, and up to 10% during the day. In Central Asia, year-round rainfall is also uneven. The amount of precipitation is 250-300 mm per year, and in some years it reaches 450-480 mm. The main part of the precipitation falls in winter and spring, and very little in summer. Sometimes there are times when it doesn't rain at all in the summer. This leads to a further decrease in humidity. High air temperatures and low relative humidity of the environment cause significant temperature, penetration, internal stresses and deformations in reinforced concrete elements.

In the calculation of reinforced concrete structures not protected from solar radiation, the construction standards shall be based on the average and daily normative values of air temperature outside BCR 2.01.07-96 [4] in the summer ( $t_{\text{VII}}^T$ ) and in winter ( $t_{\text{I}}^X$ ) is recommended to determine by the following formulas:

$$t_{\text{VII}}^T = t_{\text{VII}} + \Delta_{\text{VII}} \quad (3)$$

$$t_{\text{I}}^X = t_{\text{I}} - \Delta_{\text{I}} \quad (4)$$

Here:

$t_{\text{VII}}$  and  $t_{\text{I}}$  are the multi-year average monthly temperatures of air in July and January, taken from the norms (BCR 2.01.07-96. p. 8.4.).  $\Delta_{\text{VII}}$  and  $\Delta_{\text{I}}$  are deviations from the average temperature set for July and January. For the Central Asian climate,  $\Delta_{\text{VII}} = + 6^\circ\text{C}$ ,  $\Delta_{\text{I}} = -15^\circ\text{C}$ .

In the Central Asian climate, reinforced concrete structures are subject to periodic changes in temperature and humidity. During the day there is an increase in temperature during the day, a decrease in humidity, and at night, on the contrary, there is a decrease in temperature and an

increase in humidity. As a result of changes in temperature and solar radiation, the temperature area in the concrete changes continuously along the cutting surface of the element.

Uneven distribution of temperature and humidity along the cutting surface of the element accelerates the cracking of the element, while the appearance of specific temperature-input voltages in the element. Experimental results showed that the temperature distribution across the cut surface was not linear over time. In the calculation of the temperature field, the non-constant temperature field for the worst condition is considered to be conditionally constant. In this case, the temperature is assumed to be linearly distributed in one direction. In the other direction, it is assumed that it changes voluntarily. In this case, the linear temperature profile can be conditionally divided into two:

1. The uniform distribution of temperature along the cutting surface leads to elongation or contraction of the element. In this case, the element is calculated as the difference between the initial high temperature and the average temperature, ie the time of the hot and cold period of the year.
2. An uneven change in temperature along the cut surface without changing the length of the element leads to a change in the curvature of the element. In this case, the cutting surface of the element is calculated for the largest temperature difference between the outer and inner surfaces of concrete, as well as the time of year in hot and cold periods.

Thus, in order to accurately determine the actual condition and exact service life of reinforced concrete structures, it is necessary to calculate not only the effect of external forces, but also the effect of temperature and humidity on structures exposed to direct sunlight.

When calculating the heating elements in dry hot climates, the gross surface of the concrete or the surface of its compressed part is taken to the unheated, high-strength concrete to determine the center of gravity, as well as the static and inertia moments of the gross section. To do this, the cut is divided into several parts along the height. [3] The given surface  $A_{red}$  is found by the following formula:

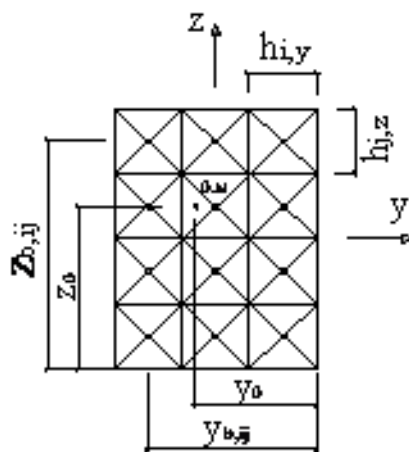
$$A_{red} = \frac{A_i \beta_{bi} h_i}{\varphi_{bi}} \quad (1)$$

where  $A_i$  is the surface of the  $i$ -th part of the cut;  $\beta_{bi}$ — coefficient depending on the temperature at the center of gravity of the  $i$ -th part of the concrete section;

$h_i$  —the coefficient depending on the temperature at the center of gravity of the surface of the  $i$ -th part of the concrete section for short-term heating;

$\varphi_{bi}$  is the coefficient taking into account the short-term hardening of concrete.

Heated elongated  $A_s$  and compressed  $A'_s$  are brought to the surface unit of unheated, high-strength concrete surface:



**Figure 1. Divide the cutting surface of the element into surfaces:**

i, j are the coordinates of the small surfaces:

i - from 1 to n · y

j - from 1 to nz

$$A_{s,red} = \frac{A_s E_s \beta_s}{E_b \varphi_{b1}}; \quad (2)$$

$$A'_{s,red} = \frac{A_s E_s \beta_s}{E_b \varphi_{b1}}; \quad (3)$$

where  $A_{s, red}$  and  $A'_{s, red}$  are the listed surfaces of the elongated and compressed fittings;  $E_s$  is the modulus of elasticity of the armature;  $\beta_s$  is the coefficient depending on the temperature of the armature.

In the calculation, temperature and humidity are assumed to be given, and the change in cutting time is assumed to be arbitrary.

The modulus of elasticity, the coefficient of linear expansion and the penetration of concrete are taken into account depending on changes in temperature and humidity.

Unlike other calculations, solar-exposed reinforced concrete structures are calculated as follows:

In hot climates, the air is heated under the influence of the first summer rated temperature, and during the long summer, the temperature cools under the influence of periodic heating and winter rated temperatures. In solving such a problem, the homogeneous properties of concrete and uneven changes in temperature should be taken into account. The heat flux is calculated by the method described in the reinforced concrete elements when the element is exposed at an angle to the main axis.

To do this, the entire surface is divided into smaller surfaces along the “y” and “z” axes. Each small surface has its own specific temperature (Figure 1).

When the reinforced concrete element is heated unevenly, it is deformed in the following order (as long as the elongation zone is not cracked) - the elongation of the axis of the element:

$$\varepsilon_t = \frac{\sum_{i,j=1,1}^{ny,nz} A_{red,ij} \cdot \varepsilon_{t,ij} + A_{s,red} \varepsilon_s + A'_{s,red} \varepsilon'_s}{A_{red}} \quad (4)$$

the curvature of the element axis relative to the u and z axes

$$\left(\frac{1}{r}\right)_{t,y} = \frac{K_y + \sum_{i,j=1,1}^{ny,nz} A_{red,ij} Z_{b,ij} \varepsilon_{t,ij} + \sum_{i,j=1,1}^{ne,nz} \left(\frac{1}{r}\right)_{f,ij,y} J_{red,ij,y}}{J_{red}} \quad (5)$$

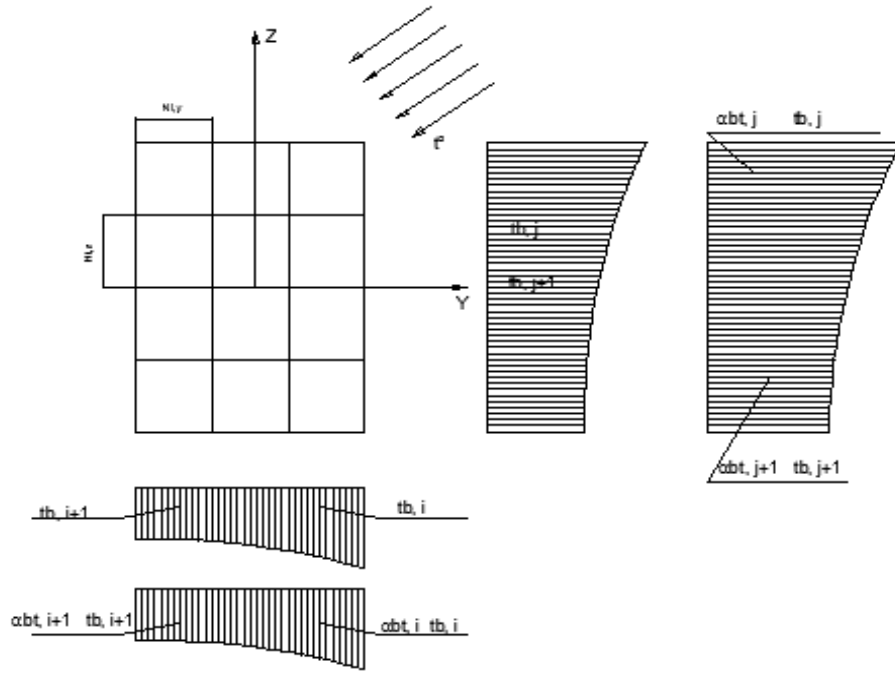


Figure 2. History of heat dissipation.

$$\left(\frac{1}{r}\right)_{t,y} = \frac{K_y + \sum_{i,j=1,1}^{ny,nz} A_{red,ij} Z_{b,ij} \varepsilon_{t,ij} + \sum_{i,j=1,1}^{ne,nz} \left(\frac{1}{r}\right)_{f,ij,y} J_{red,ij,y}}{J_{red}} \quad (6)$$

$$\left(\frac{1}{r}\right)_{t,z} = \frac{K_z + \sum_{i,j=1,1}^{ny,nz} A_{red,ij} Z_{b,ij} \varepsilon_{b,ij} + \sum_{i,j=1,1}^{ny,nz} \left(\frac{1}{r}\right)_{f,ij,z} J_{red,ij,z}}{J_{red}}$$

Elongation in the concrete section (i, j) and curves following determined from the formulas:

$$\varepsilon_{t,ij} = \frac{\alpha_{bt,i} t_{b,i} + \alpha_{b,t,i+1} t_{b,i+1} + \alpha_{bt,j} t_{b,j} + \alpha_{b,t,j+1} t_{b,j+1}}{4} \quad (7)$$

$$\left(\frac{1}{r}\right)_{t,ij,z} = \frac{\alpha_{bt,j} t_{b,j} - \alpha_{b,t,j+1} t_{b,j+1}}{h_{j,z}} \quad (8)$$

$$\left(\frac{1}{r}\right)_{t,ij,z} = \frac{\alpha_{bt,i} t_{b,i} - \alpha_{b,t,i+1} t_{b,i+1}}{h_{i,j}}$$

Elongation of reinforcement

$$\varepsilon_s = \alpha_{st} t_s; \varepsilon'_s = \alpha_{s't'} t'_s$$

will be. Included in the formulas

$A_{red}$ ;  $A_{red,ij}$ ;  $A_{s,red}$ ;  $A'_{s,red}$  ба  $y_{b,ij}$ ;  $y'_{s,i}$ ;  $y_{s,i}$ ;  $Z_{b,ij}$ ;  $Z_{s,ij}$ ;  $J_{red}$ ;  $J_{red,x}$ ;  $J_{red,y}$ ; such quantities are taken from QMQ 2.03.04.-96; the remaining quantities are taken as shown in Figure 2.

The stresses in the concrete in part i, j of the section are determined by the following formulas:

a) the tensile stress caused by heating when the temperature is distributed non-linearly across the cutting surface:

$$\sigma_{bt,ij} = \left[ \varepsilon_t - \varepsilon_{t,ij} + \left( \frac{1}{r} \right)_{t,ij} Z_{b,ij} + \left( \frac{1}{r} \right)_{t,ij,z} Y_{b,ij} \right] E_b \beta_{b,ij} \bar{V}_{b,ij}; \quad (9)$$

b) compressive stress caused by short-term heating:

$$\sigma_{b,ij} = \frac{N_x}{A_{red}} + \left( \frac{M_y}{B_y} Z_{b,ij} + \frac{M_z}{B_z} Y_{b,ij} \right) E_b \varepsilon_{b,ij} \bar{V}_{b,ij}; \quad (10)$$

c) tensile stress due to penetration and hardening in concrete during cooling:

$$\sigma_{csc,ij} = \left[ \varepsilon_{csc} - \varepsilon_{csc,ij} - \varepsilon_{c,ij} + \left( \frac{1}{r} \right)_{csc,ij,y} Z_{b,ij} + \left( \frac{1}{r} \right)_{csc,ij,z} Y_{b,ij} \right] b_{b,ij} \quad (11)$$

$M_x, M_z$  va  $N_x$  - bending moments with respect to the "y" and "z" axes and the longitudinal force applied to the center of gravity of the cut;

$\beta_{b,ij}$  and  $v_i$  are coefficients derived from BCR 2.03.04-96 [3].

Thus, in order to ensure the actual condition of reinforced concrete structures and its durability, it is necessary to take into account the influence of external factors in the calculations.

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**Rezyume:** Maqolada temirbeton konstruksiyasining harorat ta'siriga qanday hisoblash yo'llari. Betonning mustahkamligi va deformatsiyasiga haroratning ta'siri. Noteks isish natijasida harorat farqi hisobiga hosil bo'ladigan ichki kuchlanishlarning aniqlash yo'llari ko'rsatib berilgan.

**Резюме:** В статье даны пути расчета влияния температуры на железобетонных конструкций. Влияние температуры на прочность и на деформацию бетона. Показаны пути определения внутренних напряжений возникающих из-за разности температур при неравномерных нагревах.

**Kalit so'zlar:** harorat, namlik, temirbetonkuchlanish, konstruksiyaelastiklik moduli, deformatsiya, radiatsiya.

**Ключевые слова:** температура, влияние, железобетонное напряжение, эластическое модули конструкций, деформация, радиация.



**IMPROVEMENT OF THE TEACHING METHODS OF  
ENGINEERING AND GRAPHIC DISCIPLINES**

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**Summary:** *The article devoted to the using of multimedia technologies in the teaching of lectures on drawing geometry and engineering graphics, instructions and recommendations for improving quality.*

**Keywords:** *Graphic, engineering, assembly, construction, multimedia, technology, innovation, motivation, professionalism, psychological, methodology, design, design.*

Graphic Engineering is a subject in which students become familiar with a wide range of technical concepts. Knowledge facilitates the study of many other general technical subjects.

The main objectives of the course: study of structures, type and performance criteria of machine parts, assembly units (assemblies) and assemblies, study of the theory of joint work (mates) of machine parts and methods of their calculation: development of new design and technical creativity.

The course is based on general scientific and general engineering disciplines. He borrows the mathematical apparatus of research from mathematics, the apparatus of research from mathematics, methods of analysis of forces, stresses and deformations from theoretical mechanics and resistance of materials from materials science, methods graphic disciplines, without improving the methods of perception of the studied material by students, it is very difficult to achieve great success. Based on the long-term analysis of the educational process and the results of examinations, it is possible to draw a conclusion about the priority of searching for innovative ideas in the direction of increasing the internal motivation of students in the process of studying disciplines. The main arguments for such conclusions are:

- the amount of information that a student can receive, process and remember is limited, both for short-term and long-term types memory [1, p. 26].
- information overload of young people from the presence of modern means of communication (mobile phones, smartphones, laptops, free Internet access).
- a low level of motivation for a quick and high-quality study of the material and the implementation of graphic images (due to ignorance of the connection between the student and the prospect of his own development).
- poor preparation for independent analysis and development of an action plan for the development of curricula.
- unstable psychological tempering for intense creative work (patience, perseverance, physical endurance, willpower).
- low level of general education of the majority of students, borrows the mathematical apparatus studied research from mathematics, methods of analysis of forces, stresses and deformations from theoretical mechanics and resistance of materials from materials science, methods of predicting the resource of parts and components of machines from fracture mechanics, theory of mechanics and theory of reliability, etc.

The analysis of widely used and actively implemented methods of teaching engineering and graphic disciplines in the process of training engineering personnel at the present stage has shown that university teachers use a fairly wide range of various methods and educational technologies. The overwhelming majority of teachers, mostly with long work experience, prefer traditional teaching methods. This is a classic lecture room or class for practical exercises, modern blackboard, chalk, posters, models. Here, the quality of knowledge of students depends primarily on the

professionalism, talent and abilities of the teacher. Ability not only to present the studied material in an accessible way, but also skills in high-quality, step-by-step execution of drawings on a board, preferably in a color image. The trainees should take notes on both theoretical material and graphic images made on the board. The positive here is the direct contact of the teacher with the audience, the possibility of stops, additional explanations, repetitions of problem solving algorithms and other actions. The negative can be attributed to the great complexity of the implementation of drawings on the board, and as a result, the unproductive costs of classroom time. The main innovative elements of traditional teaching methods are now various options for the use of handouts both in practical and lecture classes.

In recent years, various methods of teaching engineering graphics with the use of technical teaching aids have been actively used, following the rapid development of computer technology. Multimedia technologies are more and more widely used when giving lectures on descriptive geometry and engineering graphics. The video image makes it possible not to waste time and effort on purely technical issues, allows you to show volumetric models, step-by-step execution of drawings, free the teacher to communicate with the audience. The ability to post video materials on the Internet portals of educational institutions allows the video course to be available for viewing by students of correspondence and distance learning.

When studying computer graphics, various means of three-dimensional solid modeling are used, which at the modern level allow students to carry out polytechnical and professional training for the conditions of modern production, form the foundations of computer engineering graphics, and acquire skills in the development of drawing and graphic documentation using CAD systems. The presented methods and technologies for teaching engineering and graphic disciplines, although they have passed a long-term path of approbation, should be constantly improved in the direction of reducing the disadvantages and increasing their advantages.

However, no matter what perfect innovative technologies are used in teaching and learning more methods of receiving the studied especially those who entered the paid form of education.

- a large number of disciplines studied at the university and, as a result, a reduction in classroom hours for studying each of them.

Based on the analysis of the main factors affecting the quality of knowledge and skills in engineering and graphic disciplines, the following recommendations for improving the educational process can be formulated: apply all modern innovative technologies in the oral and graphic presentation of the studied sections (multimedia equipment, handouts, three-dimensional images).

- to teach students the basics of the scientific organization of the educational process (comfortable arrangement of the workplace, full equipment with high-quality drawing accessories, provision of educational, methodological and reference literature, including electronic versions, weekly network schedules for the study of disciplines, rating self-assessment).

- achieve the full concentration of the entire group's attention on the content of the topic being studied (the teacher is required not only professionalism, but also stable psychological preparation, willpower, composure, a sincere desire for success for the trainees).

- a clear formulation of the ultimate goal of the assignment for this lesson with a step-by-step movement towards it [2].

to develop a set of psychological techniques aimed at increasing the internal motivation of students for academic success (if I learn well study, then I will learn to achieve life goals).

- to convince students of their ability to study, to find and show the strongest sides when they perform graphic tasks (I did not know and could not, now I know more, I can do better).

- develop a creative approach of students to the learning process throughout the study of courses in engineering and graphic disciplines (accept not only the methodological techniques proposed by teachers, but also develop their own approaches adapted to the characteristic features of their own body, while achieving the achievement of the set goal in the shortest possible time) ...

The outlined recommendations are only the main guidelines for further searches for real ways to improve the teaching methods of engineering and graphic disciplines in technical universities.

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***Rezyume:*** Maqolada chizma geometriyasi va muhandislik grafika fani bo'yicha ma'ruzalarni o'qitishda multimedia texnologiyalaridan foydalanish, sifatini yaxshilash bo'yicha ko'rsatma va tavsiyalar so'z etiladi.

***Резюме:*** В статье рассматривается использование мультимедийных технологий при преподавании лекций по начертательной геометрии и инженерной графике, инструкции и рекомендации по повышению качества.

***Kalit so'zlar:*** Grafik, muhandislik, agregat, konstruksiya, multimedia, texnologiya, innovatsion, motivatsiya, professionallik, psixologik, metodik, loyiha, dizayn.

***Ключевые слова:*** Графический, инженерство, агрегат, конструкция, мультимедиа, технология, инноватсион, мотиватсия, профессионализм, психологический, методика, проектирование, дизайн.

## ENERGY-SAVING TECHNOLOGIES BASED ON INTELLIGENT CONTROL OF HEAT EXCHANGE PROCESSES IN LOW-TEMPERATURE HEATING SYSTEMS

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**Summary:** *The main trends in the development of energy-saving technologies based on intelligent control of heat exchange processes in low-temperature heating systems are identified. A comparison of the temperature distribution in a room when it is heated by a high - and low-temperature radiator, and a warm floor is made. It is noted that reducing the temperature of the heat carrier in water heating systems provides significant savings in energy resources by reducing losses during heat generation, transportation and distribution, as well as greater safety for users. It is concluded that it is necessary to develop proposals for updating existing building codes, taking into account the latest achievements of science and technology in the field of low-temperature heating systems.*

**Keywords:** *low-temperature heating system, high - and low-temperature radiator, underfloor heating, heat carrier, water heating, self-regulation, intelligent control.*

**Introduction.** The development of new energy-saving technologies that ensure rational use of energy and reduce heat costs for heating leads to the use of waste heat, environmental heat, solar radiation, ground heat and other alternative energy sources. Since the temperature level of these heat sources is usually low, their use requires special heating systems that differ in their design features from traditional ones. This is why they are called " low-temperature heating systems "(Bogoslovsky and Skanavi, 1991).

Low-temperature heating systems are still not widely used, despite their advantages. An obstacle to propagation is the increased metal consumption due to the development of the heating surface area (Skanavi and Makhov, 2002).

**Radiators** are traditionally considered attributes of water heating systems with high standard temperature parameters in the supply and return pipelines-95/70 ° C and even 105/70 ° C in single-pipe heating systems (Bogoslovsky, Krupnov, Skanavi et al., 1990). But the postulates on which this point of view was based are outdated. Saving of metal and construction thermal insulation is not put above saving of energy resources today. And the technical characteristics of modern **radiators** allow us to talk not only about the possibility of their use in low-temperature systems, but also about the advantages of such a solution.

Therecent growing interest in low-temperature heating systems is associated with their undoubted advantages, as well as the relevance of using alternative energy sources (solar, ground heat, geothermal, etc.). Reducing the temperature of the heat carrier is the main trend in the development of heating equipment in recent decades in European countries (Bad Guys, 2011). This became possible with the improvement of thermal insulation of buildings and the improvement of heating devices. In the 1980s, the standard parameters were reduced to 75/65 °C. The main benefit of this was the reduction of losses during heat generation, transportation and distribution, as well as greater safety for users.

With the growing popularity of floor and other types of panel heating in the systems where they are used, the supply temperature is reduced to 55 ° C, which is taken into account by the designers of heat generators, control valves, etc.

Today, the supply temperature in high-tech heating systems can be 45 and even 35 ° C. The incentive to achieve these parameters is the ability to make the most efficient use of heat sources such as heat pumps and condensing boilers. At a secondary coolant temperature of 55/45 ° C, the

conversion efficiency coefficient for a ground-to-water heat pump is 3.6, and at 35/28 ° C it is already 4.6 (when working only for heating). And the operation of boilers in condensation mode, which requires cooling of flue gases with return line water below the "dew point" (when burning liquid fuel-47 ° C), gives a gain in efficiency of about 15 % or more. Thus, reducing the temperature of the heat carrier provides significant savings in energy resources, and, accordingly, a reduction in carbon dioxide emissions into the atmosphere.

It should be noted, however, that the use of modern high-efficiency heating equipment in low-temperature systems requires correspondingly high-quality control of the heat exchange processes occurring in them. The latter can be achieved on the basis of intelligent control of heat exchange processes using information as a measure of reflection of the ratio of production and consumption of thermal energy (Chaykovskaya, 2008, 2012).

The purpose of this paper is to identify the main global trends in the development of energy – saving technologies based on intelligent control of heat exchange processes in low-temperature heating systems.

Among low-temperature heating systems, floor heating occupies a special place. Over the past twenty years, the use of radiant floor heating has significantly expanded. In Germany, Denmark, and Austria, 30 to 50% of new residential buildings are equipped with underfloor heating (Olesen, 2003).

Floor heating is particularly widespread in Korea, where about 90 % of residential buildings are heated through floors (Olesen, 2003). As early as 100 years before our era, Koreans used hearth smoke as a means of heating the stone floor. The smoke from the kitchen fire was diverted under the massive stone floor to the opposite wall, and then rose up the inner cavity of the wall, which played the role of a chimney. Thus, the floor array served as a heat accumulator. Around this time, the Romans used a similar type of heating.

During the 1950s and 60s, underfloor heating installations with steel or copper pipes appeared in Western Europe. Unfortunately, at that time, the thermal insulation of buildings was imperfect, so the floor temperature was too high for heating, which led to discrediting these systems. By the end of the 1970s, as the thermal protection of buildings improved, underfloor heating was becoming more widespread, in particular in Germany, Switzerland, Austria and the Scandinavian countries. Currently, mainly polyethylene pipes are used (Olesen, 2003).

Modern buildings are becoming increasingly thermally sensitive, thanks to improved thermal insulation. At the same time, the most serious problem associated with thermal comfort in buildings with good thermal insulation is large fluctuations in the room temperature when internal heat releases from people, lighting, equipment, and direct solar radiation change. A consequence of low heat losses in heat-protected buildings is the fact that changes in internal heat releases have a significantly greater effect on the room temperature than in buildings with standard thermal insulation. The degree of this influence depends on the thermal inertia and controllability of heating systems. Since underfloor heating differs from other systems by greater inertia, it is often argued that when using underfloor heating, the risk of overheating the room and increasing heat loss increases. However, some studies have shown that this is not the case (Olesen, 2003).

External and internal thermal disturbances (from sunlight, household appliances, the presence of people) can strongly affect the microclimate in the room. And **radiators** respond to these thermal changes more accurately than panel heating systems.

As you know, "underfloor heating", especially arranged in a concrete screed, is a system with a large heat capacity that reacts slowly to regulatory influences.

Even if the "warm floor" is controlled by thermostats, a quick response to the supply of external heat is impossible. When laying heating pipes in a concrete screed, the response time of floor heating to changes in the amount of incoming heat is about two hours.

Quickly reacting to the arrival of outside heat, the room thermostat turns off the floor heating, which continues to give off heat for about two hours. When the external heat supply is stopped and the thermostatic valve is opened, the floor is fully heated only after the same time. Under these conditions, only the self-regulation effect is effective, which has recently been widely used in solar heat supply systems (Rashidov, 2006a, 2006b, 2006cc, d2006d, 2013).

Self-regulation is a complex dynamic process (Bad Guys, 2011). In practice, it means that the heat supply from the heater is regulated naturally due to the following two laws: 1) heat always propagates from a hotter zone to a colder one; 2) the value of the heat flux is determined by the temperature difference. The well-known (it is widely used in the selection of heating devices) equation allows us to understand the essence of this:

$$Q = Q_{\text{nom.}} (\Delta T / \Delta T_{\text{nom.}})^n,$$

where  $Q$  is the heat transfer of the heater;  $\Delta T$  is the difference between the temperature of the heater and the indoor air;  $Q_{\text{nom.}}$  is the heat transfer under nominal conditions;  $\Delta T_{\text{nom.}}$  is the difference between the temperature of the heater and the indoor air under nominal conditions;  $n$  is the exponent of the heater.

Self-regulation is typical for both underfloor heating and radiators. At the same time, for a "warm floor", the value of  $n$  is 1.1, and for a radiator – about 1.3 (exact values are given in the catalogues). That is, the response to a change in  $\Delta T$  in the second case will be more "pronounced", and the restoration of the set temperature regime will occur faster.

It is also important from the point of view of regulation that the surface temperature of the radiator is approximately equal to the temperature of the coolant, and in the case of underfloor heating this is not the case at all.

With short-term intensive external heat input, the "underfloor heating" control system does not cope with the work, as a result of which there are fluctuations in the temperature of the room and floor. Some technical solutions can reduce them, but not eliminate them.

In Fig. 1 shows graphs of changes in the operating temperature for an individual house when it is heated by adjustable high- and low-temperature radiators and "underfloor heating" (Bad Guys, 2011). The house can accommodate four people and is equipped with natural ventilation. Third-party heat sources are people and household appliances. The operating temperature of 21 °C is set as comfortable. The graphs show two options for maintaining it: without switching to energy-saving (night) mode and with it.

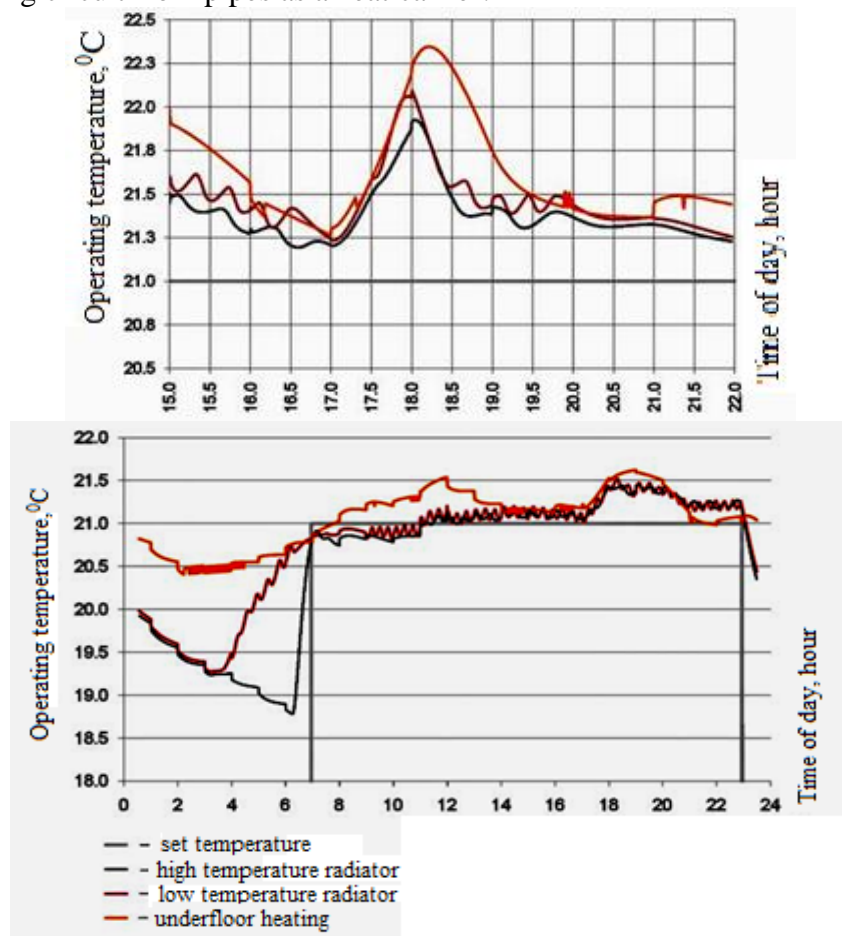
Note: operational temperature is an indicator that characterizes the combined effect of air temperature, radiation temperature, and ambient air velocity on a person. Experiments show that **radiators** respond to temperature fluctuations much faster than "underfloor heating", providing smaller deviations and a more comfortable and efficient indoor temperature profile in terms of energy use.

A comparison of the vertical temperature distribution in rooms of the same size and layout (without furniture or people), heated by a low-temperature radiator and a "warm floor" is shown in Fig. 2. The outside temperature was -5 °C. The air exchange rate is 0.8.

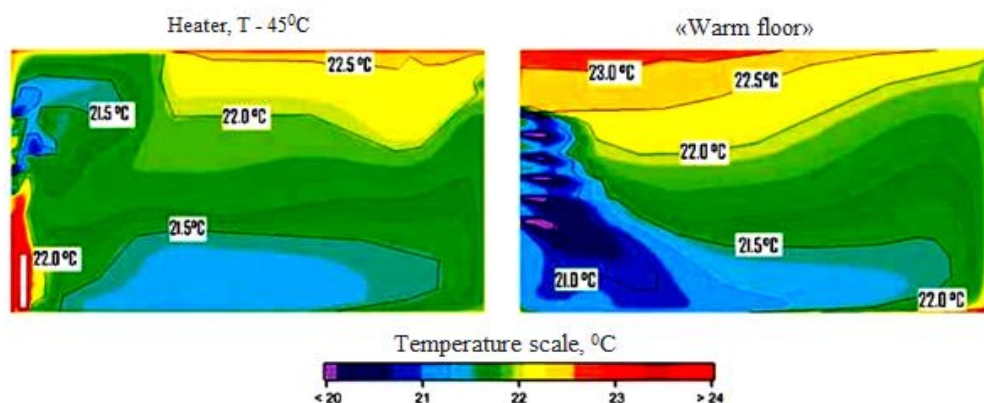
2. A **low-temperature radiator installed under the window** provides the most uniform temperature distribution, blocking the flow of cold air into the room. But when choosing a specific solution, you should take into account the quality of glazing, the location of furniture, and other features of the object.

Heat losses for "underfloor heating", depending on the thickness of the thermal insulation (100-300 mm), are 5-15 % (in the lower direction, at an air temperature of -21, a concrete base – 10 °C). For a **high-temperature radiator**, the losses through the back wall are approximately 4%, for a low-temperature radiator-only 1 % (provided that the building's thermal protection meets current European standards).

The main advantage of low-temperature heating systems is the use of water circulating through the heating circuit from pipes as a heat carrier.



**Fig.1. Dynamics of changes in the operating temperature in the simulated conditions of an individual house when it is heated by adjustable high-and low-temperature radiators and "underfloor heating"**



**Fig.2. BVertical temperature distribution in the same area and layout of rooms (without furniture and people), heated by a low-temperature radiator and "underfloor heating"**

Water has a high heat content per unit volume and can be heated by various energy sources (electricity, oil, gas, coal, etc.). It is clean, non-toxic and always available, including at the price. The low water temperature (the most economical temperature parameters at the inlet and outlet of the system are 55/45°C), at which underfloor heating systems operate, helps to save energy. From floor systems that use electricity as a heat carrier, water systems favorably differ in the absence of an additional load of electromagnetic fields.

In comparison with other heating systems (for example, radiator heating), which use the same heat carrier, namely water, floor heating is characterized by a different way of heat distribution. Long-term practical experience of various companies shows that floor heating, due to the participation of the entire floor surface in heat emission, provides an exceptionally uniform horizontal temperature distribution and close to ideal vertical distribution. Thus, the most optimal climate is created in the premises: the floor temperature in the premises ranges from 22-25°C, and the air temperature at head level is 19-22°C. These are the most favorable living conditions, which is confirmed by independent psychological tests that indicate that people feel most comfortable if the head is slightly colder than the feet.

Unlike radiator heating, the floor-standing system does not contribute to the occurrence of positive ionization of the air that is unfavorable for humans, and when using it, which is very important, optimal air humidity is maintained. The floor system is hygienic, because with minimal heat flows, dust practically does not circulate in the room. It is invisible, suitable for modern design, and in the absence of heating devices, it becomes possible to make more efficient use of residential or office space.

Finally, it is necessary to note the economic factor: with floor heating, in comparison with radiator heating, heat energy is saved by 20-30% in residential buildings, and in rooms with high ceilings (gyms, exhibition halls, church complexes), this indicator can reach 50%.

Meanwhile, the advantages of water underfloor heating consist of the total influence of the coolant and individual elements of the system, which includes pipes and accessories. In Wirsbo underfloor heating systems (Korchagin, 2002) specially designed Wirsbo-pePEX and Wirsbo-evalPEX pipes are used, made of PEX-A polyethylene with an anti-diffusion barrier that blocks the penetration of oxygen into the system and protects its steel elements from corrosion. Anti-diffusion barriers are applied to the main Wirsbo-PEX pipe, and covered with a protective layer on top to prevent possible damage during installation of Wirsbo-pePEX pipes.

The system operates on the principle of feed and return manifolds, with each loop controlled at both ends. The valve on the supply manifold can be equipped with an actuator that is controlled from a room thermostat or manually. The return manifold has built-in control valves that control the flow of water through all loops, thus equalizing pressure differences. The control equipment (thermostats and actuators) reliably provides room temperature control based on the opening and closing of the water flow (two-position control).

The water heating system is a multi-layered structure that is installed on concrete or wooden floors. It must meet all standards for thermal insulation, sound insulation and strength. For new buildings with self-levelling concrete floors, the underfloor heating system is designed as a "wet laying" system. It provides layers: concrete slab, waterproofing (especially necessary for slabs in contact with the ground and in wet rooms), sound and thermal insulation, film, pipes, concrete screed, cement layer for leveling the floor and coating. Heating loops in this version are located in a concrete mixture. Concrete conducts heat well, and this self-leveling layer serves as a screen to distribute heat across the floor surface.

In older buildings, when self-leveling floors cannot be installed, the "dry laying" method is used. Heating pipes are installed in the insulation of the load-bearing layer in special aluminum plates that ensure uniform heat distribution. This reduces the number of heavy layers and the height of the structure. The Wirsbo-Alu system has been developed specifically for this purpose. The thickness of the insulation layers and the materials used vary depending on the production purpose of the construction sites.

In 2011-2012, Uzbekistan introduced an updated regulatory and methodological framework [15-18] for the design and construction of energy-efficient buildings (Khodjaev, Kadyrov and Khodjaev, 2016), aimed at ensuring a 25-50% reduction in energy consumption for heating, ventilation and air conditioning of buildings, without reducing the normalized parameters of the



indoor microclimate. They provide for a significant increase in the thermal protection indicators of enclosing structures [15], the use of progressive energy-saving architectural, typological and spatial planning solutions for buildings [15, 18], modern efficient thermal insulation materials [15, 16], engineering systems and equipment [17].

**Conclusion.** In conclusion, it should be noted that more than five years have passed since the introduction of the above-mentioned standards, and they naturally do not fully cover the above-mentioned achievements in the field of low-temperature heating systems. Therefore, it is now necessary to develop and justify proposals for updating existing building codes, taking into account the latest achievements in heating science and technology.

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**Rezyume:** Past haroratli isitish tizimlarida issiqlik uzatish jarayonlarini aqlli boshqarishga asoslangan energiya tejovchi texnologiyalarni rivojlantirishning asosiy yo'nalishlari aniqlangan. Yuqori va past haroratli radiator va er osti isitish bilan isitilganda xonadagi harorat taqsimotini taqqoslash amalga oshiriladi. Qayd etilishicha, suv isitish tizimlarida sovutish suvi haroratini pasaytirish issiqlikni ishlab chiqarish, tashish va taqsimlash jarayonida yo'qotishlarni kamaytirish, shuningdek, iste'molchilar uchun katta xavfsizlikni ta'minlash orqali sezilarli darajada energiya tejash imkonini beradi. Past haroratli isitish tizimlari sohasida fan va texnikaning eng so'nggi yutuqlarini hisobga olgan holda amaldagi qurilish me'yorlarini yangilash bo'yicha takliflar ishlab chiqish zarur, degan xulosaga kelindi.

**Резюме:** Выявлены основные направления развития энергосберегающих технологий, основанных на интеллектуальном управлении процессами теплообмена в низкотемпературных системах отопления. Проведено сравнение распределения температуры в помещении при его обогреве высоко- и низкотемпературным радиатором и теплым полом. Отмечено, что снижение температуры теплоносителя в системах водяного отопления обеспечивает значительную экономию энергоресурсов за счет снижения потерь при выработке, транспортировке и распределении тепла, а также большую безопасность для потребителей. Делается вывод о необходимости разработки предложений по обновлению действующих строительных норм с учетом последних достижений науки и техники в области систем низкотемпературного отопления.

**Kalit so'zlar:** past haroratli isitish tizimi, yuqori va past haroratli radiator, issiq pollar, sovutish suvi, suvni isitish, o'z-o'zini boshqarish, aqlli boshqaruv.

**Ключевые слова:** система низкотемпературного отопления, высоко- и низкотемпературный радиатор, теплые полы, теплоноситель, водяное отопление, саморегулирование, интеллектуальное управление.

**OXIDATIVE DESTRUCTION OF PHENOL IN AN AQUEOUS MEDIUM UNDER THE INFLUENCE OF PILLAR CLAYS**

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**Summary:** *The results of a research study of the catalytic activity of pillar aluminosilicates in the removal of phenol from wastewater are presented. The system of heterogeneous photo-Fenton was studied as an oxidizing system. For this, first, the processes of phenol adsorption on aluminosilicates developed by pillar are analyzed. It turned out that all the obtained adsorption dependences are described by the linear form of the Langmuir equation at low concentrations of equilibrium concentrations. The adsorption capacity of intercalated aluminosilicates for phenol exceeds those for the anionic dye Congo red, which is associated with the smaller size of phenol molecules and its greater activity with respect to the surface of adsorbents. The adsorption capacity decreases in the following order: 10-Fe-KR-1 > 10-Fe-NAB-1 > V4-Fe > Fe-EK and is: 0.221; 0.199; 0.187 and 0.123, respectively. It was found that Fe- and Fe/Cu-aluminosilicates are active catalysts for the oxidation of phenol with hydrogen peroxide (HP) in aqueous solutions and lead to its complete removal. The use of ultraviolet radiation, direct sunlight, reduces the time of 100% conversion of phenol. The activity of Fe/Cu-aluminosilicates is higher than their Fe-forms at the beginning of the reaction, but the time of complete oxidation of phenol for these catalytic systems has similar values.*

**Keywords:** *adsorption, photo-Fenton system, catalysis, stability, hydrogen peroxide, ultraviolet radiation.*

**Introduction**

Recently, numerous scientific works on the creation of new materials based on intercalation processes of layered aluminosilicates have appeared in foreign literature. It should be noted that the use of intercalated aluminosilicates as adsorbents and catalysts for deep purification of industrial wastewater is becoming more and more popular due to the increase in the amount of industrial waste [1].

The problems of creating intercalated layered aluminosilicates - active solid materials for photocatalysis, catalytic oxidation of peroxide compounds, the Fenton process, and catalytic oxidation of stubborn organic compounds in water bodies with moist air - are topical. The development of a columnar clay catalyst to reduce the cost of the oxidation reaction with an emphasis on low cost, stability, recyclability, and safety of the catalysts used are key issues discussed by the authors of this paper.

Scientific advances in green chemistry and engineering are aimed at solving the problem of neutralizing toxic substances in the environment. In recent years, there has been an increasing interest in the use of columnar clays as non-toxic adsorbents and heterogeneous catalysts in the treatment of wastewater from chemical, petrochemical, textile, construction, pharmaceutical and other industries [2-4].

The research and application of clay minerals in heterogeneous catalysis is becoming more and more interesting among scientists and specialists [5]. However, clay minerals inherently have a disadvantage in the form of inaccessibility of their active centers, which reduces their efficiency in catalytic reactions. Nevertheless, the modification of natural clay minerals with pillaring of giant particles has become a promising technology, due to the expansion of clay layers, providing thermal stability, increased porosity, increased values of surface area and basal distance, as well as other physicochemical characteristics [6]. Polyhydroxocations of metals such as Al, Fe, Zr, Cr, Ni and Ti are types of inorganic pillar agents that have been fairly well studied and have been discussed in detail in numerous studies [6, 7].

As noted in early works, the process of preparing pillar clays consists of important stages: preparing a pilling agent from a metal salt in a solution and mixing it with a suspension of clay in water [8]. However, it should be noted that this method requires long periods of time and a large amount of water for production, which is a major limitation for scaling up the intercalation method to industry [8, 9].

To reduce the volume of water, the intercalation method is currently focused on the use of concentrated clay suspension, dry clay and concentrated intercalation solution [10]. Research is being carried out to reduce the duration of the process, due to the direct addition of dry clay to intercalating solutions and the use in the technological process of such methods as ultrasonic [10] and microwave treatment, as well as one-stage high-temperature synthesis [11]. Several studies have reported that when using the conventional method, the aging time can vary from hours or days (1-30 days) depending on the structural characteristics of the laminates as well as the pillar agents [12]. When using ultrasonic, microwave, and high-temperature synthesis methods, the aging process and ion exchange occurs in minutes (5-30 minutes), which facilitates its distribution on an industrial scale.

The industrial production of catalysts and adsorbents based on pillar materials is influenced not only by the optimization of preparation parameters, but also by the ability to form powder materials into granules, monoliths, agglomerates, etc. In this case, the prepared solid catalytic materials must retain their physicochemical characteristics and properties of catalytic activity and stability during use.

Recently, in order to improve heterogeneous processes with the use of catalysts, since Supported iron and others are studying clay materials as a carrier [13, 14], which is associated with their low cost, availability and ease of the process of pillar formation in comparison with other methods of modification and preparation of adsorbents and catalysts [15]. Such columnar clay catalysts have been used to remove organic contaminants because phenol and its derivatives, organic dyes, toluene [16, 17], tyrosol and other stable compounds [18].

The current time is an acute issue of wastewater disposal from toxic organic compounds. Phenols and their derivatives are widely used reagents in many branches of modern industry; production of drugs, polymeric materials, pesticides, surfactants, paints and dyes, etc. Therefore, these industries, as well as others involved in the production of phenols, have emissions as waste water with a large set of polluting toxic substances, since phenols, nitrophenols, chlorophenols, etc.

From the analysis of the literature, it is known that an effective and economical method of neutralizing phenol-containing wastewater is catalytic oxidation in the aqueous phase, which allows to significantly reduce other costs in the form of lowering the temperature and pressure of the oxidation processes of phenols and other organic compounds (dyes, fat and oil substances, surfactants).

Hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) is also an oxidizing agent in wastewater treatment. The main advantage of hydrogen peroxide over other oxidants (chlorine is usually used) is its ecological purity, since after its use there is no possible secondary pollution of various waters. This oxidizing agent is highly soluble in water and its solutions can be stored for quite a long time. Consequently,  $\text{H}_2\text{O}_2$  is an environmentally friendly and promising oxidant in wastewater treatment from various pollutants.

Modern industrial practice mainly uses the homogeneous oxidizing system of Fenton and Raff ( $\text{Fe}^{2+}/\text{Fe}^{3+}-\text{H}_2\text{O}_2$ ), despite a number of significant disadvantages. It is to eliminate these shortcomings that the research results are directed, which allow the use of heterogeneous catalysts with relatively high activity and stability. The mechanism of the oxidation process was established according to HPLC (Shimadzu Prominence 20 HPLC UFLC Syst) and spectral analysis by scanning spectrophotometry in the 190-700 nm range using a UV / V-5100 spectrophotometer (Shanghai Metash Instruments Co.)

### Experimental part

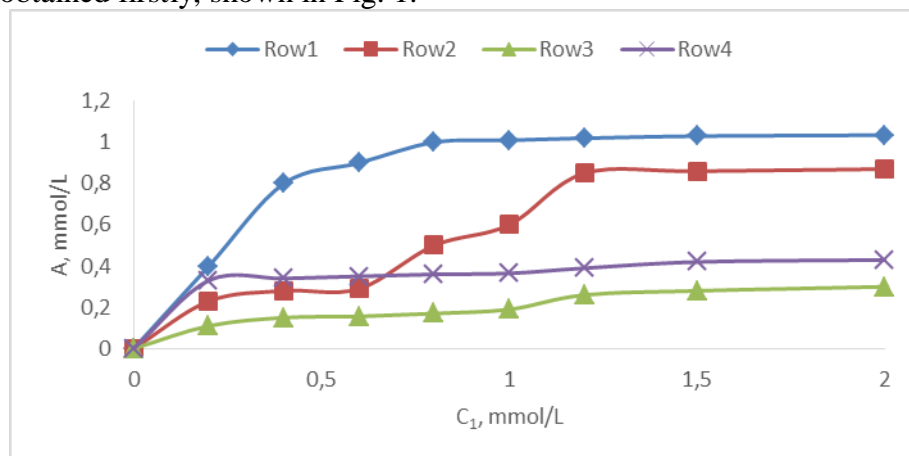
As objects of research, synthesized samples of pillar materials based on Navbakhor (10-Fe-NAB) and Krantau (10-Fe-KR) bentonite, Pakhtachi enriched kaolin (Fe-EK) and Tebinbulak vermiculite (V4-Fe) were selected, data about which are given in the early works of the authors [19, 23].

Identification at the qualitative level of the products of destruction of phenol and its derivatives was carried out by the scanning method. The influence of temperature was studied in the range from 25 to 60°C, and the pH values of the medium from 3 to 9.

In the experiments, working solutions of phenol and its derivatives were prepared by successive dilution of a standard solution with an initial concentration of 1 g/dm<sup>3</sup>. The resulting solution was standardized by iodometric titration. A solution of potassium hexacyanoferrate with a concentration of 1 g/L was used as working solutions. A borate buffer solution was prepared by dissolving 20 g of sodium tetroborate in 1 L of bidistilled water. The pH of the buffer solution was adjusted using HCl and NaOH solutions with concentrations of 1 M. Filtration of the investigated solutions and water samples was carried out using an oil-free anticorrosive diaphragm vacuum pump LH-95D/C, with a capacity of 30 l/min, which was connected to the column at the outlet. The study of stability was carried out with the determination of the concentration of metals in solution after catalysis using an atomic adsorption spectrophotometer.

### Results and discussion

To establish the possibility of sorption of phenols on intercalated materials, the sorption isotherm was obtained firstly, shown in Fig. 1.



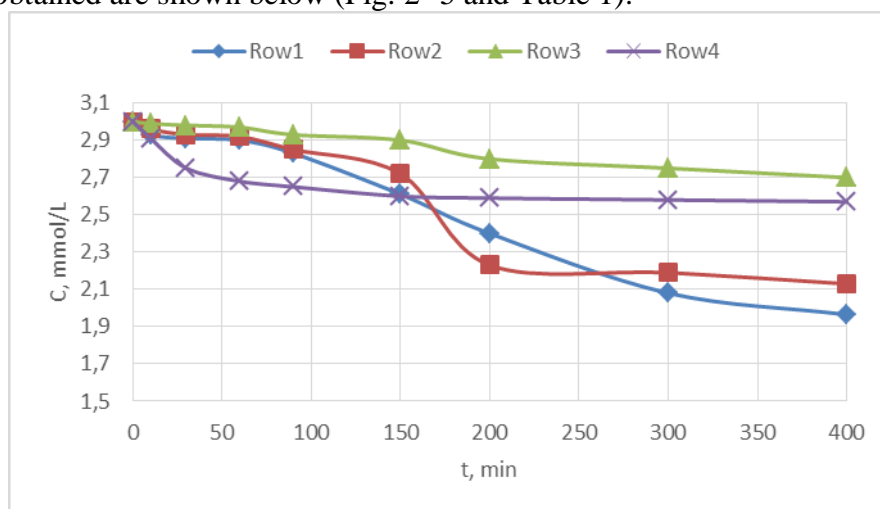
**Fig. 1. Isotherms of phenol adsorption on: 1) 10-Fe-KR-1; 2) 10-Fe-NAB-1; 3) Fe-EK; 4) V4-Fe.**

All obtained dependences are described by the linear form of the Langmuir equation at low concentrations of equilibrium concentrations. It turned out that the adsorption capacity of intercalated aluminosilicates for phenol exceeds those for the anionic dye Congo red [22, 23]. Probably, this is due to the smaller size of phenol molecules and its greater activity with respect to the surface of adsorbents. The adsorption capacity decreases in the following order: 10-Fe-KR-1 > 10-Fe-NAB-1 > V4-Fe > Fe-EK and is: 0.221; 0.199; 0.187 and 0.123, respectively. At the same time, the activities of polynuclear polycations were investigated. It turned out that the amounts of the limiting adsorption of Fe and Fe/Cu intercalated aluminosilicates differ insignificantly, which indicates a similar activity with respect to phenols.

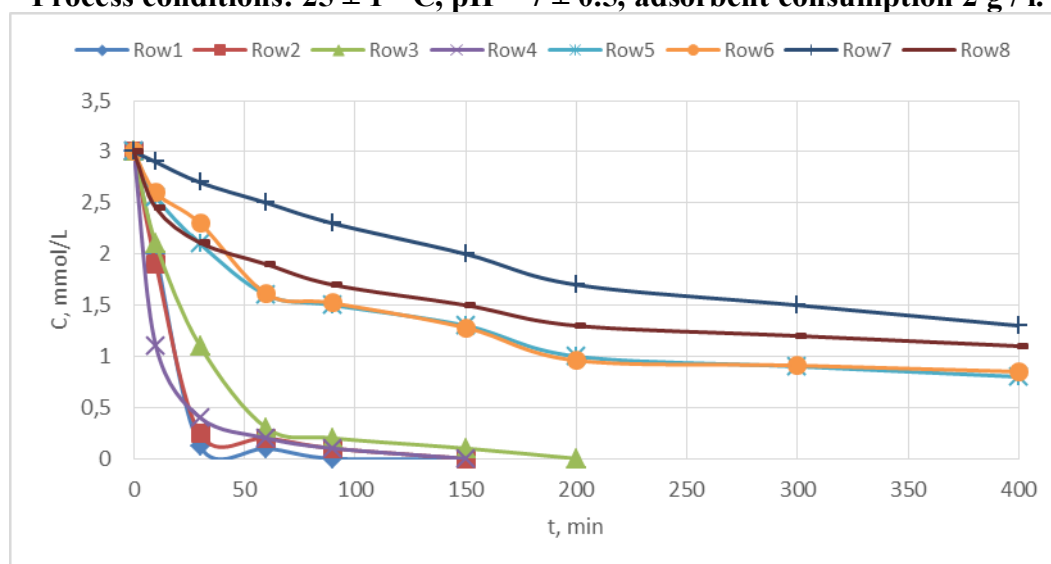
It is known that phenol, due to mesomeric effects, has a nucleophilic center in the para position to the hydroxyl group and oxidation begins at this active center with the formation of hydroquinone and p-benzoquinone.

The kinetics of phenol oxidation by hydrogen peroxide was studied with the participation of intercalated aluminosilicates and under the influence of ultraviolet radiation (UV lamp UL-

00007276 Uniel G13 18W) at temperatures from 293 to 353K and at a pH of the aqueous phase of 2-11, the data obtained are shown below (Fig. 2- 5 and Table 1).



**Fig. 2. Kinetics of phenol adsorption on: 1) 10-Fe-KR-1; 2) 10-Fe-NAB-1; 3) Fe-EK; 4) B4-Fe. Process conditions:  $25 \pm 1$  ° C,  $\text{pH} = 7 \pm 0.5$ , adsorbent consumption 2 g / l.**



**Fig. 3. Kinetics of phenol oxidative destruction in the system: 1) 10-Fe-KR-1; 2) 10-Fe-NAB-1; 3) Fe-EK; 4) V4-Fe +  $\text{H}_2\text{O}_2$  + UV and in the system: 5) 10-Fe-KR-1; 6) 10-Fe-NAB-1; 7) Fe-EK; 8) V4-Fe +  $\text{H}_2\text{O}_2$ . Reaction conditions:  $25 \pm 1$  ° C,  $\text{pH} = 7 \pm 0.5$ , catalyst consumption 1 g / l.**

It was found that Fe- and Fe/Cu-aluminosilicates are active catalysts for the oxidation of phenol with hydrogen peroxide (HP) in aqueous solutions and lead to its complete removal. Probably, the oxidation process begins with phenol molecules, which are already adsorbed on the surface of intercalated aluminosilicates. Therefore, one should expect a change in the concentration of phenol in accordance with the adsorption activity of these materials. At the same time, their activities depend on the nature of the intercalated cation.

The use of ultraviolet radiation, direct sunlight, reduces the time of 100% conversion of phenol. The activity of Fe/Cu-aluminosilicates is higher than their Fe-forms at the beginning of the reaction, but the time of complete oxidation of phenol for these catalytic systems has similar values.

UV irradiation promotes the reduction of valence iron (III) ions to  $\text{Fe}^{2+}$ . In this case, the concentration of hydroxyl radicals increases, and the rate of oxidation of phenol and its derivatives increases.

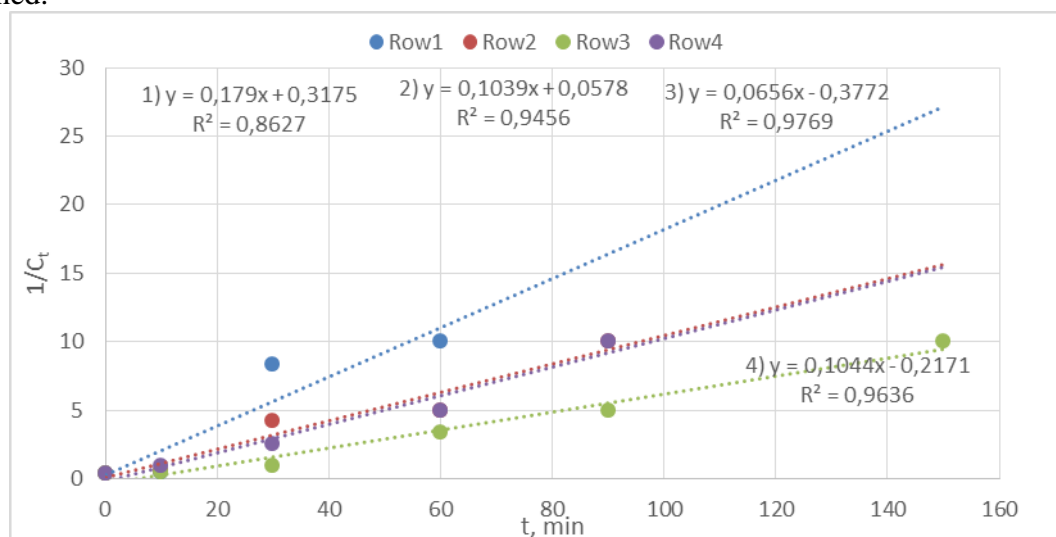
However, what is the question of the stability of the catalysts. It turned out that the stability of systems obtained by introducing polynuclear mixed Fe/Cu cations is greater than that of systems with monocations. The leaching of  $Me^{n+}$  ions during the oxidation reaction of phenol and its homologues for the first use of intercalated montmorillonites and kaolin is less than 0.23%, while for the V4-Fe and V4-Fe/Cu samples it is 2.1 and 1.9%, respectively. It is likely that it is associated with the instability of the pillar vermiculite as a result of the separation of layers due to the low energy of bonds between the intercalated cation and the negatively charged surface of the vermiculite.

When reusing catalysts (more than 10 times) 10-Fe-KR-1 and 10-Fe-NAB-1, the loss of  $Fe^{3+}$  does not exceed  $5 \pm 1\%$ , while for samples 10-Fe/Cu-KR-1 and 10-Fe/Cu-NAB-1 losses are no more than 3%. First of all, the differences in the stability of intercalated montmorillonites are a consequence of the stability of the cations themselves and their ability to dissolve in an aqueous medium. The catalytic activity of samples V4-Fe and V4-Fe/Cu decreases with repeated use, and Fe/Cu-EK does not lose activity when used again without regeneration for 2 cycles (20 hours).

In the reaction of phenol oxidation, the catalyst 10-Fe-KR-1 is more active than 10-Fe-NAB-1, but the amount of  $Fe^{3+}$  ions in it is less. Probably, the higher activity of the former can be explained by the high dispersion of iron particles in it. Previously, the authors have shown [19-21] that the activity and stability of Fe-intercalated clays largely depend on the state of iron in them.

It was found that the process proceeds through the formation of intermediate products (hydroquinone, p-benzoquinone, the corresponding carboxylic acids with a smaller number of atoms), which undergo further complete oxidation to  $CO_2$  and  $H_2O$ .

As it turned out, temperature is the main factor affecting the entire process. In the temperature range from 20 to  $45^\circ C$ , the obtained dependences are satisfactorily described by the kinetic equations of the second order reaction. Linear dependences of the reciprocal values of the phenol concentration on the process time are shown in Fig. 4, on the basis of the dependence, approximating equations and rate constants are obtained. From the temperature dependences of the logarithm of the reaction rate constants shown in Fig. 5, the values of the activation energy  $E_a$  are determined.



**Fig. 4. The linear form of the kinetic dependences of  $1/C_t$  on the time of the oxidation of phenol with an initial concentration of 5 mmol/L, at a catalyst flow rate of 1 g/L, peroxide consumption of 10 mmol/L at  $25^\circ C$ : 1) 10-Fe-KR-1; 2) 10-Fe-NAB-1; 3) Fe-EK; 4) V4-Fe.**

It turned out that an increase in temperature over 45 degrees causes changes in the nature of the process, i.e. changes in the limiting stage of the process.

Table 1.

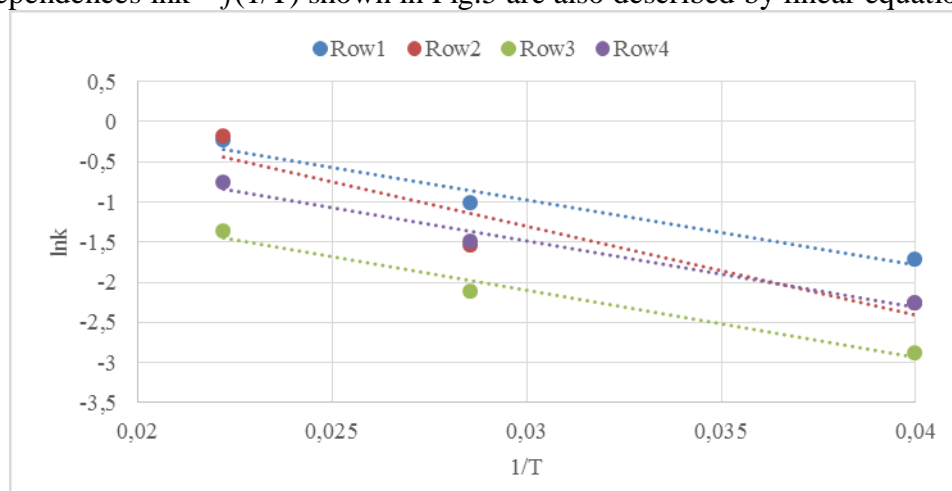
#### Parameters of phenol oxidation process



Sample	T, °C	Approximating equation	Correlation coefficient, R <sup>2</sup>	Rate constant, k	* Ea, kJ/mol
10-Fe-KR-1	25	y=0,179x+0,3175	0,8627	0,179	48,6
	35	y=0,361x+0,2233	0,8924	0,361	
	45	y=0,786x+0,2121	0,9271	0,786	
	55	y=0,0056x	0,9828	0,0056	
	65	y=0,0061x	0,9811	0,0061	
10-Fe-NAB-1	25	y=0,1039x+0,0578	0,9456	0,1039	51,2
	35	y=0,2134x+0,0118	0,9896	0,2134	
	45	y=0,8318x+0,012	0,9891	0,8318	
	55	y=0,00511x	0,9981	0,00511	
	65	y=0,0064x	0,9986	0,0064	
Fe-EK	25	y=0,056x-0,3772	0,9769	0,056	67,3
	35	y=0,121x-0,2882	0,9898	0,121	
	45	y=0,256x-0,101	0,9689	0,256	
	55	y=0,0062x-0,116	0,9615	0,0062	
	65	y=0,0071x+0,109	0,9911	0,0071	
V4-Fe	25	y=0,1044x-0,2171	0,9636	0,1044	45,5
	35	y=0,2256x+0,266	0,9112	0,2256	
	45	y=0,468x+0,211	0,8912	0,468	
	55	y=0,0064	0,9555	0,0064	
	65	y=0,0075	0,9622	0,0075	

\* -Values of activation energies, calculated by the slopes of the approximating equations based on the reaction constants in the temperature range from 25 to 45°C.

The dependences  $\ln k = f(1/T)$  shown in Fig.5 are also described by linear equations.



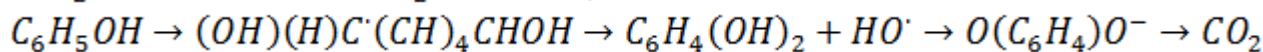
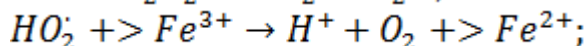
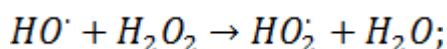
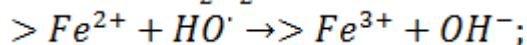
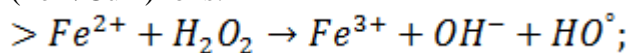
**Fig. 5. Dependence  $\ln k = f(1/T)$  in the temperature range from 25 to 45°C: 1) 10-Fe-KR-1; 2) 10-Fe-NAB-1; 3) Fe-EK; 4) B4-Fe.**

Thus, the induction period decreases with increasing temperature, as well as increasing the concentration of hydrogen peroxide and decreasing the pH of the medium to 3.5. Consequently, the catalytic activity of Fe and Fe/Cu intercalated aluminosilicates in phenol oxidation reactions at  $\text{pH} > 4$  can be related to their surface acidity.

Analysis of the experimental data obtained allows us to conclude that the oxidation of phenol by hydrogen peroxide in the presence of Fe-, Fe/Cu intercalated aluminosilicates proceeds in two different ways, mainly by the radical-chain mechanism. At the initial moment of the reaction, the



interaction of PV and water molecules occurs with the formation of compounds with  $Fe^{3+}$  ( $Fe^{3+}/Cu^{2+}$ ) ions:



The disappearance of the induction period on the kinetic curves upon the incorporation of copper ions into the composition of polyoxocations is explained by an increase in the rate of formation of active intermediate complexes. The data show that the rate and degree of removal of phenol and its homologues correlate with the amount of active ions in the composition of the catalysts. Therefore, for these purposes, it is advisable to use intercalated montmorillonites.

### Conclusion

Consequently, the use of the Photo-Fenton system for the removal of phenol residues and its derivatives has its advantages in the form of high yields of the process, due to the adsorption of both adsorbates and hydrogen peroxide molecules, as well as the occurrence of oxidative processes in which active ions  $Fe^{3+}$  and  $OH^\bullet$  participate. Thus, the heterogeneous photo-Fenton process is not only more efficient, but also environmentally friendly and economical, due to the intensification of the process by sunlight.

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**Rezyume:** Oqava suvlarni fenolda tozalashda ustunli alyumosilikatlarning katalitik faolligini o'rganish natijalari keltirilgan. Oksidlovchi tizim sifatida geterogen foto-Fenton tizimi o'rganildi. Buning uchun avval ishlab chiqilgan ustunli alyumosilikatlarda fenol adsorbsiyasi jarayonlari tahlil qilindi. Ma'lum bo'lishicha, barcha olingan adsorbsion bog'liqliklar muvozanat konsentratsiyalarining past qiymatlarida Lengmyur tenglamasining chiziqli shaklida ifodalangan. Interkalirlangan alyumosilikatlarning fenol bo'yicha adsorbsion sig'imi anion bo'yog'i hisoblangan kongo qiziliga nisbatan yuqoridir, bu hol fenol molekulalari o'lchamlarining kichikligi hamda adsorbentlar yuzasiga nisbatan katta faolligi bilan bog'liq. Namunalarning adsorbsion sig'imi 10-Fe-KR-1>10- Fe-NIB-1>V4- Fe > Fe -BK tartibida kamayadi va mos ravishda 0,221; 0,199; 0,187 va 0,123 qiymatlarni tashkil etadi. Fe- va Fe/Cu -alyumosilikatlari fenolni suvli eritmalarida vodorod peroksid (VP) ishtirokida oksidlash uchun faol katalizatorlar ekanligi hamda uning to'liq tozalanishi olib kelishi aniqlandi. Ul'trabinafsha nurlanish, to'g'ridan-to'g'ri quyosh nuridan foydalanish fenol konversiyasi vaqtini 100% ga kamaytiradi. Reaksiya boshlanishida Fe/Cu-alyumosilikatlarning faolligi ularning Fe- shakllariga nisbatan yuqori, biroq fenolning to'liq oksidlanish vaqti bu katalitik sistemalar uchun yaqin qiymatlarga ega.

**Резюме:** Приводятся результаты исследования каталитической активности пиллар алюмосиликатов при удалении фенола из сточных вод. В качестве окислительной системы изучена система гетерогенного фото-Фентона. Для этого сперва анализированы процессы адсорбции фенола на разработанных пиллар алюмосиликатах. Оказалось, что все полученные адсорбционные зависимости описываются линейной формой уравнения Ленгмюра при низких концентрациях равновесной концентраций. Величина адсорбционной емкости интеркалированных алюмосиликатов по фенолу превышает таковые значения по анионному красителю конго красному, что связано с меньшими размерами молекул фенола и его большей активности по отношению к поверхности адсорбентов. Адсорбционная емкость уменьшается в следующем порядке: 10-Fe-KP-1>10-Fe-НЩБ-1>В4-Fe>Fe-ОК и составляет: 0,221; 0,199; 0,187 и 0,123, соответственно. Установлено, что Fe- и Fe/Cu-алюмосиликаты являются активными катализаторами окисления фенола пероксидом водорода (ПВ) в водных растворах и приводят к его полному удалению. Применение

ультрафиолетового излучения, прямого солнечного освещения сокращает время 100% конверсии фенола. Активность Fe/Si-алюмосиликатов выше, чем их Fe-формы, в начале реакции, но время полного окисления фенола для этих каталитических систем имеет близкие значения.

***Kalit so'zlar:*** adsorbsiya, foto-Fenton tizimi, kataliz, barqarorlik, vodorod peroksid, ul'trabinafsha nurlanish.

***Ключевые слова:*** адсорбция, система фото-Фентона, катализ, стабильность, пероксид водорода, ультрафиолетовое излучение.

**APPLICATION OF FOAMED BITUMEN IN ROAD CONSTRUCTION IN THE  
REPUBLIC OF KARAKALPAKSTAN**

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*Karakalpak state university named after Berdakh*

**Summary:** *The article provides a research project that stops the process of destruction and prolonging the service life of old asphalt concrete coverings, on which there are signs of wear in the form of cracks, peeling, chipping, and others.*

**Keywords:** *highways, asphalt concrete, organic binders, bitumen, foamed bitumen.*

Road construction requires a huge amount of building materials. Particular difficulties of construction organizations are associated with the production of highly deficient organic binders and, above all, viscous petroleum bitumen necessary for the construction of roads with asphalt-concrete pavement.

For this reason, in modern conditions in the field of production of road construction materials, it is of great importance to introduce new progressive methods for preparing asphalt-concrete mixtures that provide the required amount of finished products while reducing the energy intensity, labor intensity and material intensity of technological processes.

Less well-known methods based on the use of foamed bitumen. Binders in the foamed state are characterized by high surface energy, low viscosity and, consequently, high activity when interacting with mineral materials (crushed stone, sand).

In the manufacture of asphalt concrete mixes, foamed bitumen during mixing of the stone material with the binder usually contains no more than 20-30% of the gas phase. Therefore, when describing the binder in this state, the authors use the term "foamed bitumen".

In cases where bitumen is considered with a volume content of a gas component of more than 50 percent, the term "Bitumen foam" is used. For the production of foamed bitumen, bitumen in a liquid or heated to a liquid state and water or steam is used. When bitumen and water interact, the bitumen foams. [1, p. 4]

This draft is essentially the first attempt to present the issues of the use of foamed bitumen in road construction practice.

Modern experience in the preparation of asphalt concrete mixes and the strengthening of skeletal materials based on foamed bitumen indicates the significant advantages of this method of work.

When using foamed binders, the consumption of bitumen (up to 10% of the binder weight) and the mixing time of materials (by 20-25%) are reduced, which allows us to consider this method as a material and energy-saving technology and increase the preparation of asphalt concrete and bitumen-mineral mixtures.

With this method, there is a real opportunity to significantly reduce the heating temperature of the binder and mineral materials, which can provide not only a reduction in fuel consumption, but also an increase in the duration of the inter-repair service life of roads with asphalt concrete coverings. When foaming, the volume of bitumen increased 15-20 times. [1, p. 5]

More extensive work on the development of the technology was carried out in the United States and Australia in the 60-70 years.

In a critical review of the experience of using foamed bitumen in road construction.

Later, a method of foaming was developed by introducing cold water into the hot bitumen stream. Water was introduced into a special container, which already contained bitumen. Bitumen in contact with water foamed and exited the container through a series of nozzles. The bitumen flow rate was constant, and the water flow rate was regulated by a shut-off valve. Approximately the greatest

effect was achieved when 1-2% of water was introduced into the bitumen. Observations of the experimental sections of road clothing showed good results.

In the 70s, in Australia, foamed bitumen was used in large quantities for processing crushed stone, followed by the construction of road pavement bases from it. This material is called foam asphalt.

In the 70-80 years, work was carried out on the preparation of mixtures based on sand, gravel and crushed stone. With the use of foamed bitumen, the preparation of cold and hot mixtures in stationary mixers of periodic and continuous action.

It is established that cold mixtures can be prepared with a wet mineral aggregate.

Such mixtures do not stick for a long time when stored in stacks. The preparation of mixtures using foamed bitumen requires less bitumen and energy costs. Meets the economic requirement.

Laboratory and field tests have shown that foamed bitumen can be used for cold regeneration of asphalt concrete surfaces, and the bitumen-mineral mixtures obtained with them have high physical and mechanical properties. From them it is possible to arrange the upper layers of the bases and coverings of highways. [1, p. 19]

In connection with the wide application of this mixture on foamed bitumen in different countries, it became necessary to develop in the Republic of Karakalpakstan "Technical Conditions" standard methods for testing them, taking into account the characteristics of the properties and structure of this material.

Thus, the prospects for the use of foamed binders in road construction, as well as in related areas of production, are very wide and cause increased interest in this field of research.

At present, the applicant has at his disposal:

A network of highways in the Republic of Karakalpakstan;

The main goal of the proposed project is aimed at solving the following tasks:

To develop methods for the preparation of asphalt concrete mixtures on foamed bitumen and samples from them in the laboratory. [2, p. 24]

To determine the main advantages of the technology for preparing asphalt concrete mixtures, namely, a more uniform distribution of the binder in the mineral material (during mixing, higher indicators) of the physical and mechanical properties of asphalt concrete, saving of bitumen and other properties.

Develop in the Republic of Karakalpakstan "Technical conditions" standard methods of their testing, taking into account the characteristics of the properties and structure of this material.

The proposal of an alternative option for the preparation of asphalt concrete mixes and the strengthening of skeletal materials based on foamed bitumen for urban conditions, which is widely used in foreign countries.

To develop the economic efficiency of the technology for the preparation of asphalt concrete mixtures on foamed bitumen.

- collection and analysis of available materials for the preparation of asphalt mixes and strengthening of skeletal materials;

- Testing of bitumen samples for foamed states under laboratory conditions;

- Preparation of asphalt-concrete mixtures with the use of foamed bitumen;

- Testing of samples of physical and mechanical properties of asphalt-concrete mixtures.

- Preparation of asphalt-concrete mixes in the field directly on the object by the method of mixing on the road. [3, p. 9]

Studies of the performed volumes of work on the physical and mechanical properties of asphalt-concrete mixtures. Determination of the parameters of asphalt concrete mixtures on foamed bitumen;

Study of temperature in the construction of highways;

Development of measures for the reconstruction of highways, development of proposals for asphalt concrete mixes, on foamed bitumen.

a) Search for the possibility of an optimal version of asphalt concrete mixtures on foamed bitumen.

b) Offer an alternative option for the preparation of asphalt concrete mixes and strengthening of skeletal materials.

c) Develop proposals for the choice of construction of asphalt concrete mixes, on foamed bitumen;

Technical and economic efficiency of the use of foamed bitumen.

The cost-effectiveness of the technology for preparing asphalt concrete mixtures on foamed bitumen is achieved by reducing the mixing time of the mixture on the roads, reducing the consumption of bitumen, reducing the energy costs for heating and drying the starting materials.

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***Rezyume:*** Maqola eskirgan asfalt-beton qoplamalarning xizmat muddatini uzaytirish jarayonini loyihasi taqdim etilgan ularda yoriqlar,bo'zilishlar va emirilishning oldini olish va eshish usullari haqida malumotlar ko'rsatilgan.

***Резюме:*** В статье предоставлен исследуемый проект останавливающий процесс разрушение и продлевание срока службы старых асфальта бетонных покрытий , на которых появились признаки износа в виде трещин , шелушения, выкрашивания и другие.

***Kalit so'zlar:*** avtomobil yo'llari, asfalt-beton, organik bog'lovchilar, bitum, ko'pikli bitum.

***Ключевые слова:*** автомобильные дороги, асфальтобетон, органические вяжущие, битум, вспененный битум.

## UNCERTAINTY AND RISK ASSESSMENT IN ELECTRICAL TESTING LABORATORIES

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**Summary.** *This paper presents a method for ensuring the reliability of measurements and assessing compliance, taking into account uncertainties and risks, in order to strengthen confidence in the activities of laboratories. In making decisions or assessing compliance with test results in accordance with the requirements of ISO / IEC 17025: 2017, the importance of taking risks into account in the process of calculating uncertainties is highlighted. Also, the order of reflection and analysis of differences in the results of measurement of consumption capacity in the process of testing electrical products on the Schuhart map. [3]*

**Keywords:** *uncertainty, risk, system, electrical products, electrical engineering, Schuhart map, ISO (International Organization for Standardization).*

### Introduction

It should be borne in mind that the laboratory must develop a system capable of ensuring and demonstrating continuous compliance with the requirements of ISO 17025-2017, as well as guarantee the quality of laboratory results. [1] The laboratory should have a principle to monitor the accuracy of the results. The final results should be recorded in a way that allows trends to be identified, and, where applicable in practice, statistical methods should be used to analyze the results. [2] Expression of statistical methods on the basis of excel program expands the possibilities of research. Statistical methods help to strengthen the laboratory activities, taking into account the risks in the measurements. Today, the demand for electrical products is growing. Checking the safety and quality of electrical products on the basis of standard requirements is a modern requirement. The main task of testing laboratories is to check the power consumption of electrical products and to ensure that they do not exceed or exceed the requirements set in the production. Consumption power is a key indicator of an electrical tool because this parameter is of economic importance. The main research of this paper has taken into account the inaccuracies and risks in the measurement of consumption power. The monitoring method has many advantages in ensuring the reliability of measurements. This monitoring should be planned and analyzed, and when possible, should include, but not be limited to: At the time of writing, the standards have been studied in detail, and statistical methods have been used to ensure accuracy and precision in the test laboratories of GOST 5725.6-2002.

### Research methods

Statistical methods are a more effective strategy to prevent losses, primarily to avoid producing the wrong products. Such a strategy involves collecting information about the process, analyzing it, and taking timely action to improve the process itself [8]. The control table was proposed in 1924 by Dr. Walter Schuhart as a graphical tool for applying statistical principles to process management. The control diagram theory distinguishes between two types of variability or variability. Statistical process control is a methodology for setting up and maintaining a process at an acceptable and stable level to ensure that products and services meet established requirements. The main statistical tool of process control is the control scheme, viz. a graphical method of presenting and comparing data based on the analysis of data from serial samples, reflecting the current state of the process, the boundaries set based on the specific variability of the process. The control diagram method first helps to assess whether the process has reached a manageable state or whether it continues in that state.

Schuhart control diagram is a graph used to show a statistical scale derived from quantitative or alternative data. When using a sugar card, we need working parameters. The Shuhart map has statistically defined control boundaries on either side of the center line [7].

- UCL -upper limit control line ( $3\sigma + \bar{X}$ )
- LCL -lower boundary control line ( $\bar{X} - 3\sigma$ )
- $\bar{X} - 2\sigma$  - bottom control line
- $\bar{X} + 2\sigma$  - top control line
- $\bar{X} + 2\sigma$  -Average quadratic deviation
- $\bar{X}$ - center line (average value of parallel values)

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{2n}} \quad (1)$$

$X_i$ - measurement result

$Y_i$ - re-measurement result

n- number of measurements

Evaluation of measurement uncertainty is a key working parameter in ensuring the conformity of products based on established requirements.

Uncertainty - A parameter that describes the distribution of values that is related to the measurement result and can be related based on the measured value. [9]

$$u(x_i) = u_A(x_i) = \sqrt{\frac{1}{n(n-1)} \sum_{g=1}^n (x_{ig} - \bar{x}_i)^2} \quad (2)$$

n- number of measurements

$X_i$ - the result of measurements

$\bar{x}$ - average value

### Research-based results

The results of the research in this article were obtained in the testing laboratory of electrical equipment LLC "GLOBAL INVESTMENT SYSTEMS". The research was carried out on refrigerated products entering the territory of the Republic of Uzbekistan as an object of study, and the results were processed, used and documented in the assessment of conformity.

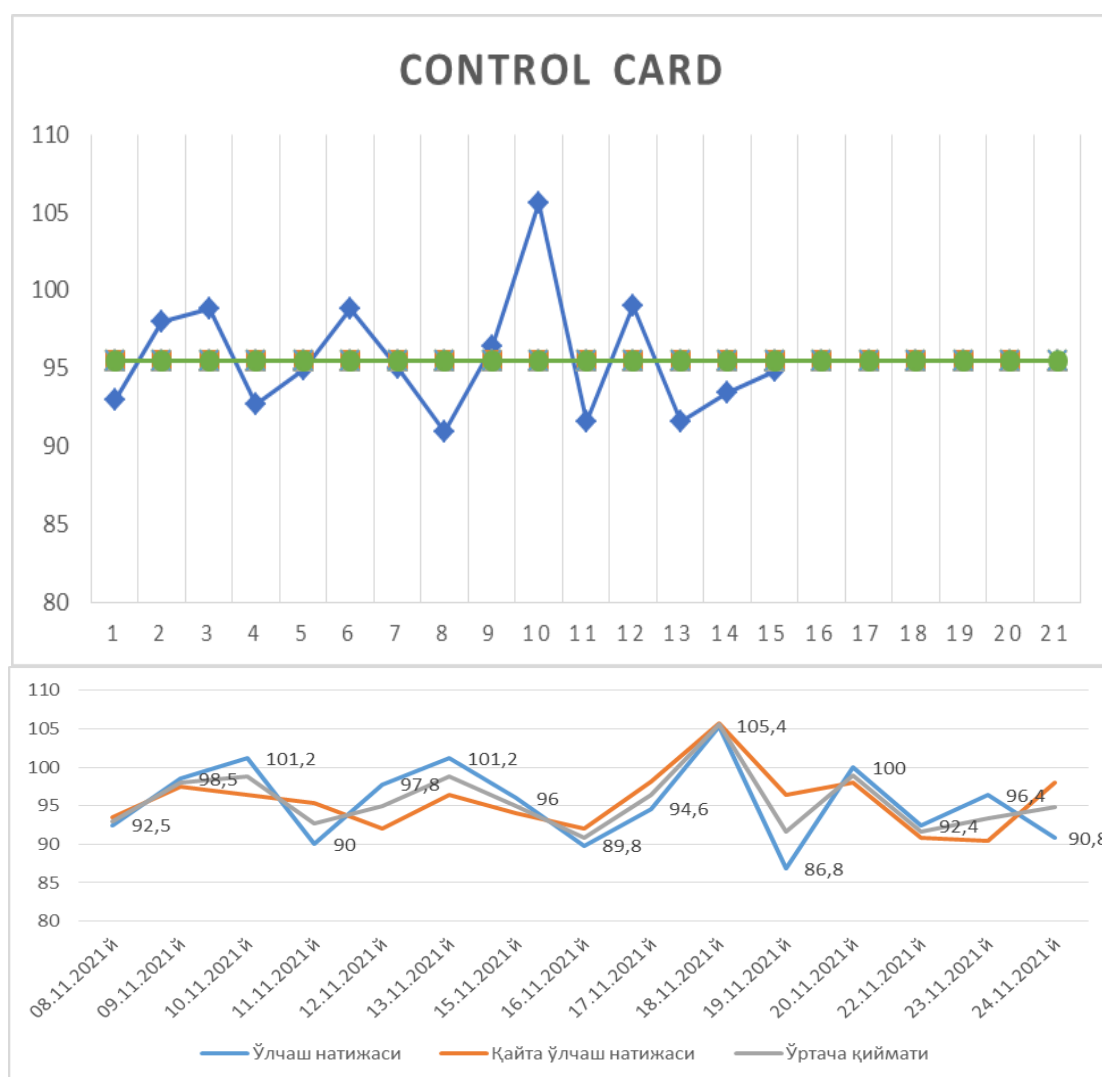
**Table 1**

#### Representation of research results on the Schuhart map

Quality indicator	Power consumption (refrigerator)		
Unit of measurement	W (VATT)		
Test requirement	Gost 60335-2015 p.10		
Trial period	08.11.2021-18.11.2021 y		
Laboratory	Electrical Engineering Testing Laboratory		
#	$X_i$	$Y_i$	$\bar{X}$
08.11.2021 y.	92,5	93,5	93
09.11.2021 y.	98,5	97,5	98
10.11.2021 y.	101,2	96,4	98,8
11.11.2021 y.	90	95,4	92,7
12.11.2021 y.	97,8	92	94,9
13.11.2021 y.	101,2	96,4	98,8
15.11.2021 y.	96	94	95
16.11.2021 y.	89,8	92	90,9
17.11.2021 y.	94,6	98,2	96,4



18.11.2021 y.	105,4	105,8	105,6
19.11.2021 y.	86,8	96,4	91,6
20.11.2021 y.	100	98	99
22.11.2021 y.	92,4	90,8	91,6
23.11.2021 y.	96,4	90,4	93,4
24.11.2021 y	90,8	98	94,8
$\sigma=$	3.29 The value found by the above formula.		
$3*\sigma + \bar{X}$	$10.87+95,6=106,47$ W		
$\bar{X} - 3* \sigma$	$=95,6-10,87=84,73$		
$\bar{X} - 2* \sigma$	$95,6-6,58=89,02$		
$\bar{X} + 2* \sigma$	$95,6+6,58=102,18$		



The results obtained from 08.11.2021 to 24.11.2021 are reflected in the map shown above, which shows that the results obtained on 18.11.2021 y. have a large deviation. Therefore, these results cast doubt on the reliability of the operator or the results. The field between  $\bar{X} + 2* \sigma$  and  $\bar{X} + 3* \sigma$  represents the presence of danger. Risk assessment in measurements represents the excellence of test laboratories. [8]

$$\bar{X} \pm U$$

$$95.6 \pm 3.90$$

The product is marked on the packaging as 110 W / h. Taking into account the uncertainty, we assess the conformity of the product. The ILAS G8 is used and documented in the conformity assessment in the laboratory of electrical engineering.



Based on the ILAS G8, the compatibility confidence limit is set at 95%. The danger area is marked as  $1 \cdot U$ . This method of matching is called binary. The advantage of conformity assessment based on the binary method is that the risk area can be controlled. Our results are between 91.7 w and 99.5 w.

### **Conclusion and recommendation**

Conformity assessment is important in improving the reliability of measurement results in test laboratories based on ISO 17025-2017. The Declaration of Conformity applies to any decision rules that apply safeguards to improve or establish a minimum risk of mishandling. When a customer hands over an item to a testing lab, they only care about the “risk of mishandling by the consumer”. However, when a laboratory returns a product as rejected, the customer must inspect the products manufactured by their organization, as this can lead to the return / subsequent recall of an expensive product [6] per statistical method. Based on these methods, we can test the qualifications of laboratory staff in the perfect implementation of these rules. We recommend GOST 17034 -2017.

The conclusion is as follows:

- We can clearly see the differences between the results obtained during the testing of laboratory products
- It should be noted that the results obtained in the Act, taking into account the average value and uncertainty, are not at risk of conformity assessment, and these requirements ensure that they meet international standards.

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**Rezyume:** Ushbu maqola laboratoriyalarning faoliyatiga boʻlgan ishonchni mustahkamlash maqsadida oʻlchashlarning ishonchligini taʼminlash hamda noaniqliklarni va xavflarni hisobga olgan holda muvofiqlikni baholash usuli keltirilgan. ISO/IEC 17025:2017 standarti talablari asosida sinov natijalari boʻyicha qaror qabul qilishda yoki muvofiqlikni baholashda, noaniqliklarni hisoblash jarayonida xavflarni hisobga olish ahamiyati yoritilgan. Shuningdek, elektrotexnika mahsulotlarini sinash jarayonida isteʼmol quvvatini oʻlchash natijalari orasidagi farqlar Shuxart xartasida aks ettirish va tahlil qilish tartibi keltirilgan.

**Резюме:** В данной статье представлен метод оценки соблюдения надежности измерений и учета неопределенностей и рисков с целью повышения уверенности в работе лабораторий. Подчеркивается важность учета рисков при внесении неопределенностей при принятии решения по результатам испытаний или оценке соответствия требованиям ISO / IEC 17025: 2017. Порядок отражения и анализа различий между результатами измерений энергопотребления при тестировании электротехнической продукции также показан на карте Шухарта.

**Kalit soʻzlar:** noaniqlik, xavf, tizim, elektrotexnika mahsulotlari, elektrotexnika, Shuxrat xaritasi, ISO (Xalqaro standartlashtirish tashkiloti).

**Ключевые слова:** неопределенность, риск, система, электротехническая продукция, электротехника, карта Шухарта, ISO (Международная организация по стандартизации).

**UDC 141**

*Globalization is a necessary action of a qualitatively new system of production of material wealth.*

*A. Toffler*

**POLITICAL, ECONOMIC, CULTURAL AND INFORMATION DEVELOPMENT OF THE WORLD IN THE PROCESS OF GLOBALIZATION**

**Biyimbetov J.**

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**Summary:** *This article highlights the relevance of globalization processes to the information industry. It is also widely analyzed that the further development of society is associated with the integration of political, economic, cultural and information systems, which are the spheres of society.*

**Keywords:** *globalization, culture, information support, information, assistance, homogenization, universalization, division of labor.*

In today's age of humanity, all human endeavors are taking shape. At the same time, the processes of rapprochement between human societies are intensifying. This process, which is called globalization, reflects on the one hand its positive aspects, as well as its negative aspects. Therefore, the study of these processes of globalization is relevant. This is because the realization of various contradictory phenomena in the form of socio-economic and cultural life of human society is, of course, directly related to the processes of globalization.

Globalization is the process of economic, political, cultural and information integration of the whole world. In particular, globalization is closely linked with the processes of information rapprochement. The results achieved in the field of international relations, the world economy and information achievement are inextricably linked with them [1.,167].

At the beginning of the 21st century, the concept of globalization has been extensively analyzed by the global scientific community. Globalization is an objective process that has a systemic character and covers all segments of society. As a result of globalization, the convergence of the economic, political, cultural, scientific and technical, information sectors is accelerating. In the process of globalization, the unification of human society is observed.

Opinions about the origin of globalization are contradictory. Some historians consider this process as one of the stages in the development of capitalism. Some economists believe that market relations are the elimination of transnational borders. The politician says that the main focus of science is the proliferation of democratic institutions (pluralism of opinion). As for the study of the field of culture, globalization suggests that this culture has a Western form. There is also a revival of information technology in explaining the processes of globalization. He argues that globalization is not just a political, economic, cultural or industrial process, but should be seen as the fruit of information news. Indeed, news in the field of information technology has accelerated the process of globalization.

In explaining the processes of globalization, the world's scientists have provided many definitions and introduced various dimensions to science. Analyzing these dimensions, it is worthwhile to take the three most rigid dimensions and show the specific aspects of globalization processes. They can be summarized as follows: firstly, globalization is a continuous historical phenomenon, secondly, globalization means the process of homogenization and universalization of the world, thirdly, globalization means the disappearance of the great process of national borders.

Globalization is not a phenomenon that has emerged today or yesterday. It has historical roots. Therefore, we must say that the processes of globalization took place in antiquity (Alexander the Great, Hellenism)[2.,351]. Thus, the Roman Empire declared its hegemony over the Mediterranean, which led to the deep intermingling of different cultures and the emergence of regional division of labor in the Mediterranean. The ideas of the global community were developed by the ancient Greek philosopher Diogenes. It reflects the globalization of the concept of cosmopolitan through the content and the participation of man in that process. That is, a person of the world or a citizen of the world connects with terms. In addition, the discovery of Khorezm coins in Western Europe in archeological excavations suggests that the relationship between Western and Eastern countries developed.

In addition, the emergence of globalization in the XII-XIII centuries, coinciding with the development of market (capitalist) relations in Western Europe, coincides with the rapid growth of European trade and the emergence of the "European world economy" [3.,80]. At that time, we can see not only the development of the economy, but also the interaction of science and culture. The rich medical heritage of our son Abu Ali Ibn Sina, created at that time, was translated into Latin in European countries and used as a guide to the XVIII century.

In general, we can not imagine the processes of development of the world and the processes of globalization of the Republic of Uzbekistan without globalization. However, it should not be forgotten that in the process of globalization, the struggle for human consciousness, all sorts of destructive ideas try to achieve their evil goals using the processes of rapprochement between these countries. On the way to its development, our country is implementing rapprochement with the countries of the world in the political, economic, cultural, spiritual and information spheres. Therefore, in the development of our country, the issue of protection from external influences is raised. It should be guided not only by the urgency of the state, but also by the mutual activity of citizens. In short, the processes of globalization are one of the achievements of the great development of human society, on the other hand, they pose new challenges for humanity.

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**Rezyume:** Bu maqolada globallashuv jarayonlarining axborot sohasi bilan aloqadorligi oshib berilgan. Shuningdek jamiyatning keyingi rivojlanishi jamiyat sohalari bo'lgan siyosiy, iqtisodiy, madaniy va axborot tizimining integratsiyasi bilan bog'liqligi keng tahlil qilingan.

**Резюме:** В этой статье подчеркивается важность процессов глобализации для информационной индустрии. Также широко анализируется, что дальнейшее развитие общества связано с интеграцией политических, экономических, культурных и информационных систем, которые являются сферами общества.

**Kalit so'zlar:** globallashuv, madaniyat, axborot, axborot yaqinlashuvi, iqtisodiyot, siyosat, gomogenlashuv, universallashuv, mehnat taqsimoti.

**Ключевые слова:** глобализация, культура, информационная поддержка, информация, помощь, гомогенизация, универсализация, разделение труда.

## THE IMPORTANCE OF USING THE DEBATE METHOD IN DIDACTIC SITUATIONS

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**Summary:** *This article discusses the discussion - an innovative learning technology in the context of the transition to a personality-oriented education. The influence of the discussion on the student's personal development is determined by its value-oriented orientation, the creation of favorable conditions for the manifestation of individuality, self-determination in existing points of view on a particular problem, and choice of one's position. To develop the ability to interact with others, listen and hear others, respect other people's beliefs, accept an opponent, find common ground, relate and coordinate their position with the positions of other participants in the discussion.*

**Keywords:** *Discussion, personality-oriented education, technology, development.*

At the present stage of development of pedagogical thought, the values of education have fundamentally changed. Today, the cult of academic achievement and discipline is being replaced by a focus on the individual with its claims to its place in the new world. Experience, the mastering of which is organized by the teacher, modern science divides into two broad areas: the first includes the experience created by previous generations (the experience of meanings), the second - the experience that the student must create himself, his personal, subjective experience (experience of meanings). And this is the adoption of vital decisions, and the choice of a life position and values, the experience of self-realization, and others. And new conditions require new approaches to pedagogical activity: work with a person is necessary here, upbringing, the essence of which is to create a situation-event, having survived which, the child with the subtle, inconspicuous support of the teacher, he must come to his own conclusion, his "living knowledge." It is necessary to give personal experience to any experience acquired by the child, knowledge, and skill.

The idea of education focused on the development of man as an individual is as old as the world itself. Even Plutarch and Campanella, I.G. Pestalozzi and K.D. Ushinsky dreamed of a school that would not be reduced only to filling the child with knowledge, but would give something more for his soul and mind. And not only dreamed, but expressed a lot of serious proposals on this subject. However, the modern concept still differs from the previously proposed interpretations of the personal approach as the "orientation of learning to the individual" (V.I. Andreev), the desire to "teach everyone differently" (A.V. Khutorskaya), the student's positioning in the subject's position (And .A. Yakimanskaya), orientation of education to culture (E.V. Bondarevskaya), etc.

The structural unit of personal developmental learning is a situation - an event requiring the manifestation of one of the fundamental personality traits, such as selectivity (need and ability to make choices of values, actions, decisions, adequately respond to events, actions of others), reflexivity (ability to introspection, create one's image, self-esteem), attitude towards another, orientation toward another, striving for awareness of the meaning of life, responsibility, selforganization, creativity, self-realization, inner NJ freedom.

But it must be remembered that the activity organized by the teacher in the lesson as a solution to the learning task is one for all, and the conclusion from it will also be common. But the situation is always "someone's", is a fragment not of a lesson, but of a person's life path, even if it happens in a lesson. And if we manage to organize such a situation-event in the lesson, then the student's interest problem is simply removed: a person cannot but be interested in his own life! Person-oriented education cannot and should not replace the traditional knowledge-oriented (subject-activity) education. They exist as two worlds - as knowledge and experience, as work and feeling, as work and its meaning, as, finally, training and education. Personally oriented education is not a "shadow process" in relation to standards and curricula, but the essential moment of staying

in school for both children and adults. But whatever the learning technologies, the lesson has been and remains the main form of interaction between the student and teacher. The formation and development of new socio-economic and political relations in society could not but affect the education system. At the present stage, new requirements are being put forward for school education, which should not only help students learn the system of scientific knowledge, but also develop the ability to think creatively, defend their point of view in a thorough manner, and be critical of information sources. One of the ways to achieve the objectives lies in the organization of student communication in the classroom using discussion methods. Discussion is an important way of enhancing the cognitive activity of schoolchildren, affects the development of thinking, makes it possible to determine a personal position, and forms the skills to defend one's point of view.

Discussion (from lat. Discussio - research, consideration) is a comprehensive collective discussion of any issue, problem or comparison of information, ideas, opinions, suggestions. An important characteristic of the discussion that distinguishes it from other types of dispute is argumentation. When discussing a controversial (debatable) problem, each side, opposing the interlocutor, argues its position. A discussion can also mean a public discussion of any problems, controversial issues at a meeting, in print, in conversation. A distinctive feature of the discussion is the presence of a theme as a unifying principle. Discussion is often seen as a method that activates the process of learning, studying a complex topic, a theoretical problem. There are several types of discussions:

1. Evolving, outgrowing from traditional types of educational work. It arises by itself, sometimes spontaneously, but for this in a traditional lesson certain conditions must be created: the presence of search questions of the type "Why?", "Why?", "What is your opinion?"; the interest of the teacher in questions on the part of the students, when after submitting a certain block of educational information, the teacher asks: "What questions did you have for me? What is not clear to you? "

2. Self-organizing discussion, ie discussion without a facilitator. It arises on the initiative of students, and the teacher, as it were, eliminates itself from the discussion. It accustoms students to independence, makes them expand their information stock of knowledge, and makes it possible to assert themselves. However, its difficulty is that it is difficult for the teacher to influence the course of the discussion, it often takes a protracted nature, and in fact, students forget about the subject of the dispute.

3. A training discussion involving a pre-training system for both the teacher and students. In this paper, we will talk specifically about the educational discussion. Specialists distinguish the following forms of discussion. 1. Round table - discussion of the issue (topics, problems) on the terms of partnership by a small group of students (usually about five people). In the process of exchange of views, positions and approaches between participants and with the "audience" (the rest of the class) are emphasized. You can organize several round tables for 5-6 people, whose representatives will then speak to the entire audience. 2. Panel discussion or "expert group" meeting - usually four to six students with a preappointed chair will first discuss the pre-identified problem within the group and then state their position to the whole class. Each group member makes a short but concise message. 3. "Forum" - a discussion similar to a "meeting of an expert group", only in this case a group of students - participants in the forum exchange views with the "audience" (class).

4. "Symposium" - a more formalized discussion compared to the previous one, during which participants make messages reflecting their points of view on the identified problem, and then answer questions from the "audience" (class).

5. "Debate" - a clearly formalized discussion, which is a sequential statement by representatives of two opposing, rival teams (groups) with argumentation and rebuttal.

6. "Court hearing" - a discussion that imitates a trial (hearing) under the procedure.

7. Aquarium technique - this form of discussion is usually used when working with material whose content is associated with conflicting approaches, conflicts, disagreement (this technique is described in detail in Chapter III).

8. "Ladder": groups (pairs) of students are included in the polylog in ascending order: from the first group to the last. Each pair of students prepares and expresses a single agreed judgment on the problem. Each group (couple) tries to score a greater number of points, calculated by the number of judgments. If the students of the next group could not come to a common opinion, they skip the turn. Two passes allow the moderator (leader) to take 3 points from the group, and the teacher has the right to evaluate students' work negatively.

9. "Microphone": within the framework of coordinated assistance, the teacher activates the weakly active students in the group by giving them a microphone: the one with the microphone says.

10. "Carousel": all students express their points of view in a circle, as they sit.

11. The Big Circle. One of the simplest methods of group interaction. Its organization requires that the chairs in the classroom be arranged in the shape of a large circle. The rules for developing a solution are established - 5-7 minutes. They agree that the answer should be clockwise, the starting place, from which the presentation of the points of view on the problem begins, is conventionally indicated. Moderator monitors compliance with the rules. The work takes place in three stages:

First step. A class or group is seated on chairs located along the contour of a large circle. The teacher sets out the problem to be solved.

Second phase. During the set time, students individually formulate their project for solving the problem.

The third stage. In a circle, each participant in the circle sets out his draft decision, the group listens without criticism and conducts a vote to include it in the general decision, which is gradually fixed on the board (or on a piece of paper). After working out a general solution to the problem, his project is voiced and approved (if necessary, adjusted) by all participants in the "circle". Reception of the "big circle" is effective in cases where there is a real opportunity to quickly find a solution to the problem or the main elements of this solution. Using the "big circle" technique, for example, you can develop any norms, rules, memos or instructions, etc.

12. Disputes (from the Latin *disputare* - to reason, argue). This form consists in the fact that there is an introductory speech (usually prepared in advance) that poses a problem or shows a certain view of the problem, and then the presentation itself is discussed, and through it (indirectly) the problem. The dispute may be in the content of the above or in the form of presentation (rhetorical techniques). In a dispute, participants usually relate to and do not refer to the speaker himself, but to the information presented (his message).

13. Virtual discussion. A new type of discussion using the capabilities of computer technology and the Internet. Such discussions are best done not in the classroom, but rather as homework. Students united in a small group (no more than 7-8 people) can discuss an article, drawing, photo, situation, political news, symbols, etc., related to a particular topic. Discussion can be free - expressing one's own point of view, one's own understanding, writing comments. However, for the learning effect, it is better for the teacher to give specific questions and tasks. Answering these questions and completing assignments, students can give their own examples, put forward arguments and counterarguments. A network should be established so that students can send letters to each member of the group with their answers. During the discussion, everyone can write several letters - in addition to their opinions, give comments, ask questions to other members of the group, respond to someone's opinions, express their concerns, and give more accurate examples from their point of view. To do this, you can make copies for each participant, but it is better to have a common box on the Internet for access to which the members of the group and the



teacher will have a password. Letters will be written to one address, and each participant will be able to read it. In such a virtual discussion, the teacher should be asked to use the basic concepts that are learned at a particular point in the course.

14. Talk show. There are several invited guests in the talk show who are of interest in connection with the issue at hand, and participants are preparing their questions on the topic. It would be desirable if different points of view were presented, and the questions were diverse. For talk shows, the ability to ask questions and answer them is important. In the process of schooling, the role of invited guests can be played by individual students, adults or the teacher (depending on the purpose of organizing the lesson in this form). It is better for participants to prepare in advance. It is also important to have a leader whose role should not be noticeable. When selecting invitees, it should be taken into account that their positions on the question or problem raised are fundamentally different, which will help maintain tension among the participants.

15. Brainstorming (from the English. Brainstorming - brainstorming) - a training method that stimulates the intellectual, creative and cognitive abilities of students.

Speaking about the forms of discussions, it is necessary to pay attention to the fact that a number of educators do not consider disputes and debates as varieties of discussions, do not distinguish such forms as the "ladder", "symposium" and others. The use of this technology allows you to create the conditions necessary for the formation and development of communicative competence. The teacher who correctly organizes the discussion ceases to be the bearer of "objective knowledge", which he is trying to convey to. Its main task is to motivate students to show initiative and independence. Using various forms of discussion, the teacher creates a "developing" environment in which each student can develop at the level of development of his intellectual and other abilities all the components of competence.

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**Rezyume:** *Ushbu maqolada muhokama - shaxsga yo'naltirilgan ta'limga o'tish sharoitida innovatsion ta'lim texnologiyasi. Munozaraning o'quvchining shaxsiy rivojlanishiga ta'siri uning qiymatga yo'naltirilganligi, individuallikni namoyon qilish uchun qulay shart-sharoitlarni yaratish, muayyan muammo bo'yicha mavjud nuqtai nazarlarni o'zini o'zi belgilash va o'z pozitsiyasini tanlash bilan belgilanadi. Boshqalar bilan muloqot qilish, boshqalarni tinglash va eshitish, boshqa odamlarning e'tiqodlarini hurmat qilish, raqibni qabul qilish, umumiy til topish, o'z pozitsiyasini muhokamadagi boshqa ishtirokchilarning pozitsiyalari bilan bog'lash va muvofiqlashtirish qobiliyatini rivojlantirish.*

**Резюме:** *В данной статье рассматривается дискуссионно-инновационная технология обучения в условиях перехода к личностно-ориентированному образованию. Влияние дискуссии на личностное развитие студента определяется ее ценностной направленностью, созданием благоприятных условий для проявления индивидуальности, самоопределения в существующих точках зрения на ту или иную проблему, выбора своей*

позиции. Развивать умение взаимодействовать с другими, слушать и слышать других, уважать чужие убеждения, принимать оппонента, находить точки соприкосновения, соотносить и согласовывать свою позицию с позициями других участников дискуссии.

***Kalit so'zlar:*** Munozara, shaxsga yo'naltirilgan ta'lim, texnologiya, rivojlanish.

***Ключевые слова:*** Дискуссия, лично-ориентированное образование, технология, развитие.

УДК 37.017.924

## THE ESSENCE AND FEATURES OF THE HUMANIZATION OF AXIOLOGICAL EDUCATION OF STUDENTS

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**Summary:** *The article analyzes the problem under study, shortcomings in the system of humanistic education; various ideas and directions in pedagogy have been widely studied and implemented: Karakalpak folk traditions; socio-cultural competence; humanistic ideas of Karakalpak folklore and literature; ethnopedagogy of the Karakalpak people; culture of the Karakalpaks.*

**Keywords:** *humanistic education, socio-cultural skills, Karakalpak folklore, humanistic ideas, ethnopedagogy.*

The pedagogical process at the university is aimed at the joint activity of the teacher and students to achieve the goals of education, creating conditions for the student to become the subject of his own educational activities and life. This is achieved on the basis of the implementation of the humanistic paradigm of education, which reflects the evolution of philosophical views, according to which a person is put forward to the center of the scientific picture of the world. Humanization is closely connected with the democratization of the pedagogical process.

Humanistic ideas have their roots deep in history, each epoch has its own humanism. In philosophy, humanism is understood as the process of a person's awareness of his spirituality, his relationship with the outside world. Humanization is represented as the development and mastering of the ideas of humanism, understanding the relationship between the material and spiritual, nature and man.

In the general theory of education, the foundations of which were laid by encyclopedists and educators: Abu Ali ibn Sino, Abu Rayhon Beruni, Yusuf Khos Khodjib, Munavvar Kori Abdurashidkhonov, Jan Amos Komensky, Heinrich Pestalozzi, Adolf Disterweg, Johann Herbart, K.D. Ushinsky, P.F. Kapterev, as well as the largest representatives of Russian pedagogy and psychology of the XX-XXI century. X.Juraev, M.G.Davletshin, G.Shaumarov, E.Goziev, S.R. Radzhabov, Z.F. Mirtursunov, U.Aleuov, A. Munavvarovym, K. Khoshimov, Zh. Khasanboev, O.Musurmanova formed the pedagogical theory of educational activity, in which special attention is paid to the humanization of the education of students, which is a scientific priority of Uzbekistan.

Today, the focus of scientists' attention is on problems related to the humanization of education, the pedagogical process, pedagogical activity and the student's personality.

To implement this approach, Russian science has accumulated a lot of theoretical experience. The problem of humanization of education is analyzed in various aspects by philosophers and sociologists G.S.Batishchev, V.G. Belinsky, V.V. Bestuzhev-Lada, B.C. Bybler, L.P. Bueva, V.P. Zinchenko, M.S. Kagan, I.S. Kon, Ya. Korchak, E.A.Podolskaya; psychologists K.A.Abulkhanova-Slavskaya, A.A.Bodalev, V.V. Davydov, I.B. Kotova, A.M. Novikov, A.B. Orlov, A.V.Petrovsky ; teachers Sh.A.Amonashvili, M.N.Berulava, E.V.Bondarevskaya, N.V. Zvyaglova, M.V. Ivanov, B.C. Lednev, B.T.Likhachev, A.V. Mudrik, Yu.N. Petrov, V.A.Slastenin, A.I.Subetto, E.N. Shiyanov, A.F. Shchipotin, etc.

The need to humanize education became especially acute in the early 90s. This was due to the following shortcomings in the existing education system: the lack of notes on the educational activities of the subjects of the educational process, ensuring the preservation of their health; the predominance of classroom classes over the independent work of students; lack or insufficient

attention to the development of creative potentials of the student's personality; weak information support of the educational process; orientation to "closed" academic disciplines of "rigid structures", which led to strict normative specification of educational information, schematism in teaching, tautology and scholasticism of knowledge; the "rigidity" of the educational system, expressed by a single stage of education, a purely state or departmental-state organization; a management and distribution scheme that ignores the self-determination of the individual; the lack of a system for measuring the quality of university activities in training specialists; the dominance of the information-volume education system over the intellectually transformative, etc.; a decrease in the quality of education, a drop in students' interest in learning, a deterioration in the moral atmosphere within the walls of educational institutions, an increase in offenses.

In addition, the pedagogical guidelines that guided teachers have become far from real life, from the democratization of society.

Due to the above shortcomings, various ideas and directions in pedagogy have been widely studied and implemented in Karakalpakstan: Karakalpak folk traditions; socio-cultural competence; humanistic ideas of Karakalpak folklore and literature; ethnopedagogy of the Karakalpak people; culture of the Karakalpaks. All of them are disclosed in the works of the following scientists and teachers (U.Aleuov, T.Utebaev, K.Ayyymbetova, J.Aitmuratova, I.B.Allaniyazov, N.P.Abdimuratova, P.S.Abdimuratova, G.Atamuratov, G.D.Dzhanabaeva, A.A.Erezhenova, etc.).

Questions on: 1) moral and aesthetic education (Zh.P.Asamatdinova); 2) Karakalpak ethnos and traditional nature use (R.Balieva); 3) the life and family of Karakalpaks in the past and present (A.T.Bekmuratova); 4) reflection in legends and folk legends (Zh.T.Berdyev); 5) Karakalpak folk children's games (G.D.Kagan); 6) folk applied art of Karakalpaks (I.V.Savitsky) and others.

Humanistic education aims at the harmonious development of the individual and assumes the humane nature of the relations between the participants of the pedagogical process. To denote such relations, the term "humane upbringing" is used. The latter implies a special concern of society about educational structures.

Humanistic education is one of the progressive trends of the world educational process, which has also covered the educational practice of the Republic of Uzbekistan. Humanistic education is carried out in the acts of socialization, proper education and self-development, each of which contributes to the harmonization of personality, forms a new mentality of students. The humanistic prospects of the renaissance make in demand not only such qualities of personality as practicality, dynamism, intellectual development, but also, above all, culture, intelligence, education, planetary thinking, professional competence.

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**Rezyume:** *Maqolada urnatilyotgan muammo, gumanistik ta'lim tizimidagi kamshiliklar taxlil qilingan; pedagogikada turli g'oya va yunalishlar keng urganilgan va amalga oshirilgan: Qoraqalpoq xalq ananalari; ijtimoiy-madaniy maxorat; Qoraqalpoq folklori va adabiyotining gumanistik g'oyalari; Qoraqalpoq xalqining etnopedagogikasi; Qoraqalpoq madaniyati.*

**Резюме:** *В статье дается анализ изучаемой проблемы, недостатки в системе гуманистического образования; широкое изучение и внедрение получили различные идеи и направления в педагогике: каракалпакские народные традиции; социально-культурная*

компетентность; гуманистические идеи каракалпакского фольклора и литературы; этнопедагогика каракалпакского народа; культура каракалпаков.

***Kalit so'zlar:*** *gumanistik-ta'lim, ijtimoiy-madaniy maxorat, Qoraqalpoq folklori, gumanistik g'oyalari, etnopedagogikasi.*

***Ключевые слова:*** *гуманистическое образование, социокультурные навыки, каракалпакский фольклор, гуманистические идеи, этнопедагогика.*

## **DIGITIZATION OF THE AGRICULTURAL SECTOR**

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**Summary:** *The gradual transition of the Republic of Uzbekistan to the conditions of a reformed economy and the emergence of the republic on the world stage as an independent state, the ability to manage a diversified farm that understands and can operate in international business is a modern requirement.*

**Keywords:** *Agriculture, dynamic reforms, economic change, agricultural development strategy.*

Agriculture is the mainstay of the Uzbek economy. In addition to supplying the population of the republic with food and raw materials for the processing industry, this sector is also a guaranteed market for a number of industries.

During the years of independence, as a result of economic reforms in our country, great results have been achieved in the agricultural sector. One of the factors ensuring the sustainable development of agriculture in the country is the introduction of modern agricultural techniques and technologies in the industry, as well as the transition to intensive methods of agricultural production. In Uzbekistan, complex measures are being taken to provide comprehensive support to the food industry, provide benefits to the sector, improve governance mechanisms and increase efficiency. In our country, important tasks have been set: "... to give priority attention to the production of high-quality food products, the creation of guaranteed reserves and their uninterrupted supply to the market, as well as ensuring price stability". Agriculture is an important sector of the Uzbek economy, accounting for 28,5% of GDP. It employs about 4,2 million people, which is more than 30% of the country's total employment. The main agricultural crops are cotton and grain, but the abolition of quotas and price controls in 2020-2021 will contribute to the diversification of crops and the gradual transition to the cultivation of other crops, fruits and vegetables. Exports of agricultural products in 2019 accounted for about 9,8% of Uzbekistan's external income.

Uzbekistan is implementing dynamic reforms and economic changes. Extensive reforms are also underway in the agricultural and food industries, opening up new opportunities for further expansion and diversification of the agricultural and food industries. The important role of agriculture in the economy of Uzbekistan also determines the important role of agricultural reforms in the economic success of the republic. Thus, Uzbekistan was one of the three countries in the region of Europe and Central Asia (YeMO), which, despite the pandemic, maintained positive economic growth in the year 2020.

The government believes that the ongoing reforms will increase agricultural efficiency through the introduction of new technologies, including resource-saving technologies and the further development of processing and packaging, in order to increase the value of domestic and export products. It is planned to develop the country's textile sector and improve the value chain.

According to forecasts, on account of the introduction of scientific and innovative ideas, the volume of production of fruits, vegetables, potatoes, legumes and oilseeds, 16% meat, 13% milk,

27% eggs, 2 times Fish, 30% honey will increase by 6-8% annually. The rate of processing fruits and vegetables rises by 15%, meat from 9 to 15%, milk from 14 to 18%.

According to the “Strategy of Agricultural Development of the Republic of Uzbekistan for 2020-2030”, nine directions are considered priorities:

1. Ensuring food security of the population. In a short period of time, the Malnutrition Index in Uzbekistan fell from 15% to 2,4%, becoming one of the best results in the region.
2. Improving the agribusiness environment and creating value chains.
3. Reducing state participation in industry and increasing investment attractiveness.
4. Rational use of natural resources and protection of the environment.
5. Development of a modern system of public administration.
6. To diversify public expenditure to support the sector.
7. Development of the system of agricultural science, education, information and consulting services.
8. Development of rural areas.
9. Development of a transparent system of industrial statistics.

Great attention is paid to the digitization of agriculture, as well as the wide introduction of technologies for rational use of water and land resources within the framework of the “Smart Agriculture” program, at the same time, providing various benefits, subsidies and loans. For example, in 2026, moist crops such as rice will be grown by seed in all secondary areas. Starting this year, as an experiment, irrigation and drip irrigation of this crop have been introduced, and machine planting of rice seedlings has been organized.

In 2018-2020, \$ 1,4 billion was invested in clusters to create a value chain. In 2019-2020, intensive orchards and vineyards were established on 10,8 thousand hectares and 19,7 thousand hectares, respectively. Water-saving technologies and modern resource-saving equipment worth 1,5 trillion soums have been introduced on 250,000 hectares of land.

To date, 463 agro-clusters have been established in all areas of agriculture (cotton-textile, grain, fruit and vegetable, rice, etc.). The clusters cover 2,2 million hectares of agricultural land. This year, 270 investment projects worth 25,5 trillion soums and 589 billion soums will be allocated for deep processing of cotton. 63 fruit and vegetable projects worth 1 trillion 164 billion soums and 122 projects worth 1 trillion 164 billion soums will be implemented.

Uzbekistan is taking large-scale measures to actively develop the digital economy, as well as the widespread introduction of modern information and communication technologies in various sectors of the economy, including agriculture. In particular, in December last year, the “Strategy for the development of smart agricultural technology” and “Action Plan for the implementation of the Strategy for the Development of Smart Agricultural Technology for 2021-2023” were approved and 3 main directions implies:

- digitization of agriculture;
- automation of water resources management, monitoring and accounting processes;
- support for business start-up projects in the agricultural sector.

At the same time, a special complex responsible for the development of digitalization of agriculture, the introduction of modern information technologies and software products in the field of agriculture and food security has been established at the Central Office of the Ministry of Agriculture.

In conclusion, it should be noted that the potential for the development of agricultural production in Uzbekistan is traditionally very high in terms of cultivation and the use of new innovative formats and technologies. The ongoing reforms are aimed at full development of existing potential, increasing the competitiveness of agricultural products and the entire agro-industrial complex.

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***Rezyume:*** O'zbekiston Respublikasining isloh qilingan iqtisodiyot sharoitlariga bosqichma-bosqich o'tishi va respublikamizning mustaqil davlat sifatida jahon maydoniga chiqishi, xalqaro biznesni tushunadigan va faoliyat yurita oladigan ko'p tarmoqli fermer xo'jaligini boshqarish imkoniyati zamonaviy talab.

***Резюме:*** Постепенный переход Республики Узбекистан к условиям реформированной экономики и выход республики на мировую арену в качестве независимого государства, способность управлять многопрофильным фермерским хозяйством, понимающим и умеющим работать в международном бизнесе, является современным требованием.

***Kalit so'zlar:*** Qishloq xo'jaligi, jadal islohotlar, iqtisodiy o'zgarishlar, qishloq xo'jaligini rivojlantirish strategiyasi.

***Ключевые слова:*** сельское хозяйство, динамичные реформы, экономические преобразования, стратегия развития сельского хозяйства.



## RESEARCHING THE PULJAY MONUMENT

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**Summary:** *The article provides information about the settlements and graves excavated as a result of archaeological excavations carried out at the Puljay archaeological monument. The location of the houses, the moonlighting of the cemeteries in the monument and the methods of burial are shown in different ways.*

**Keywords:** *Puljay, Bograhan, Mizdakhkanda, Golden Horde, Fort, graves, gishts, walls, pottery, Tower, caravan Palace.*

The Republic of Karakalpakstan is located in the territory of the Kongyrat district in the western part of the Ustyurt, behind the Karaumbet salt flats and on the back side of the village of Elabad at a distance of about 8 km [16, c.249; 3, c.153-154; 20, c. 90-96; 5, c. 145-147; 14, c. 214-224; 15, c. 77-80]. The monument is located in the oasis of agriculture among the nomads.

The Puljay monument was first excavated in 1946 by the Khorezm Archaeological and Ethnographic Expedition. Then they collected archeological artifacts on the monument and received a plan of the monument [ 17, c. 238]. His information was briefly published by Ya.G. Gulyamov. He called the monument Git in the historical-geographical literature of the Arabic language in the early Middle Ages. The local people called it "Mys kempir [3, c. 153-154].

In 1960, the monument was studied by the archeological team of the Institute of History, Language and Literature of the Karakalpak branch of the Academy of Sciences of Uzbekistan under the leadership of V.N.Yagodin. Remains of archeological artifacts were collected from the monument, as well as the excavation of the fortress, the house without a wall, the castle, the back wall. It is written that both rural areas belong to the XII-XIV centuries [19, c. 90-96]

In 2003, UNITAC "Climatic Changes in the Epoch-Golotsena and the Development of Human Settlements in the Aral Sea Basin ( CLIMAN)" studied the Puljay complex. It means that it belongs to the XII-XIV centuries AD from the first half of the first millennium BC [ 21, c. 269-282; 18, c. 201-202].

In 2004, 2012, 2014-2016, the archeological team of Karakalpak State University under the leadership of Kdyrniyazov M.-Sh conducted research on the monument [7, c. 127-130; 6, c. 81-88; 8, c. 84-90]. In recent years, S.T. Scientific articles of Saipov ) 2013), S.T.Saipov, A.K.Alimbetov ) 2013) were published. In recent years, the staff of the Karakalpak Research Institute of Humanities under the leadership of Sh. Amirov conducted archeological excavations in and around Puljay [ 1, c. 189-191; 2, c. 205].

When we analyze the scientific work of the above-mentioned scientists, the area of the monument is 2.8 x 1.85 kilometers. In the middle part of it there is a fortress. Its plan is trapezoidal. The back wall of the fortress is 83 m long, 86 m wide, 70 m west and 87 m west. The area occupied by the fortress is 6612 m<sup>2</sup>. On the outer side, at a distance of 15-20 m from the protective wall, there is a P-shaped side. If we calculate the area along the fortress, it is 1.15 ha ( 1159 m<sup>2</sup>). The width of the canyon is 4-5 m. When we look at the condition of the parts of the wall, it has a dimension in the north-western corner of the fort. 190-200 m from the fortress of the monument, 120 m in the south-west there has tombs on the west and south-west sides. The area of this land is 140 x 50 m. It is built over graves there. The remnants of the walls which were built with raw bricks are encountered. Their distance is 0.5-1 m. [ 19, c. 93-94]. There, 116 graves were found by Sh.Amirov [1, c. 201-202].

There are more than 100 hectares of uninhabited agricultural lands and 30 hectares of old settlements. On the west side of it there is an ancient deposit. In their construction, curved stones

were sharpened and woven. In some places it is used as raw bricks. From there, a group of people, both individually buried, were laid to rest. According to his researcher, he came to the conclusion that people should be close by blood. According to Janibek's hijra, the period of Puljay's appearance and development in 756 was between IX-XII and XIII-XIV centuries [5, 2011].

In 2012, an archeological expedition led by M.-Sh.Kdyrniyazov was carried out research of the monument in four places. The first excavation was carried out excavation along the valley of the river in its eastern part. The result is a 33.75 x 16.8 meter structure. Construction is poorly preserved. It is made of raw bricks that are made of whitewash. Its dimensions are 32 x 38 x 20, 58 x 20 x 45 and 78 x 45 x 20 cm. In this way it is built the walls of the space in the west. Some parts of the walls were daubed with alabaster. There are minarets which is the diameter of the outer corners of the building is 1.5 m. They are 0.8 m from the wall. The size of the minarets on the east side is 1.5 x 2 m and the size of the tower in west is 1.5 x 1.8 m. For this construction raw bricks and stone slabs had been used. On the south side of the building there is a 1.5 m wide mouth. The floor of the house is paved with curved stone slabs. On its eastern side, there are two rooms measuring 6.5 x 6.3 m (№8) and 8.5 x 6.3 m (№9). In the middle part of the Caravan serai there is a stake measuring 10.65 x 11.7 m. On the back there are 4 stubbles( 3.25 x 11.7 m). The walls of the ridges are kept at a height of 0.5-0.9 m. The walls of the Caravan serai are made of curved stone slabs and raw bricks. Their dimensions are 25-28 x 25-28 x 5-5.5 cm. On the west side of the building are two stables. Their dimensions are 7 x 9.5 m and 4.8 x 6 m.

In the middle of the first room are the stones of the column in the form of a two-sided peramid. Its height is 45 cm. The size of the upper section is 22 x 22 cm and the size of the lower section is 55 x 55 cm. The lower part of the column of this form is found in Bograkhan and Mizdakhkan [5, 2011, c. 49-54]

Three tombs are known in the eastern part of the Caravan serai. Their dimensions are 4.5 x 5.1 m. There is a stone slab on the threshold of the door of the 7th room. Its size is 0.28x0.16 m [ 11, c.82]. Structures similar to this caravan serai are found in the Aral-Caspian range. They belong to the Golden Horde period [ 12, c. 102].

The bones of five people were found during the 3<sup>rd</sup> excavations. It is surrounded by curved stone slabs. His door is on the east side. The size of the plates is 30-35 x 34-60 x 35-55 cm. They are woven in three rows. The thickness of the wall is 60 cm. The graves of the five young boys in his case were badly damaged and not well preserved. The bones of the great man are well preserved in the middle of the wall structure, close to the western wall. Initially, the tomb was covered with raw bricks. The head of the victim was covered with a large slab. He was lying on the floor in the manger. Its length is 185 cm. The horse's body was found in the grave. Adding water to such a horse was widespread in the Aral-Caspian period in the XII-XIV centuries [ 19, c. 139-158].

The third excavation was carried out on the west side of the second excavation. The man-made house is 29 x 11.5 m in size. The foundation of the wall is made of curved stones. In some places, broken parts of bricks and pots were found. The preserved height of the wall is 45 cm and the thickness is 0.5 m. The door of the building is from the back. Width 1.05 m, close to its eastern side. Eight rooms are known. The size of the 4<sup>th</sup> room is 3.7 x 4.5 m. There is a canyon in the west. In canyon's mouth there is the mouth of a stone mill. The size of the 5<sup>th</sup> room is 6.1 x 4.3 m. It was found to be 22 cm wide and 1.86 m long. Such canyons were discovered from Mizdakhkan in the XII-XIV centuries and Beleoli [ 12, c. 104]. There is canyon in the north-west corner of the room. Its dimensions are 1.08 x 0.9 m. On his west oven which is made from pottery was found.

The size of the 7<sup>th</sup> room is 4.5 x 5 m, the size of the 8<sup>th</sup> room is 3 x 5 m. There is no such thing as a construction. Among them there are fragments of pottery, bones of animals, copper coins of the Golden Horde period, millstones, fragments of colored and gray pottery.

The fourth excavation was carried out on the reverse side of the first excavation. Two graves were dug and the height of one of them was 12-15 cm. The first tomb is 1.25 m long, 73 cm wide and 114 cm deep. According to learner's opinion, the tomb was in the form of a kenotaph.

The second grave is located 50-60 cm behind the first grave. The upper surface of the tomb is 190 x 127 cm wide and covered with mourning coats of arms. It is 13-16 cm thick, 148 cm long and 114 cm deep. After the grave was 59 cm deep, a grave was dug and the body was buried. The tomb is believed to date back to the 13th and 14th centuries [ 6, 2013].

Historians of Karakalpak State University have excavated dozens of sites. The second excavations were also held in the west space of the monument in the non-residential area of the fortress. There is a bad-preserved dome. It is located in the wall, which is made of stone slabs by the north, east and west. Its preserved height is 0.5-0.7 m. The dome is broken in the old era. The diameter of the lower section is 1.6 m. It is made of raw bricks. The sizes of the bricks are 22 x 22 x 3.5 cm. As a result of the excavations, fragments of pottery from the Golden Horde period were found. Of these, the handle is round in shape, and most of the vessels found are ash-colored. They belong to the XIII-XIV centuries by [ 8, c. 85; 9, 2018].

The fourth archaeological excavations were conducted in the northern part of the village in 2012. It is 40 x 28 m on a small platform. There is a four-cornered structure on this hill. The size of the building is 33.75 x 16.80 m. Entrance is on the side of west. The construction is made of sharp stone. (32-78 x 38-45 x 20 cm). The side of the wall is flattened. The wall was daubed with alabaster.

Minarets were excavated in both north-east and west corners. They are rounded. Diameter is 1.5 m. The preserved height is 0.5-0.6 m. They are 0.8 m from the wall. They are made of sharp stones and raw bricks. The towers in the background are four-cornered in plan. The tower in color is 1.3 x 1.3 m and the tower is 1.5 x 2 m. The preserved height is 0.6-0.7 m. 10.8 m to the west of the minarets, there is a 1.5 m wide door on the south side.

In 2014, researchers found a mosque, a man-made house, and two domes that bake bricks. The size of the mosque is 8.1 x 7.5 m on the outside and 7.05 x 7.65 m on the inside. The thickness of the wall is 0.45 m. The height of the preserved wall is 0.5 m. The walls are made of curved stone slabs. In some places it is covered with baked bricks. Their size is 23-25 x 23-25-5 cm. The floor of the house is covered with baked bricks. Their size is 23 x 23 x 5 cm. In some places it is daubed with alabaster. There is a place for a half-broken mikhrab in the west dialect. The foundation of the room which was constructed with raw and baked bricks are preserved. They are on the western side. According to M.-Sh.Kdyrniyazov, the top of the stem is covered with a round dome [ 8, c. 87]. In our opinion, it was suppressed flat. This is because the thickness of the wall does not allow it to be suppressed in such a way. Fractures of the windows were found.

In the background of the short stalk is a huge beast. Its size is 9.8 x 13 m. The thickness of the wall which is between the mosque and yard is 23 cm. It has pieces of alabaster. The foundation of the colonnade and the bones of the man buried in the stone box were found there. He was on the right side, facing west and facing the south. Her legs and arms are bent. The back-west corner of the building has a door that leads into a winter room. The other is located in the south-western corner. He was halfway through the door. Inner part is constructed with baked bricks and divided into two parts. The first inner wall is 7.1 m long and 45 cm thick. It is made of baked bricks and measures 23-25 x 23-25 x 5 cm. The foundation of the column is 55 x 47 x 15 cm and is made raw bricks. According to the opinion of the inspectors, this mosque consists of two rooms and belongs to the period of Oghuz (IX-XI centuries) and Kypshaks (XIII-XIV centuries). In other words, the mosque was a place of worship. In the end, there had a grave. The dead were buried in a stone coffin. The size of the stone coffins was 40 x 50 x 25 to 75 x 45 x 27 cm. The lid of the box is made of sharp slabs [ 11, c. 82-82].

In excavations VI-VII, there were some spots for baking bricks. The first place (excavation VI) is located 60 m to the east of the gorge. The dome is 3.2 m long, 3 m wide and 1-1.2 m high. The heating section 0.7 m from the horse's back. It is 1.5 x 1.3 m at the base, and both sides of it are covered with raw bricks (22-23 x 22-23 x 5 cm). (22-25 x 22-25 x 5 cm). It is a diagonal on the west side and has a hole suppressed on the back. Its size is 15 x 26 cm. The distance between such holes is 46-50 cm. The lower part of the dome is covered here. The upper layer collapsed downwards [ 8, c. 88].

The second tomb (excavation VII) is located on the right bank of the gorge. The border of the dome which baked brick is well excavated. Its size is 7 x 4.7. The dome is in the form of four corner. On its west side, the wall is made of 5.6 m long raw bricks ( 23 x 23 x 5 cm, 23 x 17 x 5 cm). The lower surface of the outer wall is made of stone slabs.

In the VIII, IX and X excavations, human corpses were excavated. From the IX-X excavations (2014) one-thirds of the excavations were carried out. Among them were oshak-kan, sypa, tashnao' and tandyr in the Golden Horde. The houses of this farm are different from the houses along the Aral Sea in terms of their location. They are, in most cases, built on their own [ 8, c. 88-89].

Kdyrniyazov M.-Sh. Archaeological excavations in the area have uncovered fragments of about 400 shells. 280 of them (74%) are simple pottery pots. In addition, red chandeliers also contain celadons. One and a half of them are from Iran and China. Fractures of stone pots, pans, pots, tubes, pots, candles and others are well known. In addition, stone cauldrons, millstones, bottles, pieces of ironware, beads, jewelry, pieces of bronze mirrors, and items made of bone were found. It is written by the researchers that the Khorezmshahs also belonged to the Golden Age.

Researchers have written that the memory of Puljay is correct in the medieval Arabic literature as Gim (Jim) by Ya.G. Gulyamov and V.N. Yagodin. It is known that during the reign of the Khorezmshahs Mamunids, the fortresses appeared on the back borders of the Khorezm people. During the reign of Khorezmshahs-anushtegin, the Golden Horde, these lands were irrigated by branches and canals of the river. In recent years, the West Aral Sea has become dehydrated. It is included in the memory of Puljay [ 8, c. 89]. In the XIII-XIV centuries, the Oguz-Kypshaks, who lived in the Aral-Caspian region, also felt coming to these places.

As a result of archeological excavations, parts of many pottery pots have been found in the pottery of some of them [ 14, c. 77-81]. Of these, both the pots have a brain-shaped shape, their mouths are turned outwards, and the horizontal-outer edge is slightly flattened. Its smell has been a little thicker. Their necks are not so high and their mouths are almost attached to the needles. When the upper side is cut, the three are both quadrangular in shape and the outer rim is rounded. The lower part of the upper side is pressed with the fingers. The height of the vessels is 68 cm and the diameter of the mouth is 32 cm. Such hums are found in the monuments of the Aral Sea.

The tubes are spherical. The mouth is not so tall it is slightly turned to the outside. Little stones and coarse sand were added to them. Vessels are painted red and the outer surface is painted black angob. They can be designed in any way. It is known that one part of it is designed in the special machine and the other part is made by hand. The upper bouts featured two cutaways, for easier access to the higher frets. The diameter of the mouth is 24 cm and the thickness of the wall is 0.4-0.8 cm. Such pots also appeared in the Golden Horde from the IX-XI centuries. The pots in this category include well-bent and well-bent vessels [ 14, c. 215].

During the excavation of the Puljay monument, fragments of narrow-mouthed vases were often encountered. They have vertical stripes on their shoulders. In contrast to their ash-colored eyes, their handles have also been flattened in the cross-section of the handles. The color of the outer surface of the eyes is also painted with white angob. The mouths of the some pots are cone-shaped and pinched with fingers. Such pots are found in the memory of Mizdakhan in the cultural layer of the XIII-XIV centuries [ 6, c. 137].

It is considered to be a group of pots which have molded ornament on the outer surface. The clay of the containers is well-bent and strong. They are ash-colored. The outer surface has molded ornament. Its upper part is decorated with the leaves of the plant. The inscriptions decorated in this way were written in Khorezm as belonging to the XIII-XIV.

And the pots are known to have the neck made of reddish clay. They have a flat bottom, a brain-shaped body, and a flat-round handle with a needle attached to the upper lip. Its body size is 22-24 cm and its height is 38 cm. Such pots belong to the Golden Horde period in Mizdakhkan. It is also found in the monuments of Beleo'li, Churuk, Ajigeldi [ 12, c 113] and in the monuments of Mizdakhkan. Such pots are also found in the monuments of the lower reaches of the Volga River. There are a lot of red cups. In most cases, they are also encountered with geometric lines. Similar containers, according to S.T. Saidov from Mizdakhkan, were found in red and purple flower pots, which were found in the monuments of Ustyurt and along the Volga. These similarities indicate that the Aral Sea basins were closely connected with Eastern Europe in the Middle Ages [ 14, c. 217-219; 15, c. 79].

Fragments of candles were often found in the work of flower pots filled with the memory of Puljay. In their work they have a tube-shaped, long body, low, round shape and a long beak on one side of which is pressed with cotton wool. Its circular section is turned towards the case. Its lower side is conical and has a flat bottom. Its height is 28.5 cm.

Its bottom diameter is 11.2 cm. Such candles can be seen in Mizdakhkan, Gone Urgench, Jampyq fortress and other monuments; they belong to the XIII-XIV centuries AD. Such candles are found in the old Termez in Usturshana, in It is also known in Samarkand Sogd.

In other words, the monuments located in the east Ustyurt were influenced by Khorezm and the peoples of the Aral Sea. All the methods of construction - fortification, planning, construction, handicrafts - are intertwined with the interdependence of culture, sedentary agriculture and nomadic pastoralism. It is known that by the end of the XIV century, the development of art was slow. Thus, both political and economic decline proved that these monuments had been demolished.

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**Rezyume:** *Maqolada Puljay arxeologik yodgorligida olib borilgan arxeologik qazishma ishlari natijasida qazilgan turar joylar va qabirlar haqida ma'lumotlar berilgan. Uylarning joylashishi, yodgorlikdagi qabiristonlarning oylashishi va dafn qilish uslublari farqlari ko'rsatib berilgan.*

**Резюме:** *В статье приводится информация о поселениях и могилах, раскопанных в результате археологических раскопок, проведенных на археологическом памятнике Пульджай. Расположение домов, подработка кладбищ в памятнике и способы захоронения показаны по-разному.*

**Kalit so'zlar:** *Puljay, Bograhan, Mizdaxkanda, Oltin O'rda, qo'rg'on, qabirlar, gishtlar, devorlar, kulol idishlar, minora, karvon saroy.*

**Ключевые слова:** *Пульджай, Бограхан, Миздахканда, Золотая Орда, курганы, гробницы, кирпичи, стены, глиняная посуда, минарет, караван-сарай.*

## EXCAVATION IN THE TOWN OF BOGROKHAN

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**Summary:** *The article focuses on the material culture of the left bank of the Amu Darya, the history of research and their historical and written sources, which are the sacred lands between Jayhun and Sayhun, formed between two rivers that are the centers of civilization in our history.*

*Scientists who conducted research at the monument to Bogrokhan are also discussed. In general, historical sources state that the archeological monuments of the left bank of the Amudarya Delta have preserved their unique material culture traditions and that cultural ties have brought new forms of materials, construction and work methods to the ancient material culture.*

**Keywords:** *Amudarya, Syrdarya, archeological monuments, research, written sources, material culture, cultural heritage, geographers, travelers, archeologists, nomads and settlers, cultural areas, Aral Sea delta, past history, Bogrokhan, Ustyurt.*

The Bogrokhan settlement is located 10 km north-west of the city of Kungrad, on the right bank of the dry Karakul channel - one of the medieval Amu Darya channels. Bogrokhan was identified by Ya.G. Gulyamov with Madminia of the 10th century. [3.151-154].

In the 50-60s of the XX century, the site was surveyed by the staff of the Khorazm archaeological and ethnographic expedition [8.27] and the Institute of History, Language and Literature named after N. Davkaraev under the guidance of V.N. Yagodin [10.86-90].

In 1998-2003, the site was studied by the archaeological team of the Karakalpak State University named after Berdakh. It consists of a citadel, a shakhristan and an unfortified rabad. The total area of the settlement is more than 80 hectares. Rabad is not fortified in the center is a shakhristan measuring 250 x 200 m. It is surrounded by a defensive wall. The citadel, 60 x 50 m in size, occupies the north-western part of the shakhristan. Its height from the surrounding surface of the earth is 0.5-3 m (Fig. 1).

Excavations were carried out in the north-western corner of the shakhristan. Seven rooms have been uncovered here. House number 1. The entrance to the house, 1.8 m wide, was located 5 m from the inner line of the northern one and 5.5 m from the western fortress walls. In front of the entrance there was room No.1, 4.5 m long and 0.9 m wide. In the northern room No.1 there is room No.2. Its dimensions are 3.6 x 3.2 m. Along the top, there is a blockage of the wall with a thickness of about 1 m. Then there is a cultural layer of medium density, brown in color with layers of ash. The layer thickness is 5-10 cm. The floor level can be traced below it.

In the western wall there was an entrance to room No.3, 0.6 m wide. The dimensions of the room were 1.85 x 2.25 m. It has been excavated to floor level. Consequently, premises No.2 and No.3 served as a storeroom.

At the southern end of the room was the entrance to room 4. Its dimensions were 5.5 x 3.1 m. Near the middle of the western wall, a poorly preserved tashnau, 1.1 x 1.1 m, was uncovered.

In the middle of the northern wall there was a passage to room No. 5, 0.8 m wide. A tashnau was found here, built from a stone disc of a hand mill. The diameter of the disc is 60 cm and the thickness is 5 cm. The opposite side of the north-western corner of the room is occupied by a sufa. The height of the sufa is 35 cm. The sufa is plastered with clay with an admixture of adobe. The dimensions of the sufa are 3.2 x 2.1 m. In the southeastern corner of the sufa there is a hearth-furnace. An open-type ceramic hearth is cut into its edge. The mouth of the firebox is brought out to the southern side. A chimney ran from the hearth under the sufa, which was connected to a vertical chimney located in the western wall. Chimney dimensions 18 x 18 cm.

At the western end of the southern wall of room No.4 there is a passage 1 m wide into the L-shaped room No.6. The dimensions of the room were 4.3 x 3.7 x 3.7 x 1.6 x 1.2 x 5.4 m. In the southeastern corner of the room there was a hearth and a ceramic tandoor. The diameter of the hearth is 30 cm. Only the lower part with a diameter of 0.4 m has survived from the tandoor. In the middle of the room there was a hearth cabinet measuring 0.9 x 0.8 m and 0.3 m high.

At the eastern end of the southern wall of room No. 4, a passage to room No. 7 was opened. The dimensions of the room are 5.6 x 3.7 m. In the center of the room, a dilapidated tashnau, built of burnt bricks, was discovered. The western part of the room is occupied by a sufa with a hearth. The height of the sufa is 40 cm, the width is 1 m. The hearth is located 70 cm from the southern wall. Some areas of the floor are lined with baked bricks measuring 24-28 x 24-28 x 5-6 cm.

All rooms have one level of earthen floor. A cultural layer 5-20 cm thick goes along it, and above it, the rubble of the wall was opened. The walls of the premises are lined along the lower part with baked bricks from 2 to 5 rows with dimensions of 24-26 x 24-26 x 5 cm. Reed laying is laid on the brickwork and pakhsa masonry is erected on it. In some parts of the wall, a brickwork of 26-28 x 26-28 x 4-5 cm was noted. The preserved height of the wall is from 0.5 to 1.5 m. The walls are plastered with clay with an admixture of adobe. Plaster traces were noted on some parts of the walls.

The northern wall of rooms No. 2 and No. 3 The western wall of rooms No. 3, No. 4, No. 5 and No. 6 is a fortress wall built of pakhsa. The thickness of the fortress wall is about 4 m.

Consequently, two families lived in this house (premises no. 5 and no. 7). Premises No. 2 and No. 3 served as a warehouse. Room No. 6 served as a kitchen and utility room No. 4.

The upper disc of a sandstone hand mill was found in a single copy. Its thickness is 6.5 cm; its diameter is 62 cm; the diameter of the hole in the lower part is 5 cm and in the upper part is 10 cm. A disc-shaped stone core was found used for the scales. Its diameter is 12 cm and its thickness is 4-6 cm.

Found a fragment of a talcum cauldron. It has an erect rim and a body widening downward. The cauldron was equipped with four handles located at the rim in the form of protrusions. Two of them are rectangular and two are trapezoidal. Its diameter is 25 cm. Similar cauldrons were found during excavations of the Golden Horde quarters of the Mizdahkan.

A bronze thimble in the form of a wedding ring, fragments of a spoon and a rectangular tray were found. In the artistic traditions of metal products of the Khorazmshah and Golden Horde times, there is a bronze lamp with a circular conical tray without handles. It looks like a teapot, in terms of a wedge-shaped shape. The rim has two lugs with holes for hanging the lid. The side walls of the case, the seam, are in one line and have a floral ornament. The vessel is 8.5 cm long and 5.5 cm high.

In the course of the work, a nine-arm pendant lamp was found, made of a natural material of talcochlorite, found in the Sultanuzdag mountains. A truncated-conical ledge is located in the center of the luminaire. Above the ears of iron wire and a bronze chain 22 cm long is attached. Around the ledge there is a cylindrical reservoir with a diameter of 9 cm. The diameter of the lamp is 24 cm. The lower part and the outer and side walls are decorated with floral geometric and zoomorphic ornament in the form of stylized fish in a circle.

Thus, the house located on the north-western corner of the shakhristan was erected simultaneously with the fortress wall of the shakhristan in the 11th century and functioned until the end of the 14th - early 15th centuries.

6 m south of the northern and 12 m from the western fortress wall closer to the north-western corner of the fortress wall, a large structure 16 x 10.7 m in size was uncovered. At the moment, the northern, eastern outer side of the wall has been uncovered. The wall is 0.9 m thick. The walls of its structure were built on a cultural layer. Initially, the masonry was laid out with four rows of burnt bricks. Further, the masonry surface was lined with a reed pad, on top of which up to



6 rows of brickwork were traced. The dimensions of the bricks are 24-26 x 24-26 x 5 cm. The southern wall and the inner part have not been opened yet.

The mosque is located approximately 30 m from the western one, 10 m from the northern fortress wall of the shakhristan. It is rectangular in plan measuring 15.6 x 11.2 m and consists of four rooms. The wall is 1.1 m thick. The building of the mosque was built of burnt and adobe bricks, the dimensions of which were 29-32 x 29-32 x 5 cm. The main entrance is located at the northern end of the eastern wall. Its width is 1 m. Rooms No. 4 are rectangular in plan, its width is 1.8 m, length is 9.4 m. 50 cm from the southern wall next to the western wall, a sufa with a hearth is fixed, built of baked bricks, dimensions of sufa 1,4 x 0.6 m, height 38 cm.

The preserved height of the wall is 1.8 m. During the work, two levels of floors were recorded. The lower floor was built of baked bricks measuring 30x30x5 cm. The upper floor, located 1.6 m above the lower floor, was also built of baked bricks measuring 21-25 x 21-25 x 4 cm.

In the western wall, 1 m from the north-western corner of room No. 2, there was an entrance to room No1. The dimensions of the room were 7.8 x 4.5 m. A niche measuring 85 x 20 cm was fixed in the southern wall. All walls of the mosque were built of pakhsa and baked bricks measuring 29-32 x 29-32 x 5 cm. Wall thickness 0.8 -1.4 m. The level of two floors is traced in all rooms. The lower floor is made of baked bricks, measuring 30 x 30 x 5 cm. Below it, there is a layer of compacted soil 24 cm thick, which lay on the continental sandstone.

The second upper floor is traced 1.8 m higher than the first floor. It is made of baked bricks measuring 21-25 x 21-25 x 5 cm. The total height of the preserved wall is 2.7 meters. All the walls of the mosque are plastered with clay mixed with adobe. The thickness of the adobe coating varied from 0.5 to 2 cm. There are two floor levels between them, about 2 m.

According to the results of archaeological excavations of the mosque, it was revealed that it was built in the VIII-IX centuries, functioned until the beginning of the XIII century - the second half of the XIII-XIV centuries (Fig. 2.).

To the west of the mausoleum and the city minaret, 27 bases of column bases were recorded, located in four rows in the north-south direction, with intervals of 3.5 m. In the eastern row, 18 bases of column bases were uncovered at a length of 60 m. They are mainly made of yellow sandstone. The bases of the columns were of various shapes: rounded, step-square and trapezoidal. Under some of the column bases, brick layouts are fixed. The dimensions of the bricks are 27-28 x 27-28 x 5 cm. The dimensions of the calculations are 1 x 1 m. The bases of the columns were located at the level of the second floor of the minaret.

As a result of excavations in the north-western corner of the shakhristan, the minaret of the city was uncovered (Fig. 3).

**Fig. 3. Minaret on the east side.**

The sequence of its construction was revealed: first, a foundation pit was chosen and filled with river sand up to 3 m thick. A minaret was built on it from baked bricks on gypsum mortar. Their dimensions are 35-37x33-36x28-30x6 cm. The diameter of the minaret at the base is 7.9 m, higher than 9.5 m, even higher than 8.22 m. The wall of the minaret with a slope of 86. The minaret, starting from a height of 2.3 m, was repaired from baked bricks (22-26 x 22-26 x 4 cm). The preserved height of the minaret is about 5 m. Similar minarets are known in Kyat, Kunya Urgench and other cities of Central Asia.

A sufa was built twice on the south side of the minaret. The original sufa was made of baked bricks (26 x 26 x 5 cm) with a height of 43 cm. There were traces of fire on the sufa. Above the sufa, there was a layer of dense soil, which was overlapped by a secondary sufa 5.5 x 1 m in size, built of burnt bricks 24 x 24 x 5 cm in size.

2.5 meters from the south side of the minaret, a western wall 30 meters long was built. It was built of adobe bricks. Their dimensions are 24-28 x 24-28 x 5 cm. The thickness of the wall is

135 cm. The mausoleum located in its south-western corner has been uncovered. Under the wall of the mausoleum were the walls of early constructions made of adobe bricks measuring 30 x 30 x 5 cm. There is a cultural layer with ceramics of the 7th-8th centuries, on which the mausoleum wall was built with dimensions of 9 x 8.7 m. The thickness of the eastern wall is 165 cm, the walls were 105 cm. The walls were made of raw and baked bricks with dimensions of 24-28 x 24-28 x 5 cm. The wall was polished. Gypsum was the bonding mortar for the masonry of the wall. Above the mausoleum, a cultural layer 0.6 m thick can be traced. Inside the mausoleum, closer to the western wall, a sagana with a size of 4.4 x 2 m was built. The preserved height of the wall is 0.8 m. Burials in the sagana were not found. Hence, it was built in honor of a glorified person. The entrances to the mausoleum were in the middle of the southern and northern walls. The height of the passage is 1.5 m with a width of 1 m (Fig. 4; 5).

**Fig 4. Mausoleum on the north side.**

**Fig 5. Fragments of burnt bricks.**

Fragments of Arabic inscriptions were found from the outer dam of the mausoleum, first carved on raw clay slabs measuring 48 x 45 x 6 cm and then fired in a special kiln. Preserved words previously glorifying someone (Fig. 6).

**Fig 6. Fragments of Arabic inscriptions.**

Excavations continued around the minaret. In the northern side of it, the preserved eastern part of the premises, attached to the minaret, was uncovered. Its width is 3.1 m and the remaining length is 3 m. The floor of the room is laid out of baked bricks. A hearth pit with two hearths adjacent to the northern wall was located 0.8 m from the northeastern corner. The sides of the pit were faced with burnt bricks. The dimensions of the pit are 1.4 x 1.3 m, the depth is 25 cm. The diameters of the hearths are 52 cm and 30 cm. The body of a jug was used for the first hearth, and a stucco pot for the second. The pot was installed upside down. The bottom was nailed. The pot had a ridge-like rim and a short neck, turning into an ovoid body. The diameter of the rim is 17 cm. On the shoulders there is an ornament drawn with a sharp object in the form of three parallel wavy lines. The neck of the vessel was framed by an ornamental belt, which consisted of signs in the form of the letter "X" carved on wet clay.

The blockage located in the northwestern side of the minaret has been dismantled. Burnt trapezoidal brick with carved ornament in the form of sharp angles was found in the rubble. The width of the ornament elements is 0.7 cm. There are 4 such ornaments on the wide outer side of the brick. Consequently, similar bricks are laid out around the dump of the minaret in one belt. Brick dimensions: length 35 cm, width 28-33.5 cm, thickness 6 cm.

Excavations continued around the southern and southwestern sides of the mausoleum. As a result of the excavations, it was found out that, later the mausoleum was built, a large one was built, possibly a courtyard covering in the southwestern corner of the mausoleum "Bogrokhan". The northwestern corner of the courtyard is 3.5 m south of the minaret. The length of the western wall of the courtyard is 3.4 m. The walls were built of baked bricks measuring 24-28 x 24-28 x 5 cm. The thickness of the wall is 1.3 m. A reed pad was fixed 1 m higher from the base of the wall. Excavations in the southwest corner showed that the walls of the courtyard are located 0.6 m higher from the base of the wall of the mausoleum. Burnt bricks of various sizes and various architectural figured bricks (more than 20 varieties) were found from the obstruction of the mausoleum. They testify to the diversity of the architectural and compositional solutions of the Bogrokhan mausoleum.

The western half of the southern wall of the courtyard, 9.7 m long, was uncovered. At the eastern end of the uncovered section of the wall, there may have been a gate. This is indicated by the fact that the wall is neatly broken here. The western edge of the gate is in line with the eastern face of the Bogrokhan mausoleum.

On the southern side of the southern wall of the courtyard, a 4.2 m wide sufa attached to the wall has been uncovered. The height of the sufa in the western side is 20 cm. The eastern side of the sufa has two steps with a total height of 28 cm. 5 cm. When building a sufa, the bricks are laid out in different positions: horizontally and vertically. The base of the sufa is located 35 cm higher from the base of the southern wall of the courtyard. The section of the floor in front of the sufa (west side) is lined with burnt bricks.

In the southern side of the sufa, a wall 1 m thick was uncovered. It was built of baked bricks measuring 26-28 x 26-28 x 5 cm. At the moment, the exposed section of the wall from the southeastern corner of the sufa towards the west is more than 5 m long.

Consequently, the room with a sufa between the wall of the courtyard and the above-described wall was half-open and functioned as a shrine (reception room) in front of the Bogrokhan mausoleum.

On the southern side of the above described wall, two rooms No.2 and No.3 were uncovered. There are no eastern walls in both rooms. Room No.2 is a rectangle in the plan, measuring 3.2 x 3 m. In the south-western corner, a ruined tashnau was uncovered. In its southern part, the lower part of the hearth is horseshoe-shaped in plan. The upper part of the khumcha (pot) was used for it, and from the outside it was built of clay with a thickness of 10-15 cm. The floor of the room was laid out of baked bricks, which were preserved in some areas.

On the south side of room No. 2, room No. 3 adjoins. Its dimensions are 3.5x2.5 m. At the eastern end of the wall between rooms No. 2 and No. 3, a base of columns made of stone (sandstone) with dimensions of 0.5x0.5 m was first placed (installed). After a certain period of time, along the line of the base of the columns, from baked bricks, the southern wall of the room was built from baked bricks.

On the western side of rooms No. 2 and No. 3, the eastern half of the large room No. 4 was opened. The width of the room is 7 m. The thickness of the eastern wall is 1.1 m. The thickness of the southern wall of the room is 1.25 m. On the western side, the wall of the room was the western fortress wall of the shakhristan. The entrance to room 5 is located 20 m from the southeastern corner of the southern wall of the summer mosque. The width of the entrance was 1.75 m. The width of the room was 3.5 m. To the west of it, another passage was opened. The western side of which is badly destroyed. The passage leads to another room No. 6 measuring 4.3 x 3.6 m. The thickness of its southern wall is 75 cm. The functional purpose of room No. 6 has not yet been determined.

Starting from the entrance to room 6, the southern wall continues for another 13.5 m and adjoins the western defensive wall of the city's shakhristan. Thus, the total length of the southern wall is 41 m and therefore it is the southern wall of the mosque Friday. The preserved height of the wall is 1.1 m. It was built on the cultural layer. The first lower two rows were built of adobe bricks measuring 24-25 x 24-25 x 5 cm. Larger bricks of 28 x 28 x 5 cm and 34 x 34 x 5 cm are less common. Then reed laying was noted. A similar next laying is noted after the 9th row of bricks, their dimensions are 24-25 x 24-25 x 5 cm.

In 1998-2000, an excavation was laid at the southeastern fortress wall, 39 m from the southeastern corner of the shakhristan. Its dimensions are 23 x 15 m. It was excavated to a depth of 3.6 m and brought to the mainland. A continent of brown soil. It is deepened by 0.2-0.3 m. Brown soil with an admixture of coal, ash and burnt soil with fragments of pottery ceramics can be traced on it. Above it, the level of the earth's surface is traced. Above it, the walls of buildings made of adobe bricks measuring 32 x 32 x 4 cm. Bonding clay with an admixture of coal. The thickness of the wall is 0.8 m and its preserved height is 40 cm on the floor and on the wall, backfill and clay can be traced. The upper part of the layer is flat and compacted. The thickness of the layer is 0.9 m. The layer is exposed at a length of 23 m in the east-west direction.

A reed with a thickness of 5-10 cm was laid under the masonry of the wall. A fortress wall of pakhsa was built on it. Its thickness is 4.1 m. It is built of pakhsa blocks. The height of the lower row is about 1 m and the second 0.9-1.2 m. In the wall, starting from the second row of the pakhsa, there is an in-wall corridor. Its width is 1.6 m. The corridor was covered with groin masonry. The height of the lower row of pakhsa is 0.9 m. The upper row of pakhsa is preserved at a height of 0.3 m. Both sides of the fortress wall are compacted soil. On the outer side of the fortress wall, at a distance of 11 m, a wall 70 cm thick was fixed, its remaining height is 65 cm. It is laid out of burnt bricks with dimensions of 25-26 x 25-26 x 5 cm. The layer thickness is 0.4-1 m (Fig. 7.).

**Fig 7. Shakhristan section. 1. Sinking and blockage of the wall; 2. Grooved masonry; 3. Compacted soil; 4. Repair masonry; 5. Backfill and compacted soil; 6. Brick wall; 7. Mainland.**

In October 2001, we surveyed the northeastern corner tower of the Shakhristan fortress wall. During the excavation of the inner tower room, a well was discovered [9.]. The elders living in the Kungrad region remember the well of Bogrokhan, but they could not show the exact location of the well, assuming that it was somewhere in the northeastern side of the shakhristan. While exploring the northeastern tower, a well was discovered. Its dimensions and structure were determined (Fig. 8, 9.). In terms of plan, the well is round, clearing was carried out to the level of groundwater, up to 5.15 m from the surface of the day, the water is fresh and tastes good. The well is lined with burnt bricks laid in a circle in the form of a ring. Square bricks, typical of the 11th-12th centuries, measuring 30 x 30 x 6 and 29 x 30 x 6 cm. At a depth of 1.5 m, traces of well masonry repair were recorded. The repair was carried out using fragments of baked bricks, but the inner side of the well wall remained flat. Despite the renovation, at a depth of 1.4 and 1.6 m, places with fallen out or broken bricks were recorded in the well masonry. Clearing the well showed that below a depth of 1.5 m, the walls of the well retained their original state, both in the masonry of the upper part and below. The walls are made with recesses for steps, like a ladder. These grooves are comfortable for the legs and hands, it is possible that a rope or ropes were used during the cleaning of the repair work. The well was covered with soil. On the surface around the well, there are large fragments of pakhsa, which may have fallen during the destruction of the tower. Inside, to a depth of 5 m, no foreign objects were found, except for fragments of bricks that fell from the upper part of the well, characteristic of the XI-XII centuries. diameter in the upper part of the well is 1.07 m, with a depth of 5-1.45 m. by the quality of baked bricks, masonry techniques, processing of bricks and by the construction of the well, one can judge the high level of skill of the builders of Bogrokhan (Fig. 8, 9.).

**Fig 8. General view of the well.**

**Fig 9. Section of the well. 1. burned brick; 2. Brickwork; 3 recesses for steps; 4 blockage; 5 ground water level; 6 soil.**

The city water supply system was constantly under the control of local authorities, who monitored the distribution of water and the condition of the structure [1.93]. In addition to river water in the XI-XII centuries with the appearance of the fortress wall and the shakhristan rabad, the inhabitants of the medieval Bogrokhan also used the subsoil waters.

The discovered internal source of the city - a well inside the corner tower - shows that the Bogrokhan fortress could withstand a long siege, in drought and other circumstances it provided the residents of the Shakhristan of the city with water. The channel of the Amu Darya in this place often changed its direction, leaving the city without water, and when returning to the Amu Darya, artificial dams were built. Local residents consider the semi-dry Karakul channel to be the former channel of the Amu Darya, and Bogrokhan is a port city on the banks of this river. Indeed, in 3.5-4 km west of Bogrokhan there are traces of an earthen rampart going from south to north, called "Ak-kachi" White dam [3.151]. we made a cut on the dam. The height of the shaft is 1-2.5 m and the width is 5-7 m (Fig. 10.).

**Figure 10. Section Damba. 1.solation; 2 soil; 3 mainland.**

Wells are especially noted in historical sources as one of the most important structures. Local residents help archaeologists to find wells, sometimes mistaking them for dungeon. Wells discovered and investigated in the caravanserais, Dev-kala, Orta-Kuyu, Talaykan-ata and Ak-Yala, were built in the XI-XII centuries. Caravan-Saray, Orta-Kuyu took water from wells, and Talaykan-ata and ak-Yala were supplied with atmospheric water collected from the surrounding takyr into cistern-type wells, and buildings and yards were formed around the well [8.326]. A similar structure was discovered in Nesef on Shullyuk-tepa in 1973. A well, lined with burnt bricks from the inside, was noted here. Its masonry is folded in the form of a ring, which tapers slightly at the top. The depth of the well is not determined, but the open part of the well is 3.9 m [1.89].

The closest analogy to the Bogrokhan well was found in the Kyz-Kala fortress, located on the right bank of the Amu Darya. Inside one of the southwestern semicircular towers of the fortress there is a deep well with burnt bricks [3.161]. A well was also found at the settlement of Paykend, in Shakhristan II [5.]. The Paykend well has been cleared and brought up to 16 m. Nowadays, people even come from Bukhara to drink water from the medieval well of Paikend. Water is especially popular with tourists.

At many archaeological sites, archaeologists have discovered such wells. This has not been surprising, since trade caravans went from well to well along the Great Silk Road.

Thus, based on the data of archaeological excavations of the well, on the building material of the defensive wall of the Shakhristan, on observations of the stratigraphy of the settlement, as well as comparative analysis, we can assume that the well of Bogrokhan was built in the 9th-10th centuries. and functioned until the beginning of the 30s. XX century

In 2001, the southwestern outskirts of the city were surveyed. As a result of the excavations, 26 rooms of the rabad were uncovered. They belong to 4 households. House number 1 consists of two rooms. The entrance, 1 m wide, of the first room is located in the north wall. room dimensions 4.8 x 6.8 m. The next room No. 2 is located in the southern side of room No. 1. Its dimensions are 4.8 x 4.5 m. In the southeastern corner of the room, a 2 x 1 m pit was laid and deepened to 2 m. Under the floor of the room, a 1.3 m thick layer of compacted soil was recorded. There are small fragments of red clay ceramics in the layer ... In a single copy, a fragment of a talcum pot was found. Then comes the mainland layer of brown soil [9.].

House no. 2 is located southwest of house no. 1. It consists of 12 premises, of which living room No. 6 is located on the north-east side. Its dimensions are 3.3 x 5.4 m. The tashnau is located in the southeastern corner. On the west side of it there is a C-shaped room No. 11. Its length is 13 m, width is 2.7x4.6 m. Rooms No. 8-10 are located in one row and their entrances are located at the eastern end of the northern walls. Dimensions east-west 3.4 m and north-south room No. 10 1.6 m, room No. 9 2.2 m and room No.8 3 m. In the southeast corner of room No. 8 there is a hum. And the southeastern building is located room 7. The dimensions of which are 5.3 x 5.3 m.

Premises No. 21 is located on the western side of premises No 8. Its dimensions are 3 x 0.7 m. The entrance to it is 0.8 m wide, located at the southern end of the eastern wall.

Room No. 20 measuring 4.1 x 5.1 m is located on the south side of room No. 11, and room No. 22 is located on the south side of room No. 20. Its dimensions are 4.2 x 3 m. The entrance to it measuring 0.9 m was in the southern wall. Rooms 23-25 were located on the western side of rooms 20 and 22. Their dimensions are 1.6 m, 1.2 m and 4 m, their length is 3.5 m. There is a hum in the northeastern corner of room No. 25. Perhaps people lived in this house only in room 6, and the rest of the premises were used as storage facilities.

House No. 3 is located in the central part of the block and consists of 6 rooms. The entrance to the house is located in the western wall. At the entrance there is room 19, C-shaped in plan. Its dimensions are 8.4x3.1x5x4.7x4.2x3.4 m. Hum was excavated in the southeastern corner. In the eastern wall of the room there is a passage to the L-shaped room in the plan, room No. 12. The

width of the passage is 0.7 m. Its dimensions are 5 x 3.4 x 2.6 x 8.5 x 1 x 2.5 m. In the eastern part of the room there is a tashnau. And here there is also a 1.5 m wide passage to room 4. Its dimensions are 4.1 x 10 m. At the northern end of the wall there is a 0.8 m wide entrance to room No. 13, the dimensions of which are 3.5 x 8.9 m. The next room No. 4a is located on the south side of room No. 13. Its dimensions are 3.5 x 0.8 m. Room No. 5 is located in the southeastern corner of house No. 3. The entrance to the room, 0.8 m wide, was located at the eastern end of the northern wall. This room is L-shaped (4.1 x 3.6 x 2.3 x 2.5 x 1.3 x 1.6 m). Tashnau is located in the southwest corner. The premise is residential.

House No. 4 currently consists of 6 rooms. Room 26 is located on the north side of the house, where it is partially destroyed. Its length is 8.3 m and a width of 3.4 m. In the middle of the southern wall there is a passage to room 15, 0.8 m wide. It is rectangular in plan 4.5 x 4.8 m. In the middle of the eastern wall there is also a passage to the room No. 14, 0.9 m wide. The dimensions of the room are 4.7 x 5 m. In its southeastern corner, bins measuring 0.9 x 0.9 m were found. At the eastern end of the room there was a passage to room No. 14a, the dimensions of which were 4, 7 x 1 m. Room 16 was located to the west of room 15. In plan, it had a rectangular shape measuring 3.1 x 1.6 m. The entrance to it, 0.7 m wide, was located in the northern wall. The next room, No. 17, was located on the west side of the higher room described. It is also a rectangle 5.1 x 3.1 m in the plan. All walls are built mainly of baked bricks with dimensions of 21-23 x 21-23 x 4-5 cm. The thickness of the walls of rooms No. 1 and No. 2, except for the western wall of room No. 6 and of the southern walls of rooms No. 5 and No. 12 having a thickness of 0.8 m, the rest of the walls of the rooms are 24 cm thick. Therefore, these rooms were used to store some kind of food and possibly fish. And only in houses No. 1 people may have lived permanently, and in the remaining 2 houses only in rooms No. 5, No. 6 and No. 12 people lived seasonally.

Judging by the ceramic materials, this structure dates back to the end of the XIII-XIV centuries.

Judging by the archaeological materials, a settled rural settlement appears on the territory of Bogrokhan in the 7th-8th centuries. In the 9th-10th centuries, a mosque, a minaret and a fortress wall of Shakhristan were built around the settlement. Perhaps a little later, in the 10th-11th centuries, rabad appeared, a well was built, which functioned until the beginning of the 30 years of XX century.

In the aftermath of the Tatar-Mongol invasion, the Kungrad region, like other areas of the Southern Aral Sea region, fell into temporary decline.

From about the end of the 13th century, perhaps partly, urban and rural life has been restored. This, in part, is evidenced by the renovation of the construction of a mosque, a minaret and the construction of a flying mosque. The mausoleum was built in the 15th century.

After the death of the Khan of the Golden Horde Berdibek (1359), Khorazm gains political independence at the head of the Kungrad Sufis [2.104]. The Kungrad dynasty was undoubtedly closely associated with the Kungrad tribes settled mainly in the lower reaches of the Amu Darya. So far it is known that one of the first rulers of the Kungrad tribes, Hussein Sufi (died in 773 AH, i.e. 1372) [4.514-516], may have added this region to Khorazm. It is no coincidence that the closeness of the Kungrad region with Khorazm is indicated in the messages of Rashid ad-din. According to his words, the yurt of the powerful emir Saljidia Kungrad was located near Khorazm [7.70].

After the entry of Khorazm into the empire of Timur and Timurids, the history of the rulers of Khorazm from the Kungrad tribes does not end. Their representatives continued to actively participate in the political life of the region [6.108.]. Perhaps the Kungrad region, for some time, was ruled by emirs from the Kungrad tribes in the state of Timur and Timurids. This is evidenced by the source of 1960-1961, mentioning the name of Aksufi Emir of Kungrad [4.516].

With the change in the Amu Darya channel, somewhere in the 15th century, life stops in the basin of the Karakul channel. Archaeological materials testify to the desolation of the city of

Bogrokhon, the settlement of Toprakkaly, Tomarkala and other monuments. The majority of the population of this micro-oasis migrates to the current territory of the city of Kungrad and around it.

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**Rezyume:** *Maqolada tariximizning sivilizatsiya markazlari xisoblangan ikki daryo oralig'ida vujudga kelgan Jayxun va Sayxun oralig'idagi muqaddas yerlar xisoblangan Amudaryoning chap qirg'og'i yodgorliklarining moddiy madaniyati, tadqiqot tarixi va ularning tarixiy va yozma manbalarda keltirilgan ma'lumotlarga tuxtalib utamiz.*

*Bug'roxon yodgorligida tadqiqotlar olib borgan olimlar hususida ham fikr yuritiladi. Umuman olganda, Amudaryo deltasi chap qirg'og'i arxeologik yodgorliklari o'ziga xos moddiy madaniyat an'alarini saqlab qolganligi va madaniy aloqalar qadimdan shakllangan moddiy madaniyat tarkibiga yangi ko'rinishdagi buyumlar, qurilish va ish uslublarini olib kelganligi xususida tarixiy manbalar keltiriladi.*

**Резюме:** *Статья посвящена материальной культуре левого берега Амударьи, истории исследований и их историко-письменным источникам, которые представляют собой священные земли между Джайхун и Сайхун, образованные между двумя реками, которые являются центрами цивилизации в Наша история.*

*Обсуждаются также ученые, проводившие исследования у памятника Буграхану. В целом исторические источники утверждают, что археологические памятники левого берега дельты Амударьи сохранили свои уникальные традиции материальной культуры и что культурные связи привнесли новые формы материалов, строительства и методов работы в древнюю материальную культуру.*

**Kalit so'zlar:** *Amudaryo, Sirdaryo, arxeologik yodgorliklar, tadqiqot, yozma manbalar, moddiy madaniyat, madaniy meros, georafar, sayoxatchilar, arxeolog olimlar, ko'chmanchi va o'troq aholi, madaniy hududlar, Orolbo'yi deltasi, o'tmish tarix, Bogrohan, Ustyurt.*

**Ключевые слова:** *Амударья, Сырдарья, археологические памятники, исследования, письменные источники, материальная культура, культурное наследие, географы, путешественники, археологи, кочевники и переселенцы, культурные территории, дельта Аральского моря, прошлое история, Богрохан, Устюрт.*

**PRIORITY AREAS FOR THE DEVELOPMENT OF TOURISM SERVICES IN THE  
REPUBLIC OF KARAKALPAKSTAN ON THE BASIS OF PUBLIC-PRIVATE  
PARTNERSHIP**

**Khalmuratov K.P., Allamuratova P.**

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**Summary:** *This article examines the forms of public-private partnerships and ways to improve them in the service sector of the service sector of the region.*

**Keywords:** *Region, public-private partnership, public-social partnership, project, infrastructure, service sector.*

It is known that under certain conditions, the availability and concentration of a large number of tourist resources in any region leads to an increase in the potential of industries, regions and enterprises operating in this area. In particular, the attractiveness, the reputation of the region as a whole, the attractiveness of natural, material, technical, financial, labor, organizational, social and other resources in the region, as well as opportunities for their sale and reproduction, the availability of historical and architectural sites, favorable environmental conditions. the presence of attractive climatic conditions and other conditions contribute to the development of certain forms of tourism.

According to our analysis, the Republic of Karakalpakstan has the greatest resource potential for the development of tourism services and the hotel industry on the basis of the PPP mechanism. Today in Karakalpakstan there are 63 accommodation facilities ( including 32 hotels, 4 hostels, 4 grass camps, 23 guest houses, the total number of rooms in them is 695 and the number of seats is 1460 ), 34 tour operators, 288 cultural heritage and pilgrimages. fields are available. Of

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<sup>[1]</sup> Data of the State Statistics Department of the Republic of Karakalpakstan and the Department of Tourism Development

these, 131 archeological sites, 24 architectural sites, 88 monumental sites and 45 attractions were recognized as tourist attractions. There are also 11 sanatoriums, 11 and 1 museum <sup>[1]</sup> (*Sultan Uvays Memorial Complex, Savitsky Art Museum, Mizdaxkan Architectural Complex, etc.* ).

The administration of the Republic of Karakalpakstan believes that the main directions of state policy in the field of tourism should be the development of access and domestic tourism.

As well as the Karakalpak economist, Ph.D. Alimov AK also wrote dissertations for his doctoral dissertation in the districts and cities of the region, the Lower Amudarya State Biosphere Reserve, Sultan Uvays Mountain, Ustyurt Plateau, Sudoche and Saigachi, as well as the development of tourist routes based on the ecotourism potential of the Aral Sea. (METH) studies that improving the model of ecotourism development through the use of tourism will lead to the creation of new species, expansion of territories, development of infrastructure, increase of ecological culture, employment and income, as well as balance between nature and tourism. <sup>[2]</sup> .

However, today the existing tourist potential of the Republic of Karakalpakstan is not used enough. In particular, Ellikkala, Kongirat, Turtkul, Khojayli, Amudarya districts, the city of Moynak, which has changed beyond recognition over the past 2 years, has a great potential for tourism development and requires their effective use.

It is necessary to study the experience of foreign countries in promoting the tourism potential of Karakalpakstan on the basis of the PPP mechanism , effective use of electronic advertising and commercial marketing, coverage of various interesting topics on tourism potential in the country on national and international social networks.



The development of tourism in the region on the basis of the mechanism of PPP developed according to the results of the SWOT analysis, the strengths of the tourism development in Karakalpakstan PPPni all areas of the tourism sector, in particular, direct implementation of normative legal base, the abundance of historical sites and recreational resources, exhibits called "Desert Louvre" The existence of the Savitsky Art Museum, the only one of its kind in Central Asia; the presence of various relief, hydrogeological, balneological resources, water bodies, lakes, ornithological reserves, rivers, sea, historical archeological monuments.

<sup>[2]</sup> Alymov A.K. The main directions and prospects of ecological tourism development in the Republic of Karakalpakstan. Doctor of Philosophy (PhD) dissertation in economics. Samarkand. 2018.

We conducted a SWOT-analysis of the tourism services sector on the basis of the PPP, developed on the basis of the strategy of socio-economic development of the Republic of Karakalpakstan (see Table 1).

**Table 1.**

**SWOT-analysis of the development of tourism services in the Republic of Karakalpakstan on the basis of the mechanism of PPP<sup>[3]</sup>**

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"> <li>- Existence of a regulatory framework for the introduction of PPP in all areas, in particular, directly in the field of tourism;</li> <li>- Abundance of historical monuments and recreational resources;</li> <li>- The existence of the Savitsky Museum of Art, the only one in Central Asia in terms of the number of exhibits called the Louvre in the Desert;</li> <li>- the possibility of attracting tourists from Iran and other countries to Europe via Kazakhstan, Russia and other countries by road and rail, and through Turkmenistan;</li> <li>- ecological, archeological and gastronomic tourism services;</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of sufficient qualified, professional staff, advanced entrepreneurs to know the mechanism of PPP and its legal framework and its application in the field of services;</li> <li>- Insufficient development of transport services, tourist services, infrastructure on the basis of PPP ;</li> <li>- PPP mechanisms to use in the field of tourism because of the informal sector share of narrow high;</li> <li>- lack of road and roadside infrastructure at tourist facilities or absence of SGS around facilities;</li> <li>- non-coverage or unsatisfactory coverage of advertising and information materials on tourism in the region, in particular ecotourism, in international and national electronic and traditional media;</li> </ul>
<b>OPPORTUNITIES</b>	<b>RISKS (Threats)</b>
<ul style="list-style-type: none"> <li>- Transfer of facilities in the Lower Amudarya Bioreserve to businesses on the basis of the mechanism of PPP;</li> <li>- Development of hotel, hotel, motel, camping services in Elikkal, Kungrad, Turtkul, Khojayli, Amudarya districts with high tourism and recreational potential on the basis of the PPP mechanism;</li> <li>- Opportunities for the development of medical tourism through the rehabilitation of</li> </ul>	<ul style="list-style-type: none"> <li>- Risk of ruthless use of nature by entrepreneurs in the Amudarya Reserve and riverbanks on the basis of the mechanism of PPP;</li> <li>- threats to the state of flora and fauna in coastal landscape reserves and bioreserves due to water depletion;</li> <li>- the risks of foreign tourists entering the region due to economic and political instability in neighboring countries;</li> </ul>

balneological sanatoriums in Karakalpakstan on the basis of PPP; - Opportunities for the development of extreme, travel tourism in the desert zones and the Ustyurt Plateau on the basis of the PPP mechanism ; - Development of transport services based on the PPP mechanism	- restrictions on investment in tourism due to stratification or rising unemployment; - the current development trend of the services sector may lead to further strengthening of the informal sector in the future.
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In turn, the weaker aspects of PPP know the legal framework and the mechanism of its services in the field of application of qualified professional staff, the best entrepreneurs, PPP lack of transport services, tourist services, based on the type fratuzilmaning adequate development of the tourism industry PPP enough to use the mechanism of the informal sector because of the narrow - the high proportion, the lack of road and roadside infrastructure in the tourist facilities, or the absence of SGSs around the facilities.

In addition, the lack of coverage or unsatisfactory coverage of tourism and advertising materials in the region, especially in the international and national electronic and traditional media, environmental conditions in the region, poor drinking water and high salinity.

According to our analysis of the risks in the development of the sector on the basis of the mechanism of PPP, the risks of unsustainable use of nature by entrepreneurs in the Amudarya Reserve and riverside facilities, the deterioration of flora and fauna in coastal landscapes and bioreerves.

We also risked the influx of foreign tourists to the region due to economic and political instability in neighboring countries, restrictions on investment in tourism due to stratification or rising unemployment, the current trend in the development of the services sector and the future growth of the informal sector.

In addition, in this direction "Saiga festival in Ustyurt", "Journey to the island"; "Ustyurt" Paris-Dakar"; "Ancient fortresses of Karakalpakstan"; It would be expedient to create new tourist routes , such as "Amudarya three days", "Journey to Badaytuqay" .

In order to further develop tourism services in Karakalpakstan on the basis of the PPP mechanism, a number of regional and national issues need to be addressed. In particular, given the insufficient use of unique cultural and historical heritage sites and recreational resources in the region, the PPP mechanism is based on the PPP mechanism. it is necessary to develop new tourist routes.

In order to effectively use the potential of medical tourism in Karakalpakstan, it is necessary to market many existing sanatoriums, develop substantial business projects to restore or strengthen their existing ones, transfer them to entrepreneurs on the basis of PPP or direct funds from the Resorts Department of the Federation of Trade Unions of Uzbekistan. .

Relevant organizations should carry out timely and regular repairs of cultural heritage and architectural objects. At the same time, there is a need to provide the area with roads and other infrastructure facilities leading to historical monuments.

In general, the implementation of measures to develop the service sector in Karakalpakstan through the use of the mechanism of PPP in the tourism sector, in particular, the development of road and roadside infrastructure, petrol, methane propane filling stations per km, including trade, catering, PPP , the construction of motels, hostels or hotels, in addition to existing programs, will be able to launch more than 4 thousand infrastructure facilities and create more than 15 thousand new jobs.

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**Rezyume:** *Ushbu maqolada mintaq xizmat ko'rsatish sohasida davlat-xususiy sherikchiligining shakllari va ularni takomillashtirish yo'llari xususida so'z yuritiladi.*

**Резюме:** *В данной статье рассматривается формы государственно-частного партнёрства и пути их совершенствования в сфере услуг региона.*

**Kalit so'zlar:** *mintaqa, davlat-xususiy sherikchilik, davlat-ijtimoiy sherikchiligi, infratuzilma, xizmatlar sohasi.*

**Ключевые слова:** *регион, государственно-частное партнёрство, государственно-социальное партнёрство, инфраструктура, сфера услуг.*

## ANALYSIS OF YOUNG FOOTBALLERS MORPHOFUNCTIONAL AND PHYSICAL PERFORMANCES

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**Summary:** The article revised analyzes of indicators of morphofunctional parameters in the relationship between speed indicators of football players at the stage of in-depth specialization. The experiment was conducted during the competitive period, using the methods of Bioimpedansometry and the computer mathematical-statistical program SPSS for parametric non-parametric correlation.

**Keywords:** Kendal correlation method, SPSS computer program, Bioimpedancemetry method, test "8" ("eight"), etabolic rate, bone mass density index.

### INTRODUCTION

The constant growth of competition in the international arena, the sharp expansion of the sports calendar in recent years due to commercial competitions, significantly increase the load on the athlete's body, which requires him to mobilize the maximum functional reserves in the conditions of training and competitive activity. This provision requires that a football player must meet these conditions, which to a large extent depends on the rationality of building many years of training and the effectiveness of its management method. About ethos, it is important to note that in the European countries of England, Holland, Belgium, Germany, Poland, Spain, a harmonious system of training talented football players has been developed. The clubs Ajax, Liverpool, Manchester United, Anderlecht, Atletico Madrid, Barcelona, Bavaria, Real Madrid and others are played by pupils of football academies. Training plans for young teams developed by the Association of European Clubs, created in 2012.

The purpose of the study is the application of innovative methods for diagnosing and managing the training of football players at the stage of in-depth specialization, using innovative methods and tools for studying morphofunctional indicators of body composition and the methodology of correlation of speed physical qualities of football players at the stage of in-depth specialization [8]. Research Objectives:

- to carry out a comprehensive review of foreign and domestic scientific and scientific and methodological literature on the problem of dissertation work;
- to study the body composition component of football players at the stage of in-depth specialization using the bio-impedance method (BIA);
- to determine the optimum age for the development of speed qualities using the Microgate Raistime 2 device (Figure 1).



Figure 1. "Microgate racetime 2" device

To establish the features of the correlation relationships of morphological and functional indicators with the parameters of control exercises in order to identify effective means of developing speed qualities;

As an object of study, 12 students of football players of the RSHIOR (Republican boarding school of the Olympic reserve) aged 16 years were selected.

The subject of the study, the study of the use of innovative tools and training methods for gifted young football players. Application and interpretation of innovative methods for the analysis of morphofunctional indicators (body composition) by bioimpedance analysis.

### **LITERATURE REVIEW**

Total physical activity was estimated using metabolic equivalent hours/week for the questionnaire and mean acceleration for the accelerometer. Time spent in moderate-and-vigorous physical activity (MVPA) was also assessed by questionnaire and accelerometer. Adiposity assessment included body mass index, waist circumference, and fat mass index. Fat mass index was calculated as fat mass/height<sup>2</sup> (kg/m<sup>2</sup>), with fat mass estimated using bioimpedance (Sabia et al., 2015). To generate reference ranges for bioelectrical impedance indices throughout pregnancy and to investigate whether a relationship exists between these indices and the neonatal birth weight (Ghezzi et al., 2001).

The present investigation observed that none of the indices (BMI, BAI, ABSI, and BRI) were adequate proxies of adiposity in athletic populations and that they should not be used to replace other field methods such as bioimpedance or skinfold prediction models. New body indices, including body adiposity (BAI), a body shape (ABSI), and body roundness (BRI) indices have been developed to estimate adiposity. The aim of this study was to compare percent fat mass (%FM) with novel indices in an elite athlete population (Santos et al., 2015).

Bioelectrical impedance analysis (BIA) equations can predict total body water (TBW) and extracellular water (ECW) in non-athletic healthy populations. This study aimed: a) to develop BIA-based models for TBW and ECW prediction based on dilution methods in a sample of national level athletes (Matias et al., 2016). Phase angle (PA) is derived from resistance and reactance determined by bioimpedance analysis (BIA) and it appears to relate to cellular stability and integrity. Interpretation of PA values could be complemented by bioelectrical impedance vector analysis (BIVA), which relates to body hydration and structure. Body composition, age, sex, and nutrients are known to stabilize cell membranes, such as zinc, have been related to PA although information is scarce in adolescent athletes. The aim of the present study was to assess the association of body composition, skeletal maturity and zinc biochemical indices with phase angle and bioelectrical impedance parameters, in forty male adolescent soccer athletes ( $13.4 \pm 0.6$  years). BIA was performed with a single-frequency tetrapolar analyzer. PA and BIVA were determined using resistance and reactance BIA data. Plasma and erythrocyte zinc concentrations were measured using inductively coupled plasma-optical emission spectrometry. Body composition was determined by dual-energy X-ray absorptiometry, and bone age by hand X-ray measurements. PA was higher in adolescents classified by bone age as “Early” ( $6.8 \pm 0.9^\circ$ ) compared to “Late” ( $5.7 \pm 0.5^\circ$ ) ( $p < 0.05$ ). PA correlated with bone age ( $r = 0.562$ ), BMI ( $r = 0.382$ ), fat-free mass ( $r = 0.468$ ), and erythrocyte zinc ( $r = 0.379$ ) ( $p < 0.05$ ). BIVA confidence ellipses were sensitive to skeletal maturity status. Phase angle was higher in adolescents with erythrocyte zinc concentration above the median ( $>0.66 \mu\text{mol.g hemoglobin}^{-1}$ ) compared to those below the median. Multiple linear regression analysis showed that bone age ( $B = 0.254$ ,  $p = 0.001$ ) and erythrocyte zinc concentration ( $B = 1.168$ ,  $p = 0.047$ ) were significantly related to PA in this group, and accounted for 34% of its variability. Our results indicate that bone age and zinc erythrocyte contribute to PA values in the young male soccer athletes and that BIVA is influenced by skeletal maturity status in this group (Koury et al., 2018). Bioimpedance analysis (BIA) and dual energy X-ray absorptiometry (DXA) are commonly utilized for total and segmental body composition assessment, but the

agreement between these methods varies. Group (i.e., constant error [CE]) and individual error (i.e., standard error of estimate [SEE] and 95% limits of agreement [LOAs]) of single-frequency BIA were determined in apparently healthy men and women ( $n = 28$  and  $45$ , respectively) when using DXA as a reference method (Nickerson, 2018).

The assessment of body composition in adolescent athletes should consider sexual (female) or skeletal (male) maturity. The newly proposed equations showed promising results in Brazilian adolescent athletes. A test in different groups and populations is necessary to evaluate the general suitability of the equations in adolescents (Koury et al., 2019).

Phase angle (PA) is derived from resistance and reactance determined by bioimpedance analysis (BIA) and it appears to relate to cellular stability and integrity. Interpretation of PA values could be complemented by bioelectrical impedance vector analysis (BIVA), which relates to body hydration and structure. Body composition, age, sex, and nutrients are known to stabilize cell membranes, such as zinc, have been related to PA although information is scarce in adolescent athletes. The aim of the present study was to assess the association of body composition, skeletal maturity and zinc biochemical indices with phase angle and bioelectrical impedance parameters, in forty male adolescent soccer athletes ( $13.4 \pm 0.6$  years). BIA was performed with a single-frequency tetrapolar analyzer. PA and BIVA were determined using resistance and reactance BIA data. Plasma and erythrocyte zinc concentrations were measured using inductively coupled plasma-optical emission spectrometry. Body composition was determined by dual-energy X-ray absorptiometry, and bone age by hand X-ray measurements. PA was higher in adolescents classified by bone age as “Early” ( $6.8 \pm 0.9^\circ$ ) compared to “Late” ( $5.7 \pm 0.5^\circ$ ) ( $p < 0.05$ ). PA correlated with bone age ( $r = 0.562$ ), BMI ( $r = 0.382$ ), fat-free mass ( $r = 0.468$ ), and erythrocyte zinc ( $r = 0.379$ ) ( $p < 0.05$ ). BIVA confidence ellipses were sensitive to skeletal maturity status. Phase angle was higher in adolescents with erythrocyte zinc concentration above the median ( $> 0.66 \mu\text{mol.g hemoglobin}^{-1}$ ) compared to those below the median (Koury et al., 2018).

Bioelectrical impedance analysis (BIA) has been used to evaluate cellular health and integrity through bioelectrical indicators. In the sporting context, monitoring these indicators can be useful to assess the quality and vitality of cells and body tissues. In the included studies, the cellular health and integrity indicators were: Z, Xc, R, total water, intracellular water, ECW, PA, BIVA, BCM, and ECW/BCM (Martins et al., 2020)

## **METHODOLOGY**

In the research have been used methods of SPSS package of computer programs for mathematical statistics, including a software procedure that implements parametric and nonparametric methods of correlation analysis.

Three standard tests were also applied: Run to 30 m / sec, Run to 10 m / sec, Shuttle run 5 \* 30 m / sec, Test “8” m / sec (Table 1).

## **RESULTS**

During the study, 4 control tests were used to determine the speed qualities of football players. Speed characteristics were recorded with the Microgate Racetime 2 device (figure



Figure 2. Registrating speed performance through “Microgate racetime 2” device.

Information on the effect of physical exercises on the length of body weight in young athletes is scarce. This is due to the difficulty of organizing lengthy experiments involving subjects who regularly engage in physical exercises for several years. In addition, it is extremely difficult to take into account the effects of changing factors such as diet and heredity that significantly affect body size in a long study on a young man.

Table 1

**Results of 4 control tests**

№	Participants	Run to 30 m/sec	Run to 10 m/sec	Shuttle run 5*30 m/sec	Test "8" m/sec
1	T-M	4,39	1,92	31,76	15,1
2	J-M	4,52	1,09	32,04	16,4
3	T-Z	4,26	2,11	28,97	15,03
4	E-D	4,61	1,92	30,86	15,43
5	T-J.	4,51	1,92	30,64	15,01
6	C- C.	4,41	1,88	30,28	14,36
7	K-A.	4,49	1,96	30,04	14,88
8	G-X.	4,5	1,98	31,76	15,38
9	B-A.	4,53	1,94	30,58	14,24
10	N-T.	4,55	2	31,3	15,09
11	R-A	4,2	1,87	30,43	14,75
12	K-S	4,69	1,9	32,09	15,95
$\Sigma$		<b>4,47</b>	<b>1,87</b>	<b>30,89</b>	<b>15,13</b>

There is a bioimpedansometric method for determining body weight and percentage of fat in an athlete's body. With regular measurement of body weight and body fat percentage, one can accurately determine how the structural composition of the body is measured in favor of active muscle tissue. The normal fat content in young men for 18-year olds is 14-20%. It is important to note that the composition of the body in young athletes varies, and as in adults, adipose tissue increases.

Before starting the calculations, descriptive statistics and exploratory analysis programs were performed to determine the basic statistical characteristics and check the distribution of the initial data for normality (table 2).

The table shows the name, average, standard deviations and the number of all studied indicators.

We used nonparametric methods for calculating pair correlation coefficients based on rank correlation methods (table 2).

According to the Kendal ranking method (Table 2), the 10-meter run correlates on average with the growth indicator ( $r = 0.556$ ) and with the percentage of total fat and water in the body, to a weak degree, respectively  $r = - 0.327$  and  $r = 0.266$ .

Running on 30 m by this method had a correlation only with the percentage of total fat in the opposite direction with a correlation coefficient equal to  $r = - 0.327$ , and running with other physiological indicators did not correlate with 30 m.

The shuttle run indicator 5 \* 30 m according to the Kendal rank correlation method had the same weak tightness of connections with two physiological indicators: muscle mass and metabolic rate ( $r = 0.286$ ). This indicator also weakly correlated with bone mass index ( $r = 0.355$ ), and shuttle running did not correlate with other physiological parameters.

The G8 test only correlated with three indicators, but weakly. These indicators are growth, body weight and the percentage of water in the body with the corresponding correlation coefficients

$r = 0.327$ ,  $r = 0.367$  and  $r = -0.286$ . The correlation of the G8 test with other physiological indicators was very weak.

**Table 2**

**Method Kendall correlation analyses**

	Run to 10 m	Run to 30 m	Shuttle run 5*30 m	Test 8	Height (sm)	Weight (kg)	Fat %	Water %	Muscle weight (kg)	Body construction	Energy
Run to 30 m	,667*										
Shuttle run 5*30 m	,473	,618*									
Test 8	,327	,473	,571*								
Height (sm)	,556	,222	,182	,327							
Weight (kg)	-,182	-,036	,214	,357	,255						
Fat %	-,327	-,327	-,214	-,071	-,036	,429					
Water %	,255	,109	-,143	-,286	-,182	-,929**	-,500				
Muscle weight (kg)	-,109	-,109	,286	,143	,327	,786**	,357	-,857**			
Body cons.	,252	,168	,041	-,206	-,084	-,536	-,866**	,536	-,371		
Energy	-,109	-,109	,286	,143	,327	,786**	,357	-,857**	1,000**	-,371	
Bone Density Index	,000	,000	,355	,197	,401	,749*	,197	-,749*	,906**	-,273	,906**

According to the Spearman ranking method (Table 2), the 10-meter run correlates on average with the growth indicator ( $r = 0.590$ ) and with the percentage of total fat in the body in the opposite direction and with the type of addition, lower than the average degree, respectively  $r = -0.443$  and  $r = 0.285$ .

Running 30 m higher than the aforementioned method very weakly correlates with the physical growth indicator ( $r = 0.271$ ) but with the percentage of total fat in the body to an average degree and in the opposite direction with a correlation coefficient equal to  $r = -0.419$ , and with other physiological no correlation was observed.

The shuttle run 5 \* 30 m according to Spearman's rank correlation method had lower average connections with the following physiological parameters: height, body weight, total fat percentage, muscle mass, metabolic rate and bone density index with corresponding correlation coefficients 0.299, 0.405, -0.310, 0.333, 0.333, 0.408.

Test "eight" to an average degree correlated with two physiological indicators. These indicators - growth ( $r = 0.503$ ) and body weight ( $r = 0.476$ ), and with two other indicators - the percentage of water in the body and the bone mass density index, weakly correlated with the corresponding correlation coefficients  $r = -0.333$  and  $r = 0.284$ .

To develop the speed abilities of football players at the stage of in-depth training, use the means of special physical training using the situational method. It is necessary in the course of preparation to evaluate the data.

## **DISCUSSION**

Correlation analysis is used to determine the degree of tightness of the relationship between two random variables X and Y. The coefficient / correlation is used as a measure of communication.



The correlation coefficient is estimated from a sample of the volume of  $n$  related observation pairs  $(X, Y)$  from the joint general population of  $X$  and  $Y$ . There are several types of correlation coefficients, the use of which depends on assumptions about the joint distribution of  $X$  and  $Y$ . Based on the aforementioned speed and physiological indicators of athletes, we created a sample in the Excel file format, consisting of eight observations (rows) and twelve indicators (columns), a copy of which was further used as initial data for the correlation analysis program. Due to the fact that the processed file has fewer observations, in addition to the parametric method (calculation of the correlation coefficient by the Pearson-Brave method), non-parametric methods (Kendal and Spearman rank correlation methods) for calculating the correlation coefficients were also used.

### **CONCLUSIONS**

In practice, in football there is a shortage of the use of innovative methods in the training of young players. This makes the problem of reforming the existing system of training young football players at the stages of long-term training, especially at the stage of in-depth training (14-17 years), a particularly urgent problem, since it is aimed at creating the necessary prerequisites for intensive training in order to realize individual opportunities. Conclusion is the use of innovative methods such as bio-impedance analysis, microget reystime 2, i.e. serve to substantially increase the following:

1. It is necessary in the process of training young players at the stage of in-depth specialization pays attention to exercises that contribute to the formation of athleticism.
2. Form a solid foundation for physical fitness and sustainable motivation to achieve sports results. Improve general physical fitness as a basis for future special physical fitness.
3. Strengthen individual training in accordance with the game specialization (defender, midfielder and striker).
4. Identify and increase the volume of special training facilities for football players.
5. Achieve high performance in tests of physical and special physical fitness and competitive activity.

### **ACKNOWLEDGEMENTS**

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**Rezyume:** Maqolada chuqur mutaxassislik bosqichida futbolchilarning tezlik ko'rsatkichlari o'rtasidagi bog'liqlikdagi morfofunktsional parametrlar ko'rsatkichlari tahlillari qayta ko'rib chiqilgan. Tajriba tanlov davrida Bioimpedansometriya usullari va parametrik parametrik bo'lmagan korrelyatsiya uchun SPSS kompyuter matematik-statistik dasturidan foydalangan holda o'tkazildi.

**Резюме:** В статье пересмотрены анализы показателей морфофункциональных параметров во взаимосвязи скоростных показателей футболистов на этапе углубленной специализации. Эксперимент проводился в соревновательный период с использованием методов биоимпедансометрии и компьютерной математико-статистической программы SPSS для параметрической непараметрической корреляции.

**Kalit so'zlar:** Kendal korrelyatsiya usuli, SPSS kompyuter dasturi, Bioimpedansmetriya usuli, test "8" ("sakkiz"), etabolik tezligi, suyak massasi zichligi indeksi.

**Ключевые слова:** корреляционный метод Кендала, компьютерная программа SPSS, метод биоимпедансометрии, проба «8» («восьмерка»), скорость метаболизма, индекс плотности костной массы.

**GUARANTEES OF PROPERTY RIGHTS IN THE DEFENSE OF A LAND PLOT FOR THE NEEDS OF THE STATE AND SOCIETY**

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**Summary.** *This article analyzes the procedure and legal basis for the seizure of land for the needs of the state and society. In addition, the article cites the views of theoretical scholars on this social relationship, but also clarifies the extent to which this issue is reflected in developed countries.*

**Keywords:** *landlord, private property, land, state and community needs, compensation.*

In world practice, there are absolute and relative forms of protection of property rights of the owner. Withdrawal of land owned by the owner for absolute protection for the needs of the state and society is allowed only with the consent of the owner, if the owner resists the seizure of land, his property rights may not be revoked in court. In the case of relative protection, in the absence of the owner's consent to the seizure of the land for the needs of the state and society, the interested party (relevant government agency or investor) may obtain a seizure of the land by filing a lawsuit. Under our national law, the protection of property rights is also relative.

Although the property rights of the owner are relatively protected, this does not mean that the property rights of the owner can be violated. In particular, the right to own a plot of land or a part of it for state and public needs, as well as for the implementation of investment projects, does not have the right to own the real estate located on the plot, which occupies a central place among the property rights. This right is the right of the property owners to receive compensation in connection with the termination of the property. If the real estate is left without compensation to the owner, this right will appear in the indication of the owner. I.B. Zokirov's statement in the vindication states: "If the view of the owner is that the property is illegal by a person (citizen or legal entity), then the person has the right to return the property in its original form. The current Civil Code, the Housing Code and the Land Code provide for the following compensations to compensate for the damage caused to citizens as a result of the seizure of land plots for state and public needs:

a) Citizens are allocated exactly the same plot of land as the previous plot of land, and the enterprises, institutions and organizations to which the land plot is transferred, build housing, industrial buildings and other structures in a new place and give them property rights. In such cases, the value of demolished houses (apartments), buildings is not covered by money;

b) citizens are allocated a plot of land for individual housing construction at their discretion. The enterprises, organizations and institutions to which the land plot is transferred fully cover the cost of demolished houses, buildings and structures, and provide citizens with land plots.

I.B. Zokirov. Civil Law: Textbook. Part I. Revised and supplemented fifth edition.

it is obligatory to provide temporary housing on the basis of a lease agreement for a period of up to two years;

c) other housing on the stage, not less than the social norm of the living space of equal value to the former, with all the amenities. If the value of the demolished house exceeds the value of the accommodation provided, the difference is compensated to the owner;

(g) In all of the above cases, the value of the confiscated timber shall be paid to the citizens.

Citizens can appeal to the court in any case on the amount of compensation.

If an agreement is reached between the owner and the responsible organization on the issue of valuation and compensation, it means that the situation is much easier. However, in practice, most of the disputes arising from this issue stem from the fact that the parties could not agree on the exact assessment. So what are the reasons for this? Professor O. Okyulov answers this question as follows: The law sets the market price as a criterion. However, the organizations that estimate the market price determine the expert opinion. In most cases, the relevant government agencies provide an expert opinion, which, of course, sets a price that "does not burden the budget." Unfortunately, that alone is not enough. In foreign countries, when the courts examine the matter, the first criterion is the legality, the second criterion is the expediency, and the third criterion is the full compensation of the damage to the owner at market prices.

When it comes to the expediency criterion, the body that made the decision on 'demolition' must prove that the decision made is expedient, that there are no other alternatives, or that they are more harmful or contrary to the public interest if available.

Appraisal of the real estate subject to demolition after the decision to withdraw and before the conclusion of the Agreement in the manner prescribed by the Cabinet of Ministers of the Republic of Uzbekistan. This is not enough to reduce these conflicts in the future.

Today, the problem of the population of our country in this area is the lack of proportionate compensation, that is, the damage caused by the seizure of land for state and public needs is not covered in the prescribed manner. According to statistics, the largest number of appeals was in Tashkent, Tashkent and Namangan regions, and the lowest in Navoi region. In 2018 and the first half of 2019, the state of the land plot confiscated for state and public needs and the damaged construction sites in this regard were studied. In this regard, 846 cases of non-written notification of owners, as well as 1388 cases of violation of the deadline for written notification, as well as violations of construction projects without clarification (underestimation) of their value were found in Tashkent and Bukhara regions, least in Samarkand. observed in the province.

Although more than 600 billion sum of compensation was paid for the demolition, it was found that in Tashkent, Tashkent, Fergana, Kashkadarya and Namangan regions there is a debt of about 300 billion sum for compensation for damaged housing. 359.2 hectares of land were allocated from other places instead of the confiscated land plots for state and public needs.

One of the types of compensation mentioned at the beginning of this article is self-determination of the owner. But in practice, in any case, the government or other authorities offer only two types of compensation, namely, affordable housing or an appropriate amount of money. This, in a sense, leads to a violation of property rights. In order to eliminate this situation, it is necessary to adopt a single law to regulate the relations related to the revocation of property rights to real estate and to abolish the right to property without direct seizure of property, including concepts such as nationalization, requisition, confiscation. should also be mentioned separately.

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3. Civil law Textbook Tashkent 2020 y

**Rezyume:** *Ushbu maqolada yer uchastkalarini davlat va jamiyat ehtiyojlari uchun olib qo'yish tartibi va huquqiy asoslari tahlil qilinadi. Bundan tashqari, maqolada nazariyotchi olimlarning ushbu ijtimoiy munosabatlar haqidagi fikrlari keltiriladi, shu bilan birga rivojlangan mamlakatlarda bu masala qay darajada o'z aksini topganiga oydinlik kiritiladi.*

**Резюме:** *В данной статье анализируются порядок и правовые основы изъятия земельных участков для нужд государства и общества. Кроме того, в статье приводятся взгляды ученых-теоретиков на данную социальную связь, а также уточняется, в какой степени данный вопрос отражен в развитых странах.*

**Kalit so'zlar:** *uy egasi, xususiy mulk, yer, davlat va jamoa ehtiyojlari, kompensatsiya.*

**Ключевые слова:** *помещик, частная собственность, земля, государственные и общественные нужды, компенсация.*

**PUBLICATION AND ENTRY INTO FORCE OF REGULATIONS**

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**Summary:** *The article discusses the official publication and entry into force of a regulatory legal act, its rules and shortcomings, as well as proposals for improving the rules of official publication and entry into force of a regulatory legal act.*

**Keywords:** *Normative legal document, rule-making, law enforcement.*

The concept of "entry into force of a normative legal act" is often used and is of great importance in rule-making and law enforcement practice. When a normative legal act is adopted, the question arises of its entry into force. This document will not be used in practice until it comes into force. Issues related to the entry into force of the document also affect the legal consciousness and legal culture. Only if the documents are published through official sources, it will be possible to find all the news in it, that is, if they are published in the sources where you can find all the news. The official publication and entry into force of the document are closely related. In addition, not all documents are published officially. This is because they are accepted under the guise of "confidential" or "for use within the service." So, is there a legal basis for the adoption of such rules within such codes? What documents are accepted for these vultures? Don't they have rules in the interests of individuals and legal entities? When do they come into effect and when do they expire? Will all ordinary documents that are not accepted under such seals be officially published?

At first glance, these issues do not play a significant role in rule-making and law enforcement practice. But the principle of legality must be applied in all areas, especially in the creation and application of law. There must be clear rules for the official publication and entry into force of all documents, and they must be followed. This is one of the hallmarks of the rule of law.

Let's make analytical comments on some of the norms enshrined in our laws on this matter!

According to the first part of Article 84 of the Constitution of Uzbekistan, the law comes into force after it is adopted by the Legislative Chamber, approved by the Senate, signed by the President of the Republic of Uzbekistan and published in official publications in accordance with the legislation of the Republic of Uzbekistan. law. The Constitution sets out the general rules for the entry into force of a law. In fact, not only the law, but also any normative legal act comes into force after its publication in official publications. Of course, sometimes a document or part of a document may be invalid on the date of its official publication, but at a different time specified in the document itself. But in any case, this period should be after the official announcement. ...

Another issue related to the official publication and use of documents is confidential and useful documents.

The Law of the Republic of Uzbekistan "On Normative Legal Acts" does not contain provisions on normative legal acts adopted under the mark "confidential" and "for official use". In practice, however, such rules are common. It is known that article 29 of the Law lists official sources for the publication of regulatory legal acts, documents published in other sources or not published at all have no official legal force. How, then, do documents obtained for use secretly or as part of a service come into effect? Unfortunately, the law does not address these issues.

In addition, we believe that the law should clearly state which documents should be accepted for confidential or proprietary use and what rules should be written in them. Because the fact that state bodies can accept any document secretly or publicly does not correspond to democratic principles. As long as government bodies are formed by people and serve people, people have the

right to know and control their every decision. Only documents related to state secrets cannot be published. However, it is not known whether all documents received for confidential or official use are classified as state secrets. It is currently unknown what he will do after leaving office. The law on the protection of state secrets does not address this issue. Of course, it cannot be denied that such documents can be adopted, but we are in favor of reducing the ambiguity and making it as clear as possible.

We also believe that the adopted regulatory legal acts should be kept in a systematic open state account. That is, for example, the average citizen should know how many documents were adopted by the Cabinet of Ministers in 2020, how many of them are confidential, how many are for public use and how many are open. He also plays an important role in public oversight of the execution of regulations. In fact, public control over the execution of decisions is a separate issue. For example, we see that some documents are not available on the website [www.lex.uz](http://www.lex.uz), one of the official sources for the publication of regulatory legal acts - the National Database of Legislation. For example, there are no Resolutions of the Cabinet of Ministers No. 7, 12, 33 adopted in 2020 (this is an example). An open government account also allows you to keep track of how many documents were received, how many are confidential, how many documents are intended for public use, which were published, and which documents were simply not published at all. In this regard, the use of a single electronic official source of advertising (for example, [lex.uz](http://lex.uz)) simplifies the work of users.

It should be noted that the decisions of the Cabinet of Ministers start with the number 1 every year and end with a certain number at the end of the year, say, the number 1049. However, according to article 29 of the Law, the official source of publication of decisions of the Cabinet of Ministers is not limited to the national database of legislation, article 29 also provides "A set of resolutions of the Government of the Republic of Uzbekistan. ... ", "Collected Legislation of the Republic of Uzbekistan", "Khalk So'zi" and "People's Word". In it, these decisions (Resolutions 7, 12, 33) are probably published in the same sources. However, [www.lex.uz](http://www.lex.uz) cannot be compared with other sources for providing the population with legal information. In practice, the website [www.lex.uz](http://www.lex.uz) is known to the public as an official source. Therefore, we propose to publish all documents on the website [www.lex.uz](http://www.lex.uz) and store documents in a clear and transparent state account, which is intended not only for the state, but also for citizens.

After the above problems are resolved, or in combination with them, it may be wise to focus on another problem. It is known that, in accordance with the requirements of Article 27 of the Law "On Normative Legal Acts", the Code of Administrative Responsibility of the Republic of Uzbekistan has been supplemented with article 198<sup>3</sup>. According to him, the execution of normative legal acts not registered by the Ministry of Justice of the Republic of Uzbekistan by officials of ministries, state committees and departments - from seven-fold base amount (1,561,000 soums) up to ten times (2,230,000 soums). , in case of repeated - from ten times the base amount of the calculation (1,561,000 soums) to fifteen times (3,345,000 soums) shall result in the imposition of a fine in the amount of rupees.

In connection with the above, the Code of Administrative Responsibility also provides for the establishment of responsibility for providing texts of regulatory legal acts and protecting the rights and interests of individuals and legal entities:

unofficial publication of normative legal acts subject to official publication;

implementation of a normative legal act, which should be officially published, but not officially published.

### **Conclusion**

In conclusion, these types of responsibility can be expressed in the article itself or in a separate article, with a logical continuation of article 198[3].

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**Rezyume:** *Maqolada normativ-huquqiy hujjatning rasmiy e'lon qilinishi va kuchga kirishi, uning qoidolari va kamchiliklari, shuningdek, normativ-huquqiy hujjatning rasmiy e'lon qilinishi va kuchga kirishi qoidalarini takomillashtirish bo'yicha takliflar ko'rib chiqiladi.*

**Резюме:** *В статье рассматриваются вопросы официального опубликования и вступления в силу нормативного правового акта, его правила и недостатки, а также предложения по совершенствованию правил официального опубликования и вступления в силу нормативного правового акта.*

**Kalit so'zlar:** *Normativ-huquqiy hujjat, norma ijodkorligi, huquqni qo'llash.*

**Ключевые слова:** *нормативный правовой документ, нормотворчество, правоприменение.*



**IMPROVING THE EFFICIENCY OF THE PUBLIC ADMINISTRATION SYSTEM  
BASED ON FOREIGN EXPERIENCE AND NATIONAL PRACTICE**

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**Summary:** *Currently, according to the experience of some developed and highly developed countries, each nation occupies a worthy place in the world community, is able to set and achieve large and long-term goals. This article presents the necessary and useful information about improving the efficiency of the public administration system, studying foreign experience in it, applying it in national practice in order to ensure the well-being of our people, a beautiful lifestyle and, in general, achieving high achievements in each area.*

**Keywords:** *the system of state and public administration, the system of public services, cooperation, international experience, modernization, democratization.*

Successful implementation of cardinal changes and reforms taking place in the life of the state and society requires, first of all, young and proactive personnel with deep knowledge in a market economy, understanding and analyzing the directions of today's foreign and domestic policy of Uzbekistan. In this sense, the strategy of actions on the five priority areas of development of the Republic of Uzbekistan for 2017-2021, developed at the initiative of the President of our country Shavkat Mirziyoyev, pays special attention to the reform of the public administration system, the development of the organizational and legal foundations of the civil service. The driving force of the State action strategy is the State and its bodies. The guarantor and guarantor of reforms is an event related to the effective activity of the state. Possessing managerial skills, he plans long-term goals, manages political and social processes, mobilizes the population, uses available resources rationally and fairly. Consequently, the modernization of the country's life is impossible without improving the system of state and public administration. Modernization leads to the development of the country, brings the service life of management to a new level of quality and requirements. These processes require the formation of a legislative framework that allows local governments to make independent decisions when dealing with issues directly related to regional development.

At the beginning of 2019, in order to improve the efficiency of public administration in Uzbekistan, active actions began on the initiative of a joint program with the United Arab Emirates. A delegation of Uzbekistan consisting of representatives of ministries, departments, economic departments and educational institutions arrived in the United Arab Emirates to participate in the second meeting of the working group of the intergovernmental program "Improving the efficiency of public administration". The President of our country insisted on the need to strengthen control over the adoption of parliamentary decisions and the execution of laws, optimize the system of executive power, continue administrative reforms and the widespread use of modern management methods in public administration, attract qualified specialists. He gave instructions on issues of public service, policy development, redistribution of powers and responsibilities of local authorities and further strengthening of their independence.

The new institutions introduced into the constitutional legislation in recent years play an important role in further improving the system of public administration, in creating effective organizational and legal mechanisms of relations between government structures (parliament, president, government). The main purpose of the visit is to study the experience of the United Arab Emirates in creating a public administration system and further implementing an alternative concept in Uzbekistan, holding the second meeting of working groups, discussing the "way" in 2019. Development and approval of the 2020 "map" in various areas. After the March visit of President Shavkat Mirziyoyev to the UAE, bilateral relations between Uzbekistan and the UAE have reached a new level. During the visit, the parties agreed on the initiative of the joint program "Improving the

efficiency of public administration", and the seminar, which is scheduled to be held in May, is a logical continuation of the program. The President of our country Shavkat Mirziyoyev noted that the modernization of the government is one of the priorities of the country, and international experience contributes to its effectiveness.

The visit of the delegation of Uzbekistan to the UAE demonstrates the government's commitment to strengthening bilateral cooperation in improving governance. According to the Minister of the United Arab Emirates, ensuring high efficiency in the development of government activities is an important part of the UAE's efforts to ensure the security of the future. The United Arab Emirates expressed satisfaction with the successful experience of developing and implementing new business models. In the modern era of globalization, the system of providing public services is of great importance for improving the efficiency of the public administration system. Basically, one of the leading issues is the provision of public services, the purpose of which is to serve the interests of the population. The idea and its implementation "the people should serve our people, not state bodies" was very much liked by our people. The "Electronic Government" system plays an important role in creating effective mechanisms for ensuring the rights and freedoms of citizens, in further increasing their level of satisfaction with the activities of executive authorities. In turn, the consistent improvement and modernization of the system of providing public services contribute to improving the quality of life of the population, the investment climate, the business environment and further business development. This makes it necessary to further improve the services provided by government agencies.

The Law of the Republic of Uzbekistan "On electronic government" is of great importance in improving public services. In accordance with the law, measures have been established to ensure the efficiency, efficiency and transparency of the activities of state bodies, strengthen their responsibility and executive discipline, transfer business entities to the use of electronic document management, including in the processes of providing statistical reporting, customs clearance, issuing licenses, permits, certificates, as well as in the processes of obtaining information from state bodies. There are also issues of expanding the access of business entities to e-commerce systems, product sales and procurement via the internet, as well as the introduction of automated accounting, control and payment systems for utilities. The Ministry for the Development of Information Technologies and Communications is recommended to integrate the Unified Portal of Interactive Public Services into the integrated information system "license", to introduce the procedure for issuing licenses in electronic form, together with bodies providing public services, to improve the functions of automated filling out applications for public services. The logical continuation of the reforms carried out in our country to further improve the system of providing public services was the adoption of the Decree of the President of our country "on measures to radically reform the national system of providing public services to the population" and the resolution "on the organization of the activities of the Public Services Agency under the Ministry of Justice of the Republic of Uzbekistan". Over the past period, administrative regulations have been developed and agreed with interested ministries and departments, providing for the elimination of various bureaucratic barriers, simplification and reduction of required documents and deadlines for the provision of 13 public services specified in the list approved by the above-mentioned decree until April 2018, 17 administrative regulations have been approved by relevant resolutions of the Cabinet of Ministers. Information has been obtained about the services provided by the Ministry and other organizations providing public services, a register of ministries and departments has been formed. The decision of the Ministry of Justice and the Ministry for the Development of Information Technologies and Communications adopted the "unified register of public services".

To date, the number of services provided through the centers, compared with experimental services, has reached 100. Over 6 months of this year, more than 1 million 200 thousand services were provided to legal entities and individuals through the centers. Most of them, namely more than

417 thousand, are the issuance of certificates of electronic digital signature, more than 282 thousand-placement of children in preschool educational institutions and more than 146 thousand-registration of business entities. Also, in order to enhance the use of contactless forms of interaction between the population and business entities with government agencies, a new version of the Unified Portal of Interactive Public Services — the “Unified Portal” has been launched. More than a hundred electronic services are provided through the portal. More than 850 thousand applications were received from these services, and unnecessary waste of time, expenses and worries of the population were prevented. In particular, in 2018, more than 30 automated public services were launched through Public Service Centers and a Single portal.

In our country, the system of providing public services is being consistently improved and modernized. This, of course, will contribute to ensuring the rights and interests of the population, investment attractiveness and further improvement of the business environment. Also, in the final part of my opinion, it should be noted that the Uzbek people have long been considered a hardworking, patriotic, religious, knowledgeable and wise people. It is known from history that our great-grandmothers were rulers and at one time ruled the state exclusively and in an orderly manner. In particular, the second president of our country, Shavkat Mirziyoyev, makes a lot of efforts, works tirelessly in the name of achieving high goals and the development of our Motherland. The result of such actions will certainly serve as a huge foundation for improving the efficiency of the public administration system.

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**Rezyume:** *Hozirda ayrim rivojlangan va yuksak rivojlangan mamlakatlar tajribasiga ko'ra, har bir xalq jahon hamjamiyatida munosib o'rin egallaydi, o'z oldiga katta va uzoq muddatli maqsadlarni qo'ya oladi va ularga erisha oladi. Ushbu maqolada xalqimiz farovonligi, go'zal turmush tarzini ta'minlash, umuman olganda, davlat boshqaruvi tizimi samaradorligini oshirish, bu borada xorijiy tajribani o'rganish, milliy amaliyotda qo'llash bo'yicha zarur va foydali ma'lumotlar berilgan. har bir sohada yuksak yutuqlarga erishildi.*

**Резюме:** *В настоящее время, по опыту ряда развитых и высокоразвитых стран, каждая нация занимает достойное место в мировом сообществе, способна ставить и достигать большие и долгосрочные цели. В данной статье представлена необходимая и полезная информация о повышении эффективности системы государственного управления, изучении в ней зарубежного опыта, применении его в отечественной практике в целях обеспечения благополучия нашего народа, красивого образа жизни и в целом достижения высокие достижения в каждой области.*

**Kalit so'zlar:** *davlat va jamiyat boshqaruvi tizimi, davlat xizmatlari tizimi, hamkorlik, xalqaro tajriba, modernizatsiya, demokratlashtirish.*

**Ключевые слова:** *система государственного и общественного управления, система государственных услуг, сотрудничество, международный опыт, модернизация, демократизация.*

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## LINGUOCULTUROLOGICAL FEATURES OF SPEECH ETIQUETTE IN ENGLISH AND KARAKALPAK LANGUAGES

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**Summary:** *The article deals with the importance of teaching Speech Etiquette from a linguistic and cultural position promotes awareness of general cultural norms, values shared by peoples, basic stereotypes of thinking and behavior, norms and rules, rituals of verbal communication, adopted in the culture of the country of the target language. With this approach, students will be able to master not only the language, but also the general culture of speech behavior, the ability to enter into interpersonal interaction with native speakers. Also, in Karakalpakstan, the Karakalpak and Uzbek languages are recognized as the state languages, but the majority of students are taught in the Karakalpak language. Therefore, for the adequacy and success of intercultural interaction between adolescents, it is necessary to know the linguocultural specifics of the Speech Etiquette of the language being studied, and training should be based on knowledge of the Karakalpak culture.*

**Keywords:** *linguoculturological approach, units of speech etiquette (USE), Karakalpak, Uzbek and English languages, verbal communication.*

In view of the fact that there are close interrelationships between language and culture and that it is a person who is a native speaker of language and culture and an interpreter of subjective relations in intercultural communication (interaction), we turn to comparative-pragmatic analysis [6, 15]. Units of Speech Etiquette (USE) are employed in order to identify the rules and strategies for their use in the English-speaking and Karakalpak linguistic cultures. Contrastive pragmatics is the area in which the means represented by different languages are investigated for the implementation of social interaction in comparable or typical communication situations [2, 175-180].

We believe that such an approach to the analysis of the Speech Etiquette (SE) will give us the opportunity to investigate the means used in these languages for expressing the same communicative content of etiquette formulas and to establish their linguocultural features. L.V. Shcherba put forward the position regarding the two-way comparison of languages for teaching and for linguodidactic purposes: "... the study of foreign language is the best means for learning the native language, ... the enormous importance of the native language for learning a foreign language" [2, 341], since the question of the peculiarities of language as a subject of instruction is inseparable from the question of the goal of teaching a language. The goal of teaching a foreign language is speech activity in the target language. As I.A. Zimnyaya notes: "*speech activity acts as the main object of learning a language*", while learning a language is seen as satisfying the need to communicate with the help of a foreign language [3, 20]. Based on the benefits of comparing the mother tongue and the target language for learning purposes, A.M. Shakhnarovich and A.S. Mamontov formulated some general principles of comparison:

- 1) The principle of comparative designation of the realities of the objective world;
- 2) The principle of communicative sufficiency of an element of the system (is the content that is inherent in the intention of the speaker and determined by the course of the communicative act adequate);
- 3) The principle of functional correspondence between the elements of the native and the studied languages (functional methods of transmitting communicative content may not coincide, but functionally they must be equivalent).

4) The principle of equal semantic saturation of elements (equality of the level of generalization of each of the compared elements);

5) The principle of correspondence of the compared elements to the background knowledge of students [4, 188].

The principles of comparison we have noted for educational purposes are acceptable for comparing the USE, but their full implementation will be achieved by taking into account the following linguistic and cultural parameters: lexical grammatical design; cultural meaning, including connotations; sphere of use, social roles and relationship, politeness. The analysis will involve studies that clearly demonstrate the specific features of the English linguistic culture: S.G. Ter-Minasova [7], G.V. Elizarova [1], L.P. Thyssen [8]. The main purpose of such a comparison is to determine the nature and degree of rapprochement, contrasts, and nuances that are created in the process of teaching SE at the junction of the two cultures of English and Karakalpak. We have chosen the USE of the English and Karakalpak cultures as the object of analysis. The USE, which are used at the initial stage of training, are also used for the analysis, since there are significant errors in the speech of Karakalpak students even in grades 8-9 when they are used.

Analyzing the “*greetings*” formulas, we found that the greeting in English is used depending on the time of day - good morning, good day, good afternoon, good evening, good night. In the Karakalpak language, all three forms basically correspond to “*Sa’lem*”. But other forms are also used, for example, in the morning for greeting in the Karakalpak language, the more common forms “*Jaksi jatip turdin’izba?*” In the Karakalpak language, parting with a wish for the night is used “*Jaqsı jatip turin’iz*”. In contrast to the Karakalpak culture, English “*Good night*” is sometimes accepted not only just before bedtime, but also as an evening farewell in general, when the one who says goodbye knowingly knows that the addressee can still go somewhere before bedtime (theater, restaurant), for instance, *Have a nice evening*. In the Karakalpak culture, greeting is accompanied by a handshake and exchange of a kiss; in the English-speaking culture, the greeting gesture is accepted, however, the exchange of a kiss is acceptable only among close people.

In English, there is another form of greeting “*How do you do!*” English “*How do you do!*” used in a formal setting, for example, at a party, you cannot use other forms of greeting (Hello, How are you?), because they will be considered impolite in the given setting. In English, the expression “*How do you do!*” can only be heard among older people. In the Karakalpak culture, the form “*qalaysız*” is used not only by adults, but also by peers in neutral and familiar registers of speech to demonstrate respect.

In the Karakalpak culture, the ritual and some means of greeting women are different from men. For example, women greet “*Sa’lem berdik*”, and men “*Assalawma aleykum*”. As in Karakalpak and English, the word “*Hello!*” – “*Salem*” is used in an informal setting and casual friendly relations. The greeting “*Qalaysız*” in the Karakalpak language is answered: “*Jaqsı! Jaman emes ... Qudayg’a shu’kir, Boladi*”, and in English on “*How do you do!*” the answer “*How do you do!*” is required. In English culture, if you say “*How do you do!*” to a child, then it will have a different connotation, namely, it will either make him laugh or put him in an awkward position [8, 8]. In English, the greeting form “*How are you?*” is considered only a formal acknowledgment of the contact and requires the answer “*Fine, thank you, I’m fine! It’s OK!*”. Formulas “*Bad*” or “*So-so*” are considered indecent because the interlocutor should not impose their problems. In English culture, you are not allowed to talk about your personal problems, relationships at work, ailments, worries, etc. While in the Karakalpak culture, this is the case. For example, to the greeting “*Jumislar qalay?, Qalaysız?*” Karakalpaks can answer widely “*Jaqsı. Den sawlig’im jaman emes. U’y ishleri aman*”. In the Karakalpak language, if a person complains, then a condescending attitude and participation is required towards him. For example, “*Ahwallarin’ qalay?, Jag’dayin’iz jaqsıma?*” These examples indicate that the usual use of similar units in terms of expression reveals

their differences. These examples reflect cultural specificities, the use of which depends on the setting, social relations. We will clarify this in the following:

1. An informal form of greeting, in this situation, two friends meet.

-Hi! How are you?

-Fine thanks, and you?

“Hi” is the informal form of the equivalent of “Hello”;

2. The formal form of greeting when introduced.

-Mr. Wilson, I'd like you to meet Dr. Edward Smith.

-How do you do, Dr. Smith.

-How do you do?

“How do you do” - has the form of a question, but this is not a question by meaning, but a polite form used in the formal form of greeting.

Thus, from the standpoint of speech behavior, textual activity, linguocultural features are manifested at the level of meanings in each separate speech act. Our analysis showed that SE appear more contrastingly and have own specific communicative value in intercultural interaction. The communicative value depends on many factors, including such as in saying of Professor I.C. Yusupov “Speech actions carried out with the aim of expressing the same thought in different languages differ in the operational structure and nomenclature of operations” [9, 84]. In our opinion, this is due to the specificity of the cultural reference of native speakers.

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**Rezyume:** *Maqolada nutq odob-axloq qoidalarini lingvomadaniy nuqtai nazardan o'rgatishning ahamiyati ko'rib chiqiladi, xalqlar madaniyatida qabul qilingan umumiy madaniy me'yorlar, umumiy qadriyatlar, fikrlash va xatti-harakatlarning asosiy stereotiplari, me'yor va qoidalar, nutq aloqasi marosimlari, shuningdek, dunyo xalqlari, tili, mamlakati haqida xabardor bo'lishga yordam beradi. Bunday yondashuv yordamida talabalar nafaqat tilni, balki nutqiy xulq-atvorning umumiy madaniyatini, ona tilida so'zlashuvchilar bilan shaxslararo muloqotga kirishish qobiliyatini ham egallashlari mumkin. Qoraqalpog'istonda ham davlat tillari qoraqalpoq va o'zbek tillari deb tan olingan, ammo talabalarning aksariyati qoraqalpoq tilida o'qitiladi. Binobarin, o'smirlarning madaniyatlararo o'zaro munosabatlarining muvaffaqiyati uchun o'rganilayotgan til nutq odob-axloqining lingvomadaniy xususiyatlarini bilish, o'rgatish esa qoraqalpoq madaniyati haqidagi bilimlarga asoslanishi zarur.*

**Резюме:** *В статье рассматривается важность обучения речевому этикету с лингвокультурной позиции, способствует осознанию общекультурных норм, общих ценностей народов, основных стереотипов мышления и поведения, норм и правил, ритуалов*

речевого общения, принятых в культуре народов мира. страна изучаемого языка. При таком подходе студенты смогут овладеть не только языком, но и общей культурой речевого поведения, умением вступать в межличностное взаимодействие с носителями языка. Также в Каракалпакстане государственными языками признаны каракалпакский и узбекский языки, но обучение большинства студентов ведется на каракалпакском языке. Поэтому для адекватности и успешности межкультурного взаимодействия подростков необходимо знать лингвокультурные особенности речевого этикета изучаемого языка, а обучение должно основываться на знании каракалпакской культуры.

***Kalit so'zlar:*** lingvomadaniy yondashuv, nutq odobi birliklari (NOB), qoraqalpoq, o'zbek va ingliz tillari, og'zaki muloqot.

***Ключевые слова:*** лингвокультурологический подход, единицы речевого этикета (ЕРЭ), каракалпакский, узбекский и английский языки, вербальное общение.

**THE ROLE OF LAW EDUCATION IN THE DEVELOPMENT OF LAW CULTURE OF STUDENTS**

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**Summary:** *This article describes the role of legal consciousness and legal culture in the development of society, the main tasks of the educational system in the development of legal culture of students. In addition, practical suggestions and recommendations for the development of legal culture of students were given.*

**Keywords:** *legal consciousness, legal culture, civil society, higher education, legal education, legal advocacy.*

It is known that the development and future of any country depends on the knowledge and intellectual potential of young people, their physical and spiritual well-being. The development of legal literacy and legal culture of young people is one of the top priorities in the face of such great goals as a democratic state governed by the rule of law, the development of a free civil society, and the achievement of a worthy place for the new Uzbekistan among developed countries. High legal culture is the basis for the development of society, which means that legal education plays a special role in the modernization of education, its organization at the level of world standards. Improving the legal culture of young people, first of all, serves as a practical solution to a number of problems, such as the formation of respect for the law, full understanding and observance of their rights and duties, prevention of indifference, crime prevention. The quality of legal literacy has a significant impact on the individual-society-state relationship, allows for a fair and impartial solution to problems arising in life, work or any other field. Commenting on the scale of reforms at the current stage of development of Uzbekistan, the head of our state said: "As a result of our large-scale measures for political, social and economic modernization of society, a new Uzbekistan is being formed. Today, democratic changes in our country are irreversible." In any country where the people do not fully understand the government's policy and do not support it with a single goal, the results of these reforms are clear. Therefore, the country is currently reviewing the system of training in all areas. Especially in the legal education system. High legal culture is the foundation of a democratic society and an expression of the maturity of the legal system. It is a factor that actively influences the various life processes in society, promotes the integration of citizens, all social groups, ensures and strengthens the integrity and order of society. Respect for the law is one of the main requirements for the effective functioning of the legal society, political and legal systems. What is the process of teaching legal sciences in our system of secondary, secondary special, professional, higher education today? It is natural that this situation makes everyone think. Because Tashkent State Law University, law colleges, not to mention the legal lyceum, which are specialized educational institutions, in other educational institutions, legal sciences are considered as "2nd level science". This leads many people in the field to forget their duty, and gradually form a legal nihilistic mood. With the process of increasing access to information, increasing convenience, the indicators of legal culture of today's young generation are growing inversely proportional. The indifference of many sections of the population to the ongoing reforms is also a consequence of the fact that they do not learn enough from the law. In 1997, the "National Program for Raising the Legal Culture in Society" was adopted, on January 4, 2001, the Presidential Decree "On the organization of the study of the Constitution of the Republic of Uzbekistan" was issued. Presidential Decree "On radical improvement of the system of raising legal awareness and legal culture in society" of January 20, 2019, adoption of the Regulation "On monitoring and evaluation of



measures to improve legal culture in society" All this is the legal basis for the goal of raising legal literacy, ensuring the active participation of all in the country's large-scale reforms within their rights and duties. On the basis of the Presidential Decree of 2001, courses on the study of the Constitution were introduced in all educational institutions. The above-mentioned Regulation states: "The main purpose of monitoring and evaluation of measures to improve the legal culture in society is to increase the effectiveness of legal advocacy activities to raise legal awareness and legal culture of the population, strengthen the responsibility of government agencies and organizations. development and implementation of proposals for the introduction of new innovative methods of organizing advocacy activities "

In the process of radical reforms, it is important to form a legal culture in society, to make it a daily rule and custom for everyone, whether a leader or an ordinary person, to respect the Constitution and laws, the rights and freedoms, honor and dignity of others. Because only when laws work does they work well. And laws only work if they are obeyed, if they are required to be obeyed. Not everyone has to be a lawyer to do this. Today, in our society, the idea is put forward that every citizen, first of all, should follow the laws in their field, to completely eliminate the idea of circumventing the law. After all, the era demands that every citizen not only be afraid of responsibility, but also understand that it is bad to walk the forbidden path, not to follow that path, that the rules work in their favor, and to respect them. Respect for the law is a legal culture. On the contrary, disregard for the legal norms accepted in society, a situation that encourages them not to follow them, indicates that a person has formed a legal nihilistic behavior. It is the citizens of the legal culture who must be not mere observers of reforms, but direct implementers, executors and, if necessary, initiators. There is no other way about it and it can't be. Only when every citizen realizes that laws are good for the future will society be able to move up the ladder of cultural development. This is one of the reasons why our country today pays great attention to raising the legal awareness and culture of citizens. Legal education in pedagogical educational institutions was reserved only for students of Higher Education in the field of Legal Education. This has led to a decline in the interest of other professionals in the existing and newly adopted regulations in society. In this case, teachers of all disciplines should be required to take a creative approach to the subject, as well as to study the legal basis of all the subjects studied. The demand for highly qualified lawyers has also increased in the economic life of our country. With this in mind and in order to provide various segments of economic life with legal personnel with secondary and higher education, the existing law colleges have been transformed into technical schools, with a special focus on the process of legal education.

The provision of legal personnel in all sectoral systems will help the current reforms of the country to bear fruit soon, with the consent of the population, to increase the living standards of our people. "Only a man who is happy to do his duty can live freely," Cicero said. Duty and law are so closely intertwined that it is hard to imagine them apart. Because a person who knows his rights well can also do his duty. Through this he finds his place in life, serves society. The development of legal culture is a key criterion for solving any problem. This is the main reason why the society pays special attention to the promotion of legal awareness, legal culture and strengthening the rule of law.

The formation of legal immunity of students against the factors that negatively affect their legal education, respect for the law and the rules of etiquette, loyalty to national values, a sense of intolerance to crime are especially relevant today. We all need to feel that the effectiveness of our reforms is at the heart of the full and creative approach of the staff and specialists in charge of educational institutions, legal education and advocacy. At the same time, in order to improve the legal culture of students, it is necessary to establish an effective mechanism of social cooperation between educational institutions, civil society institutions, law enforcement agencies and the media.

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**Rezyume:** *Ushbu maqolada huquqiy ong va huquqiy madaniyatning jamiyat taraqqiyotidagi o'rni, o'quvchilarning huquqiy madaniyatini yuksaltirishda ta'lim tizimining asosiy vazifalari yoritilgan. Shuningdek, talabalarining huquqiy madaniyatini yuksaltirish bo'yicha amaliy taklif va tavsiyalar berildi.*

**Резюме:** *В данной статье описывается роль правового сознания и правовой культуры в развитии общества, основные задачи системы образования в развитии правовой культуры учащихся. Кроме того, были даны практические предложения и рекомендации по развитию правовой культуры студентов.*

**Kalit so'zlar:** *huquqiy ong, huquqiy madaniyat, fuqarolik jamiyati, oliy ta'lim, huquqiy ta'lim, huquqiy targ'ibot.*

**Ключевые слова:** *правосознание, правовая культура, гражданское общество, высшее образование, юридическое образование, юридическая адвокатура.*

## **SOME DISTINCTIVE PROBLEMS OF LYRICAL CHRONOTOPE RESEARCH**

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**Summary:** *The main directions of the study of lyrical chronotope are studied in the article on the example of world and Russian literature.*

**Keywords:** *lyrical chronotope, style and chronotope, chronotope analysis, images of artistic time and space*

Lyric - expressing a sensitive attitude to "events that belong to the poet" [1, P.9-12], expressing personal apologies in the form of a monologue (through "I") [2, P.56-61], narration (epic), show (drama) rather, it is the most subjective literary genre, with a wide range of ideas and emotions [3, P.346-354]. A literary character who is "dependent" on events in the epic and conflict in the drama rises to the level of a lyrical protagonist-individual who has his own personal apologies, meditative thoughts in the lyrics and demands a lyrical chronotope in the face of these qualities. In this article, we aim to determine the level of study and the main directions of the lyrical chronotope on the example of world and Russian literature.

In the study of world literature, much attention has been paid to the comparative study of the literary chronotope with other sciences [4], and the interest in the independent study of the lyrical chronotope has increased in the XXI century. In 2019, the English scholar Zh. Kasanova's work "Forms of the Chronotope in Finnish de-Siècle British Women's Poetry" was published. The research consists of three parts except introduction and conclusion, and it studies chronotope forms in the poetry of poets such as Amy Levy, M. Blind, A. Mary, K. Mattos, D. Radford, who worked in the late nineteenth and early twentieth centuries through gender and feministic views, social-political events and women psychology at that times. This is one of the first large-scale studies of chronotope in women's poetry in the field of literature, which includes new types of chronotope (imaginary chronotope, strangeness chronotope, human and non-human chronotope). The peculiarity of the study is that the scientist focuses on the transformation of common chronotope into author's chronotope. For example, in the lyrics of R.M. Watson there is an imaginary chronotope, M. Kendall's dream chronotope, Mattos's labyrinth chronotope and others. In our opinion, such a scientific approach shows the importance of chronotope in the creation of individual style and prevents the formation of the notion that "the main dimension of style is the chronotope."

Different views of several poetries such as (E. Pound, T. Eliot, J. Ashbury, C. Bernstein (american-english) and V. Khlebnikov, V. Mayakovsky, Brodsky (Russian), etc.) about time, space, history and language were studied comparatively in the work of Professor J. Probst "The River of Time: Time, space, history and language in avant-garde, modernistic contemporary Russian and Anglo-American Poetry" [5]. M. Malone studied chronotope forms in the poetry of the Russian period and studied Russian as a chronotope [6]. The scientist T. Axalkatsi emphasizes that the concept of time and space in Georgian romantic poetry [7] is conceptual, the past is illuminated through personal recollections, and the future can be connected in the form of poetic imagination.

The problem of lyrical chronotope has been studied in detail in Russian literary criticism. According to the well-known scientist V. Khalizev, in lyric poetry the chronotope "has a symbolic character in the form of motive and leitmotif" [8]. In this case, the chronotope rises to the level of a symbolic image. For example, in lyric poetry, the chronotope of "autumn" is shaped as a traditional depiction of the end of human life, maturity or aging, as well as a symbol of anticipation and longing. However, each poet has his own individual style, his own way of thinking, his own way of illuminating. In this process, traditional symbolic images are transformed, creating new content.

The monograph "Images of space and time in Russian poetry of the XIX-XX centuries" (Kurgan, 2012) was published by scientists I.M.Zhukova and N.K.Nezhdanova. In this work, the artistic semantics of the images of time and space in the transition from Russian classical poetry of the XIX century to Russian rock-poetry of the XX century were studied in connection with the genre, architectonics, composition, evolution and transformation of images, another Russian scientist, N. Lovchinsky ("Images of space in modern Russian postmodern poetry". Volgograd, 2010) has studied the peculiarities of the creation of spatial images in modern Russian postmodernist poetry.

The scientist A.B. Yesin in his work "Principles and methods of analysis of literary work" (Moscow, "Flinta. Nauka", 2000) devoted to the methods of selection of works of art focuses on each literary chronotope and emphasizes the lyrical chronotope with epic, dramatic chronotope. The scientist connects the "breaking" of traditions by poets, the transformation of images, the introduction of new descriptions into the literature in relation to their chronotope. These studies confirm that the individual attitude of authors to time and space realizes their psychological differences, views on the world, objective reality. Thus, in the post-Soviet period, the study of lyrical chronotope in Russian literature was dominated by the study of individual authors. In this direction chronotope in the works of famous Russian poets such as A.S Pushkin [9], M.Yu. Lermontov [10], A. Akhmatova [11], S. Yesenin [12], B. Pasternak [13], M. Tsvetaeva [14], V.V. Mayakovsky [15].

In short, the problem of lyrical chronotope in world and Russian literature began to be studied in the late twentieth and early nineteenth centuries. While the research in this direction is carried out in the periodical approach to the study of world literature, it can be seen that in the study of Russian literature the focus is on the study of the chronotope in the education of individual authors.

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**Rezyume:** *Mazkur maqolada jahon va rus adabiyoti misolida lirik xronotopni o'rganishning asosiy yo'nalishlari ko'rib chiqiladi.*

**Резюме:** *В статье исследуются основные направления изучения лирического хронотопа на примере мировой и русской литературы.*

**Kalit so'zlar:** *lirik xronotop, uslub va xronotop, xronotopik tahlil, badiiy zamon va makon obrazlari.*

**Ключевые слова:** *лирический хронотоп, стиль и хронотоп, хронотопный анализ, образы художественного времени и пространства.*

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## COMPARATIVE-PRAGMATIC ANALYSIS OF SPEECH ETIQUETTE IN THE ENGLISH-SPEAKING AND KARAKALPAK LINGUISTIC CULTURES

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**Summary:** *The article describes the importance of teaching Speech Etiquette that promotes awareness of general cultural norms, values shared by peoples of the target language, basic stereotypes of thinking and behavior. Also, in the article, comparative-pragmatic analysis of speech etiquette in the English-speaking and Karakalpak linguistic cultures have been described. In the paper, the author notes the interference of the Karakalpak language and culture is manifested in all the types of units of speech etiquette (USE).*

**Keywords:** *comparative-pragmatic analysis, units of speech etiquette (USE), Karakalpak and English languages, speech etiquette formulas (SEF).*

The comparative-pragmatic analysis shows that the interference of the Karakalpak language and culture is manifested in all the types of units of speech etiquette (USE) we have noted. This means that all these types present difficulties for Karakalpak students, as evidenced by the examples given in the following interference are due to the national specifics of the USE of these languages and consist in the reflection of the customs and traditions of people, originality of the design of the etiquette content of statements due to the peculiarities of the linguistic structure and the mismatch of the systems of stable communication formulas. It should be noted that the linguistic meaning of the USE does not always coincide with its cultural meaning, since the cultural meaning is derived from the linguistic and non-linguistic context. The non-linguistic context in our case is associated with the communication situation, from the personal and social connections in which the communicants are located, from the chosen tonality and USE of speech. Therefore, it is very controversial to talk about the complete coincidence of the meaning of the USE in the two languages. And M.N. Kamalova subdivides the Speech Etiquette (SE) into three types: 1) SEF - speech etiquette formulas, which have complete coincidence of meaning in the Uzbek and Russian languages; 2) SEFs that partially coincide and 3) SEFs that do not have coincidence [5, 19]. At the same time, the author emphasizes that their correspondence is found in semantic and functional relations, and the difference is in structural and stylistic ones.

In English, Cheer (s) is also used as a greeting, as an exclamation greeting, which corresponds to the meaning of the word Welcome. The word Welcome in the Karakalpak language corresponds to the phrases Келиңлер or Хош келдиңиз. There is also another form of Nice to meet you - Сизди көргенимнен куўанышлыман, which is accompanied by a wide smile and appropriate eye contact. A greeting between men can be accompanied by a handshake [6, 266], as in the Karakalpak culture. In English, when communicating, not only when greeting, you have to smile - this is a stereotype of behavior in a public place, the English-speaking people show with a smile that they have no aggressive intentions [4, 14].

In the Karakalpak culture, people also smile when greeting, but the smile is less restrained, depending on social roles and relationships and the communication situation in general. When parting in English, they use Good-bye, See you soon / tomorrow, Till we meet again, in an informal setting Bye for now, Bye, Good luck, Ciao. In the Karakalpak language, Хош болың! Көрискенше! Аман болың! in an informal setting Жаксы онда, Көрисемиз. Our culture often uses the borrowed phrase "Gone like English" when a person leaves without any

farewell ceremony, so if this is taken to be true, students may experience pragmatic interference. In English culture, this speaks of bad manners, of a negative, hostile attitude of a person. According to the English SE, one cannot leave someone else's house without thanking and praising for the treat. The system of appeals in the Karakalpak language is much broader than in English, since it is more differentiated in terms of age and gender. In particular, age differentiation is observed (for women - *жақсы қыз, қызым, апа, кише, әжапа, сиңлим*; for men - *иним, аға, әжаға, жезде, балам, ата*, and to her husband - *ағасы*). As you know, the following phrases are used in English: Sir, Mr, Mrs, Miss, Madam, Young Lady. Appeals to clerics - Sister Karie, Brother Bred. The address Madam is used without a given name and surname and is addressed to a young or elderly woman. It is also used as a semi-professional prefix title such as Madam Chairman, Madam Mayor, indicating the possession of a particular post. Mainly in shops, hairdressers, restaurants, they are addressed in the form of Madam.

Such an appeal, according to E.O. Leonovich, replaces the service character's uniform [2, 90]. Formula Miss + Last name is the standard courtesy to an unmarried woman. Currently, this form and Mrs is replaced by Ms and is recognized as neutral or syncretic [3, 178], which obliterates the distinction between married and unmarried women. It is known that in the case of a group call, this call is replaced by the word Ladies. To express social roles and relationships that characterize communicatively significant differences between participants in communication by age, status, gender, in English, purely grammatical means such as the article are also used. The indefinite article is naturally used to denote the uncertainty of the social status "A Mr. Parkis wants to see you" - Some Mr. Parkis wants to see you. In the Karakalpak culture, the grammatical category of the article is absent, but there is a similar grammatical form, expressed by the pronoun "Бирей (әле ким) сизди сорап атыр", which demonstrates that the person is unfamiliar. Traditionally, the form of address Sir is seen as an indicator of respect for the addressee. This appeal to a man is used to reflect social or professional superiority. Formula Mr + Last name is the traditional polite form of addressing a man. Sir is used without a given name and surname when treated with respect. However, when it comes to a title of nobility, then it is always used with the full name Sir John Douglas. The following appeal to the group of men is possible Gentlemen. At present, the Karakalpaks in an official setting include the address "Мырзалар, төрелер (gentlemen)", but its use is specific for a certain official setting, on the street and in public places it is not used.

It is known that English schools (especially Public schools) used to require a male teacher in a Sir uniform, which led to the fact that they were called all the elders, including relatives.

"How old are you?"

"Nine" said Philip.

"You must say "sir"", said his uncle.

"I expect you've got a good lot to learn", the headmaster bellowed cheerfully.

*(W.S. Maugham. Of human bondage)*

This text demonstrates the social roles and relationships between speakers, i.e. the social status of the speakers, and the choice of the form of the address used depends on this. Now this address at school is increasingly being replaced by a surname, which is not inherent in the Karakalpak culture. The use of a surname without a given name as an address is strictly limited to the English SE. As a rule, the surname is used in an official setting when referring to a servant; officers to soldiers; teachers to pupils and students; in a neutral style - clients to well-known service workers - salespeople, tailors, etc.; regulars of bars and restaurants to waiters. By name, representatives of English culture address under certain conditions: sincere conversation, patronage of an influential person, respect for a young elderly person, innocence noticed by a young person in an elderly person, etc. In other cases, being addressed by name will be perceived

as disrespect, disdain, or arrogance. In the Karakalpak culture, the elders address the younger, peers by name, and аға, аға, иним, балам, қызым, апа, әжапа to strangers.

In English, market traders refer to the buyer as Squire. The most popular respectful address in Britain is Governor, often shortened to Guv. Often the pragmatic function of this appeal is used to flatter the interlocutor from whom he expects benefits, which is why the taxi drivers of the clients call Guv, avoiding the more traditional Sir. In English, even with outrage and negative attitudes, Sir is used when addressing. An Englishman, indignant at the antics of his competitor, writes to him: "Dear sir. You are a swindler", without the appeal "Dear sir", according to the rules of the SE, he cannot start a letter [1, 92].

In the Karakalpak language, when addressing, the connotative meaning acquires special affixes –улла, –бай, in English there are also diminutive affixes: Teddy, Libby. At the familiar level, abbreviated forms of proper nouns are often used: William-Will, Robert-Bob, Elizabeth-Libby, Betsy-Bess. In the Karakalpak language, abbreviation is observed in the case of a complex name, for example, Иззетулла–Иззет, Тилепбай–Тилеп, Нурсултан–Султан или Нурик. The next national peculiarity of the Karakalpak culture is that younger relatives cannot turn to the older members of the family on "you". Elderly people are addressed respectfully "сиз". Children and young people in the presence of their elders are not allowed to start a conversation first, to sit down until an invitation follows. In a conversation, the initiative and the right to ask questions rest with the elder. In English, there is only the pronoun you - you, but politeness is conveyed by many other means (please, would / should). In the Karakalpak culture, in order to demonstrate respect for elders and social roles, two forms of сиз and сен are used, elders are addressed with сиз, and peers and younger ones are addressed with сен. One more feature of the English language should be noted, "I" is always written with a capital letter, students are always interested in this question. S.G. Ter-Minasova explains this fact by the fact that in English culture a person takes upon himself an action and responsibility for this action [8, 275], and in Karakalpak culture a person dissolves into a collective, because ethical standards do not allow you to expose your "I". Therefore, you cannot talk about your merits, talk about yourself. And in English culture, preference and authority are given to individualism, personal contribution. For example: "I must - Маған керек, I am hungry - Аўқат жегим келип тур/Аш болдым". In English, I is in the first place, and in Karakalpak there is a passivity and dependence of the subject - Маған. In the Karakalpak language, Сиз is written with a capital letter in order to emphasize respect. In the Karakalpak language, the possessive affix -м, -ым, -ылар also carries a large semantic load in circulation. For example: достым – my friend, хұрметли оқтыўшылар – our respected teacher. In English - My friend. English people have a habit of using the word "Dear" when addressing in formal and informal settings, which carries the connotation "respected". In the official setting of the Karakalpaks, "Хұрметли" is used, so Karakalpak students can say / write Respect instead of Dear. In addressing the teacher, the Karakalpaks use "Муғаллим" or Гульмира апа is allowed. In English, it is not customary to refer to a teacher as a teacher; for English society, it is more customary to refer to "Mr. Brown, Professor Stake, Doctor Bloom, or Sir. In addition, the abbreviation "Doc" is used. It should also be noted that in the official setting in the Karakalpak culture, a patronymic is used along with the name, for example, Бийбисара Нурадиновна/Артық Турдыбайевич, which is not typical for native speakers of English. The use of the middle name was borrowed from Russian culture during the existence of the USSR and it still remains a stable fact of the Karakalpak culture. Although at present there is a tendency to return to their origins, therefore, there are cases of the appeal of Артық Турдыбай улы, Джумагуль Ақмарал қызы.

Here we should also mention another linguistic and cultural feature in the appeal to a group of inhabitants of the British Isles. The use of "English" will not be polite, nor would it be polite to the Scotch. To refer to the English they use the word Englishmen, and the Scotch word



is associated with whiskey among the Scots, and in this case only Scottish is permissible [9, 9]. In the Karakalpak culture, in this case, Қарақалпақ елим or Қарақалпақлар is used. From the point of view of the orientation of communication to a specific person in English, it is presented both explicitly (openly) and implicitly (hidden) and is mainly expressed on behalf of one person or in an impersonal form, for example: That was Bob. I'm sorry; Excuse me, It's a pity, in the Karakalpak language, mainly - Кеширерсиз. Аңсат болмады. In a situation where someone is guilty, the following expressions are used: Excuse / Pardon, Forgive me for ... Sorry for doing, Excuse me for coming late, and in the Karakalpak language the form "Кеширерсиз" is mainly used. The linguocultural feature inherent in the Karakalpaks is manifested in the unwillingness to admit their mistakes, any violations. To illustrate, we will take a common situation for school children - frequent lateness for classes is justified by various circumstances and reasons, but not by their recognition: mother is ill, transport does not go well.

Thus, in the English language classes, special attention should be paid to the SE, since there are many differences in the linguistic and cultural aspect.

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**Rezyume:** *Maqolada nutq odob-axloq qoidalarini o'rgatishning muhimligi tasvirlangan, bu umumiy madaniy me'yorlarni, o'rganilayotgan til xalqlari tomonidan baham ko'riladigan qadriyatlarini, fikrlash va xatti-harakatlarning asosiy stereotiplarini anglashga yordam beradi. Bundan tashqari, maqolada ingliz va qoraqalpoq tillari madaniyatidagi nutq odobining qiyosiy pragmatik tahlili berilgan.*

*Maqolada muallif qoraqalpoq tili va madaniyatining o'zaro ta'siri nutq odobi birliklarining barcha turlarida namoyon bo'lishini ta'kidlaydi.*

**Резюме:** *В статье описывается важность обучения речевому этикету, которое способствует осознанию общих культурных норм, ценностей, разделяемых народами изучаемого языка, основных стереотипов мышления и поведения. Кроме того, в статье дан сравнительно-прагматический анализ речевого этикета в англоязычной и каракалпакской языковых культурах. В статье автор отмечает, что взаимовлияние каракалпакского языка и культуры проявляется во всех типах единиц речевого этикета.*

**Kalit so'zlar:** *qiyosiy-pragmatik tahlil, nutq odobi birliklari (NOB), qoraqalpoq va ingliz tillari, nutq odobi formulalari (NOF).*

**Ключевые слова:** *сравнительно-прагматический анализ, единицы речевого этикета (ЕРЭ), каракалпакский и английский языки, формулы речевого этикета (ФРЭ).*

**GAZELLE GENRE IN MODERN TURKISH POETRY**  
**(On the example of Uzbek, Karakalpak and Turkmen lyrics)**

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**Summary:** *This article comparatively examines the use of gazelle in modern Turkic poetry, one of the oldest genres widely used in Eastern classical poetry, including Uzbek, Karakalpak and Turkmen lyric poetry, and their typology.*

**Keywords:** *poetics, poetry, gazelle, typology, artistic form.*

The dominance of the principle of studying the formation and evolutionary development of the genres of written literature at the level of lyropoetic thinking in modern world literature has led to the role of the literary process in the context of national artistic thinking.

The study of the interrelationships and typological similarities of the literatures of ethnoculturally close peoples radically renews the theoretical views of the functional-semantic properties and poetic nature of literary genres. At the same time, it was noted that the system of genres of peoples' literature, which is based on ethnic origin, socio-cultural development, artistic traditions, way of life, language and national values, has a historical and genetic influence. This is due to the diversity of forms of adjectives in the literature of the Uzbek, Karakalpak and Turkmen peoples, who have long been neighbors in the ethno-cultural area of Central Asia in the Aral Sea region, the national character of literary traditions, the poetic mastery of educators, creates a wide range of opportunities for research in the context of literary relations and the process of artistic influence. Therefore, in this article we will talk about the gazelle genre in modern Uzbek, Karakalpak and Turkmen poetry and its importance in modern lyric poetry, the issues of typology in the gazelle genre in the poetry of the three nations.

As far as we know, the traditional forms of art that prevailed in the classical literature of the peoples of the East for several centuries, that is, the additions written in the size of aruz and its inconsistency with the classical dimensions, were criticized by the great educator Abdullah Qahhor [1, P. 71-78]. It should be noted that E. Vohidov proved with his "Youth Devon" that he could write beautiful works, gazelles and muhammas, especially in the genres of poetry of that time and in the literary center. In the formation of this work, he took a new path in accordance with the content of the gazelle.

The composition "Uzbegin", written on the classic aruz, was recognized as a work that sang the anthem of the glory and past of the Uzbek nation.

The intonation and rhythm of E. Vohidov's composition have such a dimension that it belongs to the elements of the composition, such as rhythm: "Aruz wa barmok":

« Two poems

On two pages of the notebook,

On the one hand - aruz,

On one side is a finger» [2, P. 282].

The compound was written by E. Vohidov in 1977. Therefore, the poet is not only a departure from the classical traditions, but also a desire for a new dimension. He does not want to turn the traditions of classical poetry into "old-fashioned". So many Uzbek poets such as Abdulla Oripov, Jamol Kamol, Jumaniyaz Jabborov, Matnazar Abdulhakim, and Abdulla Sher responded to those who criticized the form of the poem with a variety of poetic forms. Among them, the modernity of the dream stands out in the upbringing of E. Vohidov.

In fact, E. Vohidov in his special article "About Aruz" wrote: "Gazzele - a complex and difficult genre. Gazelle requires a lot of meaning in a few words, the presentation of ideas in the space of artistic representations ... Like all forms of Aruz literature and poetry, it requires talent and skill, deep thought and emotion [3, P. 121]. From such opinions it is clear that the form of the compound requires content, and most importantly, talent. Hero of Uzbekistan, People's Poet of Uzbekistan Abdulla Oripov: "Erkin Vohidov appeared at the door of the dream as a defender» [4, P. 11] –wrote , for "young people interested in gazelles" E. Vohidov's upbringing emphasizes the possibility of becoming a school, which in itself is evidence of the continuity of traditions. The continuity of such classical traditions in the modern world is naturally found in the cultivation of Turkmen and Karakalpak poets.

Turkmen poet Ahmet Mammadov on the form of the gazelle: "Gazzele joins in the form of aa, va, ha, and its size consists of 14, 15, 16 generations. However, there are cases when it is written in 11 syllables. The size of the band of each gazelle is 7 to 10 balls. It is the most delicate, the most difficult form of lyricism. Because it requires a lot of joins. Gazzele lost his vow and initially aimed only to radiate feelings of love. Later, it was associated with the intonations of love, the glorification of God by Sufi poets, as well as the genre of poetry» [5, P. 15] – offers theoretical descriptions.

In modern Turkmen poetry there are several gazelles of A.Atabaev, K.Gurbanmuradov, U.Eminov, A.Mammadov. But they wrote the gazelle in the size of a finger. For example, the poet of A. Mammadov:

The moon is locked, if I make a friend out of a flower:  
His tongue is like a squirrel, and his speech is fivefold.

He walks like a falcon, his attitude is like a falcon,  
It is well known that I hunted for it [5, P. 15].

In the Gazelle, the analogies are not in the traditional form, but in the modern sense. That is, we all know that in folk poetry, a flower symbolizes a girl, a nightingale symbolizes a young man. However, despite the fact that the modern poet A. Mammadov retains the tradition of depicting the shoreline, in his own new way he adorned the appearance of the shore with flowers, and his speech was like a nightingale. In the next verse, the girl's behavior is similar to that of a bird, and the allegorical description is predominant. Of course, he didn't say, "I'm open to a girl," as in classical poetry. This gift is the mastery of modernizing the traditional form as a result of artistic research of modern poets.

We can see that the genre of gazelles was developed in the education of modern Karakalpak poets, enriching them with new content, new ways of depiction. In Karakalpak poetry, the gazelle is written in the size of a finger. Gazelles of poets such as I. Yusupov, M. Karabaev, A. Utepbergenov were well received by students in Karakalpak poetry. For example, in I.Yusupov's newspaper "Uzbek music":

I wonder if the instrument of my heart is narrow,  
I wonder if Uzbek has the most elegant sense of music.

I said to the morning breeze, "Take it away!"  
He knocked and ran away, but he was not afraid either.

Don't tremble, my soul is beautiful "Tanavar",  
shuddered at me, wondering if I was wrong [6, P. 50] , –

The gazelle is reminiscent of the gazelles in classical poetry. It is known that the main theme is love, but the poet wrote his gazelle in the size of a finger, and in the first stanza (praise) he managed to describe the feelings of love of the lyrical hero in a hidden way, in a metaphorical way.

In other words, the poet describes the beloved daughter of the lyrical hero in the style of a duo. In the gazelles of classical poetry, the beauty of a girl is described in detail, and the traditional metaphor of the poet is used in a new vivid way: "The most elegant sense of music is in Uzbek. "The image of the morning breeze is enlivened in the poem and one of the novelties is the image of the open hero in a friendly and encouraging way.

At the same time, in the gazelle, in a dialogical way, the classic poet addresses Alisher Navoi. If the reader reads the gazelle of Alisher Navoi, the king of the Gazelle, in these lines, he will understand the thoughts of the poet. Therefore, in his gazelle, Poet managed to symbolically depict the inner feelings of love of the lyrical hero through the music of drums.

As for the structure of the chorus, it is similar to the gazelles in classical poetry, joining in the form of a-a, b-a, g-a, and after the bands, the rhythm is repeated.

It is well known that literary influence has become a tradition in classical literature. However, in the Uzbek, Karakalpak and Turkmen literature of the twentieth century, the gift of mastering literary forms prevailed in some form. Well-known K. Kurambayev, who specially guarded this literary gift: «Abylkasym (Karakalpak poet Abylkasym Utepbergenov is taken into account – G.O) I have a good opinion about his ghazals and muhammas in the spirit of the traditions of Eastern poetry. I consider Poet's muhammas, nazirs, and the continuation of Poet's traditions in modern Karakalpak poetry as a symbol of respect for the sultan of the Gazelle's property» [7, P. 401]. From such reflections it is clear that in modern Karakalpak poetry the influence of Alisher Navoi, and in terms of form, the traditions of the great Uzbek poet continue.

Poet A. Utepbergenov in his book of poems "The box of mystery is not opened, the world of cheese is mine ..." "Five muezzins for five gazelles," "In the world of poetry, I felt the need to tie muhammas to the gazelle of Khoja Ahmed Yassawi, Hafiz Sherazi, Hazrat Navoi, Nasimi and I. Yusupov (Ayazi), who shook the whole world" [8, P. 80] – wrote. Poet's "Muhammad to the Navoi Gazelle" :

I will sigh and sigh, my lips are not pale,  
Kumai's eyes were clear, his face was bald, and his face was pale.  
Thousands of souls did not come,  
The man said he would come, but he did not come.  
I couldn't sleep until the morning [8, P. 82-83]

In Muhammed, the first stanza is a-a-a-a-a, and the last row in the rest of the stanzas is the same as in the rows of the first stanza. That is, in the form of b-b-b-b-a. Poet calls himself Jaihun after the song and also mentions Alisher Navoi. The spoon consists of 16 joints, forming long rows and revealing feelings of love. The poem consists of 7 verses, in which the traditions of classical poetry are more evident in the methods of depiction.

Poet with his five-line muhammas develops and introduces a new form in the twentieth-century Karakalpak lyric poetry. This phenomenon can be understood as the result of the poet's artistic research.

Such a connection to the gazelle is evident in twentieth-century Uzbek poetry. For example, the poet Matnazar Abdulhakim in his collection of poems "Selected Works" wrote:

Do not understand your sorrows, do not speak to the ignorant,  
There is no will to go, there is always talk of opportunity,  
There will be no more darkness.  
O heart, do not deceive a man, do not speak to a fool,  
Because he is not a human being, but a human being.

For whom the word is a compliment, for whom the word is a challenge,  
I am wise in my words, ignorant and ignorant.  
The word is happiness, the word is misery, the word is kindness, the word is generosity,

The word is a precious gem in the human heart,  
Don't despise him, Debon [9, P. 293]

The number of joints in the rows of joints is 15, the joints are in the form of the first band a-a-a-a, the next band b-b-b-b-a, forming the compositional structure of the joint. Although the appearance of the muhammed is preserved in the poem, but the content adds something new to the theme. In classical poetry, it is more in the form of a jam, and its narration is widely used in didactics, and now in resin muhammas. It can be understood that the content of this resin infused the spirit of the times, opened its way to the idea-theme, the space of content. The poem consists of 9 verses, in the next verse the resin mentions its name and remembers its teacher. Therefore, it is emphasized that every word of a person has a deep meaning, and a few words have a lot of meaning. Poetic repetitions are of great importance in conveying ideas.

The repetition of the word "word" ensured the intonation of the meaning. The opinions are expressed in a more comparative way, in an antithetical way. This muhammes, which was an element of the Gazelle, was followed by a four-line verse. This method, of course, is not preserved in the traditions of classical poetry. This is the artistic pursuit of the poet. And in Uzbek lyric poetry, when we discuss the gazelle of the Uzbek national poet Sirojiddin Sayid "Bilsa Bas", it is typical of the traditions of classical Uzbek poets.

Seven layers of earth, seven layers of blue, the valley of emigration, my heart,  
If only the valley of Hijrah knew my heart [10, P. 69].

According to the structure, the gazelle's mat and cotton have their own characteristics. Classic poets in cotton will never forget to put a nickname. However, the fact that this tradition has changed in modern poets can be seen in the fact that the name of the poet is not mentioned in the cotton of Sirojiddin Sayyid's ghazal, which is written in the size of a mahzuf. Similar conditions exist in other poetss.

Therefore, it is true that in the Uzbek, Karakalpak and Turkmen literature of the twentieth century, several genres of classical suffixes, such as gazelle, rubai, tuyuk, muhammes, continue and educational products are believed in this way. In Uzbek, Karakalpak, and Turkmen literature, the classical forms of art are based on the poems of Jumaniyaz Jabborov's "The Beauty of my soul ", "Choice" by Jamol Kamol, "Youth Devon" by Erkin Vohidov, "Harmony of the Years" by Abdulla Oripov (1984), "Visit of Javzo" by Matnazar Abdulhakim, "Selected Works", "Flower Years, Nightingale" by Abdulla Sher Sirojiddin Sayyid's "Give your porches to the swallows», Akhtamkuly's "Forty gazelles", I. Yusupov's "Spring and you" (1976), "Life is not open to you ..." (1999), A. Utepbergenov's "Springs" (1991), "The secret box is not opened, the mysterious world is mine. . » (1994), A.Mammedov in such collections as "Turkmennama "(1996).

In short, in world literature, as well as in Uzbek, Turkmen and Karakalpak literature, only talented literary educators who are engaged in artistic creation create works that will last a lifetime in the history of literature. In turn, such eternal ideas are reflected in the gazelle genre of poetry. Therefore, the existing traditions of artistic education have the right to be created along with other innovative practices, while updating the content.

Secondly, it became clear that one of the most beautiful examples in the literature of the nations under discussion is the poetic form of the poem and the harmony of its content. As a result, the above-mentioned poetic changes have continued in the formation of traditional artistic forms of Uzbek, Karakalpak and Turkmen poetry in the poetry of the last generation, and this phenomenon is the renewal of traditions,

Also, as a follower of the literary heritage, the Uzbek, Turkmen and Karakalpak scholars studied each aspect.

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**Rezyume:** *Ushbu maqolada Sharq mumtoz she'riyatida, jumladan, o'zbek, qoraqalpoq, turkman lirikasida keng qo'llanilgan eng qadimiy janrlardan biri bo'lgan g'azalning zamonaviy turkiy she'riyatdagi qo'llanishi va ularning tipologiyasi qiyosiy tahlil qilinadi.*

**Резюме:** *В данной статье сравнительно исследуется употребление газели в современной тюркской поэзии, одного из древнейших жанров, широко используемых в восточной классической поэзии, в том числе узбекской, каракалпакской и туркменской лирике, и их типология.*

**Kalit so'zlar:** *poetika, she'riyat, g'azal, tipologiya, badiiy shakl.*

**Ключевые слова:** *поэтика, поэзия, газель, типология, художественная форма.*

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## PRESETT PROGRAMME AS A NEW APPROACH IN UZBEKISTAN

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**Summary:** *This article deals with the PRESETT programme as a new approach in learning and teaching English in the republic of Uzbekistan. The modules of the programme and its periods are indicated and compared with the traditional one. This is emphasized that PRESETT students will be practical and can easily implement their knowledge in their future career.*

**Keywords:** *PRESETT(pre-service English teacher training), modules, approach, language skills.*

Nowadays, the role of learning and teaching English is achieving a higher speed in the world as well as in Uzbekistan. The great importance is attached to the study and teaching of foreign languages. According to the Presidential Decree 1875 adopted on December 10, 2012 “On measures for further enhancement of the system of teaching of foreign languages” pupils must start learning foreign languages at the early ages. [1] One of the accomplishments is the implementation of the current PRESETT programme in higher education institutions’ foreign language faculties. It is closely associated with modern approaches to future English teacher education in European countries in terms of both standards and content.

Through command of the target language, The PRESETT curriculum prepares us with the future competent and skilled English teachers. Students will be capable of modifying and developing lesson plans, collaborating with students of different ages, using various teaching methods after graduating from the university or institutes.

PRESETT is an internationally accepted term that stands for “pre-service English teacher training”. The PRESETT curriculum is a four-year undergraduate programme that designed to train teachers for primary and secondary special education institutions. Within the framework of the programme, 20 modern but new modules were created in Uzbekistan and approved by the order of the Ministry of Higher and Secondary Special Education dated August 28, 2013 №319 and gradually implemented in all universities specializing in training foreign language specialists.[3]

The new PRESETT curriculum was improved on the basis of world standards, offers 2 major courses: Linguistic and Methodological courses. Each course consists of a total of 20 modules in 4 stages.

1. Linguistics course is aimed at preparing graduates who can understand, speak and write English at the level of international standards and have in-depth knowledge of language systems required for pedagogical activities, and includes the following modules:

1. Integrated language skills
2. Listening and Speaking
3. Reading
4. Writing
5. Communicative grammar
6. Communicative lexicology
7. Discourse analysis (text)
8. English as an International Language
9. Development of intercultural communication competence.

The main purpose of the modules included in the linguistic course is to teach the perfect acquisition of language skills (listening comprehension, writing, speaking, reading skills) in a foreign language. In particular, The Writing module, which runs from 1<sup>st</sup> year to 3<sup>rd</sup>, teaches in

English everything from informal and formal letters to reports, reviews, and articles. At the 4<sup>th</sup> year, students are introduced to the requirements of Research writing, develop the skills of writing their dissertations, writing research papers in general. In addition to developing language skills through these modules, special attention was paid to the development of several transferable skills of the student (English transferable skills, critical thinking, basic research skills, group work, etc.). [2]

2. Methodological course or integrated course of foreign language teaching consists of several modules. They are conducted from 2<sup>nd</sup> year to 4<sup>th</sup>. This course is aimed at preparing future teachers who will be able to rationally use effective methods of learning and teaching English, which will meet the requirements of students of the XXI century in learning a foreign language. This foreign language methodology course is a practical course, and the information-methodological support, assignments and assessment requirements recommended in the program are designed to conduct this course only in English. This course consists of the following modules:

1. Language learning
2. Approaches to Language Teaching
3. Teaching Language System for Communication
4. Independent Study Skills.
5. Teaching and Integrating Language Skills.
6. Classroom Language.
7. Materials Evaluation and Design.
8. Planning Learning and Teaching.
9. English for specific purpose (ESP).
10. Classroom Investigation.
11. Language Testing and Assessment.
12. Teaching Different Age Groups,

The aim of the full course of practical methods, which develops module-by-module, is to introduce new methods and technologies that lessons can be planned step by step, integrate language skills in the student, assess knowledge and skills in a foreign language, forming the right attitude to the language learner and learning requirements. aimed at training a modern specialist-teacher who will receive. The program pays special attention to the approach to English as an international language of communication and the cultural approach. [2]

In Karakalpakstan, Nukus State Pedagogical Institute and Karakalpak State university are the higher educational establishments which adopted the curriculum of PRESETT aiming at preparing teachers of English who are skillful in practical classroom methodology and in language referred to international standards since 2009. The implementation of the new approach PRESETT was fully accomplished in 2013. I had a chance to study in PRESETT groups between 2013 and 2017 at KarSU. Studying under the programme's guidelines provided me with an excellent opportunity to improve my teaching abilities, which was beneficial to my current job. I would like to demonstrate this point by stating that during the learning process, we were assigned tasks such as giving presentations and making videos on different topics by using laptops and projectors. This aided in the development of our body language, eye contact, self-confidence and self-control, speaking style and other communication and evaluation skills. We also learned how to analyse and provide feedback in classes. Our research writing was the most challenging and demanding task. We conducted extensive research, library research, data collection and data analysis after selecting topics suggested by our supervisors. In addition, we carried out our research during our teaching practice with college, lyceum and school pupils. Finally, as the proverb says "You reap what you sow", when the most exciting day came and we defended our research papers in front of the state committee. It was a memorable day in each student's life because they were finally able to get the fruits of their hard work. As I experienced PRESETT programme at university in 2013-2017 in the following paragraph I want to compare it with the previous traditional way of teaching.



The language and methodology modules, teaching approach, students' role and other aspects of the PRESETT Curriculum differed from the traditional program. Consequently, it led to advantageous outcomes so far. The benefits of PRESETT can be seen in many aspects. For instance, I would like to emphasize reading skills. Before the PRESETT programme, lessons in the old education system were organized around a certain text designated for reading and translation with the use of teacher-centered learning. It was rather boring. However, the PRESETT curriculum focuses on developing learners' reading skills and strategies through variety of engaging and effective tasks. Students work more independently, striving for their goals by evaluating themselves. PRESETT helps students to improve their abilities in reading, writing, listening and speaking skills. The course on listening and speaking skills course is also crucial in studying a foreign language. Students' mastery of grammar does not imply that they are fluent in the language. For that, students should use audio and video recordings to improve their listening and speaking skills in classes.

In traditional teaching programme, students focus on learning language by grammar translation method, using the book named "Practical course of English language" by Arakin, students were trained not only on translating texts but also on the theory of Phonetics, while PRESETT students focus on a specific teaching skills by conducting micro-teaching. Students do their extended micro teaching in authentic school environments. [3] Each student relatively performed the activities and in accordance with the common text in the field of receptive and productive skills and grammar. It allows them to gain experience as a future teacher for many aspects of the classroom: preparing lesson plans, selecting objectives, speaking in front of the class and acquiring and applying methods of evaluation.

To sum up, comparing with the traditional teaching, PRESETT programme is much more accessible. PRESETT is a need of today's language learning and teaching process because it can meet the needs of today's learners. Nowadays learners want to apply the things learnt in real life situations. In addition, teachers of this programme can bring up pupils who are able to communicate fluently in English everyday situations.

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***Rezyume:*** Ushbu maqolada PRESETT dasturi O'zbekiston Respublikasida ingliz tilini o'qitish tizimidagi yangi yondashuv sifatida ko'rib chiqiladi. Dasturning mazmun-mohiyati, uning o'qitilish davrlari va an'anaviy yondashuv bilan taqqoslanadi. PRESETT talabalarining amaliy ko'likmalari va kelajakdagi kasblarida o'z bilimlarin oson amalga oshirishlari mumkinligi ta'kidlanadi.

***Резюме:*** В этой статье рассматривается программа PRESETT как новый подход в системе обучения и преподавания английского языка в Республике Узбекистан. Указаны модули программы и ее периоды, которые сравниваются с традиционным. Подчеркивается, что студенты PRESETT будут практичными и смогут легко применять свои знания в своей будущей карьере.

***Kalit so'zlar:*** PRESETT (Ingliz tili o'qituvchilarni oldindan tayyorlash), modullar, yondashuv, tilni bilish.

***Ключевые слова:*** PRESETT (подготовка будущих преподавателей английского языка), модули, подход, языковые навыки.

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## THE USE OF HEADWEAR TERMS WITH DIALECTICAL FEATURES

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**Summary:** In the article the use of the clothing terms in the northern dialect of the Karakalpak language, in particular, headgear terms in terms of semantics and structure is analyzed. We divided headgear terms into two groups: men's hats and women's hats. At the same time, we analyzed the use of the headgear terms in the phonetic and lexical variants, the use of words in the multiple meaning, literal and figurative senses, the use as the homonyms in the context of the dialect materials. We also told about words borrowed to the dialect from other languages.

**Keywords.** Northern dialect, speech, phonetic variant, lexical variant, polysemy of words, ways of changing the meaning of words, homonymous words, assimilation, ethnography, prefix, compound word, noun, gerund verb.

The words used in the northern dialect of the Karakalpak language have phonetic, lexical-semantic, morphological and syntactic differences. In this case, dialectal words are used with more lexical differences.

The dialectal vocabulary of the Karakalpak language is very rich. The words used in it cannot be divided into certain thematic groups. In particular, they are the names of housing, construction, household items, clothing, animals, birds, insects, etc. From them it is possible to make analyze of clothing terms. Clothing terms can be divided into hats, outerwear and footwear terms. In the article, we analyzed the names of hats and divided them into two groups: men's hats and women's hats. Also, the terms of the hats can come in phonetic, lexical variant, poly-semantic, both literal and portable meaning, and homonymous. At the same time, in the northern dialect, words borrowed from other languages related to the names of hats are also found. We have analyzed them as follows.

**Names of men's hats.** In the northern dialect of the Karakalpak language, the names of men's hats are used with peculiarities of the dialect. These terms differ greatly in phonetics, meaning and structure. For example, in Moynak and Shymbay dialects of the Northern dialect, the word *toppi* is used in the sense of the word *malaqay*. In the literary language *malaqay* is called a thick hat with ears. The *toppi* is thin and different in shape from the *malaqay*. In the dialect, both *toppi* and *malaqay* are called *toppi*.

In B. Beketov's work, the word *toppi* is used as a *topi* in dialects and speeches of the Kazakh language, young children's hats sewn and rubbed, and putting cotton in it. The word is often spoken in the language of local Uzbeks. The local Kazaks say that this was borrowed to the Kazak language from Uzbek language.

It also shows that the word *malaqay* is often spoken in the vernacular among the words *malaqay//tumaq-qulaqshin*. He notes that the word *Malakay* is pronounced not only in one dialect, but also in other dialects of the Kazakh language. [1.105]

At the same time, in the northern dialect, the names of men's hats are found in the lexical variant: *jataq* (Karauzak) - headwear.

Dialectical words come in the form of compound words and are used in the lexical variant. *Jataq malaqay* (Shomanai), *shashaq malaqay* (Kegeyli). For example: Qıs aylarında tünde úlken adamlar kiyip jatatuğın bas kiyim. (A hat worn by adults at night during the winter months.)

The explanatory dictionary of the Karakalpak language gives different meanings of this word: 1) *Jataq* noun. - A place to stay and spend the night. For example, Úyindegi eki shopan, jataq

jeri gúdi topan. (The two shepherds in the house, sleeping place is very dusty). (Ótesh) 2) *Jataq malaqay* - a hat that older people wear on their heads at night, made of goat or sheep skin. 3) *Jataqqa jattı* – to be sick and lie in bed. [2.185]

That is, the word *jataq* is used in several senses. 1) A place to sleep at night; 2) a hat; 3) getting sick, lie in bed.

T. Begzhanov also wrote that the word *jataq* is a term of men's hats says in his work: *Jataq* is a kind of hat. The old men wear it at night and sewn from the leather. Some of them are wool, both inside and out. The fur side of the skin is sewn outwards. [3.104]

It is shown that in the dialects and speeches of the Kazakh language the word *jataq* is used in the sense of the word *taqiya* (*doppi*). In the dialects of the Kazakh language the word *taqiya* occurs in several variants: *tópi*, *taqiya*, *tebetey*, *kepesh*, *jataq*, *qatırma*, *qalapash* and others. [4.23]

In the vernacular, this word is used in the sense of *jataqqa ketiw*, *jataqqa bariw* or the word combinations *qonağa bariw*, *qonada jatiw* in the sense of these word combinations. Thus, as can be seen in these examples, the multiple meanings of words in the spoken language and dialect of the people has emerged.

According to B. Kurbanbayeva, the word *qona* is used in the southern dialect of the Karakalpak language in the sense of the word *qoniq*: The affixes a / -e form derivative nouns which is characteristic of the dialect, from the verb that denote the term of thing that occur as a result of the process of action. For example: *Ózim bardım qonağa*. *Ketip baratırğanda kettiń be demedi*. (I went to stay alone. Nobody said anything when I was leaving). (Amudarya District). [5.42]

This word is ethnography which is used in connection with the customs and traditions of the people. For example, in the customs and traditions of our people, on ceremonies, on the weddings the relatives, the in-laws, close and far relatives, friends come to the house where the ceremony is held the day before and stays there. This is called *qoniq* (staying at night) in the Karakalpak language.

In the northern dialect there are also names of men's hats *dalbay* (Nukus, Khalkabad) - summer hats, *jalbağay* (Nukus), *tánkibay* (Shymbay) - horsemen's hats, *sıyrımay malaqay* (Nukus district)-one type of the *malaqay* . For example: *Ana ishtegi tamda shegege qıstırıwlı turğan atańnıń sıyrımay malaqayı*. (Your grandfather's hat, which is hang on a nail on a wall in that room).

In the Karakalpak language and its dialects, the word *dalbay* is used in several senses.

The explanatory dictionary of the Karakalpak language shows that this word is used in two different variants: *Dalbay* // *dalbağay*. *Dalbay* noun. 1) The skin in the form of a stuffed animal sewn from the hunting bird for the training of birds, a method, technique, way of training birds. 2) In the figurative sense: Inappropriate argument, cause, reason. *Dalbay bilğaw* is in vain. For example:

Bilim bazarın qurğanda,	When building a knowledge market,
Dalbay bilğap shaqırğanda,	When calling in vain,
Aq suñqarday quw quwğa kel.	Come like a white falcon (S. Majitov) [2.56]

*Dalbay qağıw* is unwarranted quarrels for various reasons. For example: *Nurjamal eriniń geyde dalbay qağıp ketetuğın minezin bileđi* (Nurzhamał knows that her husband's character that he makes unwarranted quarrels for various reasons).

The word *dalbay*, which means men's hat, is also found in the dialects of the Kazakh language. B. Beketov's division of dialect words into thematic groups confirms that the word *dalbay* means a hat: *Dalbay* is a large hat made of fox skin. [1.105]

The word *Dalbay* also means a hat in the dialects of the Kazakh language. There are also types of the men's hats: *jek* (beaver hat), *qalpaq*, *shápke*, *doğalay*, *kúlápára*, *qulaqshın*, *tumaq*, *itqulaq*, *borik*, *telpek*, *shoppash*, *boric*//*qurash*//*shógirme*, *malaqay*//*timaq*, and others. [4.23]

In the dialects of the Kazakh language, the consonant “g” and vowel “a” of the last syllable of the word *jalbaǵay* in the northern dialect of the Karakalpak language are omitted and used in the form of *jalbay*.

In G. Kaliev, Sh. Sarybaevs' works it is shown as following: *Jalbay* is A bare-brimmed hat worn over the outside of the turban. For example: *Jalbayımız qalıp qoydı.* (We left our bare-brimmed hat). (Orınbor). *Bórkimniń sırtınan jalbayımdı kimesem, búgin kún suıq eken.* (If I don't wear my hat, it's cold today). (Kostanay) [6.70]

**The women's' hat names.** The names of women's hats are used in the northern dialect in the form of ambiguous words. For example, 1) *sharshı* (Bozatau, Shymbay, Khojeli) -scarf. For example: *Ana apańnıń gone bir sharshısın-aq berse.* (Give your mother's scarf over there).

2) *sharshı* (Moynak) is handkerchief. The word handkerchief is found in the dialect in several variants: *bet oramal-qol oramal-qol sharshı* (Karaozek, Kanlykol), *bet sharshı* (Bozatau), *sharshı qıyıq* (Nukus district). In the spoken language of the people the borrowed variant of this word from other languages is actively used: *platochka* - handkerchief.

The word "sharshı" in the dialects of the Kazakh language also means the headwear of women.

In the Kazakh language the following words which means the name of a woman's hat: *baylauish, jaulıq, kásipke//kásteńke, shılaush, sharshı, shek, oramal, kúndik, sálde* (a scarf for women's heads), *sulama, ekme* (a type of dress), *kama bórik* (a type of beaver beret), *pota, ileshek*, etc. [4.23]

Hat terms are also found in both literal and figurative senses. The first component of the term hat, which comes in the form of a compound word, comes in the form of a variable meaning: *elgezer oramal*. There is a version *diywana oramal* of this term in the vernacular of the people. The word *elgezer* is a compound word in the form of a noun + gerund. The literal meaning of this word is *to travel, to travel around the country*. The *elgezer oramal* dialectism in the dialect is a kerchief that is carried from one place to another on wedding ceremony. This word is used in the figurative meaning in the northern dialect and means a hat.

In the Northern dialect, the name of a hat made with the prefix *-biy* is homonymous: 1) *biyxabar* (Shomanai) – a scarf which is bound on a head by old ladies, 2) in the sense of unaware.

Also, the names of hats are used in the lexical variant: *bir tartım* - a small type of scarf that is bound on women head, *bir tartım shalgıstay* (Shymbay) - a small scarf, *shalǵısh tartım* (Shomanai) - a large scarf with thread, *shalǵısh* (Shymbay, Nukus district) - a kerchief to tie on women's heads, *shay oramal* (Kanlykol, Kegeyli) - a small kerchief made of silk material.

A small type of scarf is also called *bir tartım* in the Moynak dialect of the Karakalpak language. [3.106]

G. Bekmuratova in her work confirms that a large kerchief with thread is called *shalǵısh tartım*. [7.19]

Also, in the northern dialect, borrowed words from other languages are actively used: *qarqara* (Khalkabad) - a hat with a high top, a beaver skin, which has not arrived till now, *sharqat* - a woolen scarf around the neck (Kegeyli).

For example: *Qısı menen úyde júrsem de moynımnan sol jún sharqatımdı taslamay júrdim.* (Even though I was at home in the winter, I still wore a woolen scarf around my neck).

In the colloquial language of the people there is a proverb: “Qáyineneli kelin qarqara kelin, Qáyinenesiz kelin masqara kelin” (Bride with mother-in-law is beautiful hat, bride without mother-in-law is shameless”).

The word *qarqara* taken in the example is derived from the Uzbek language to the Karakalpak language and its dialects, and the word *sharqat* is derived from the Kazakh language. The word *Sharqat* is often used in the Moynak dialect of the Northern dialect. This is because the Kazakh people live with the Karakalpak people mixed in Moynak.

The local people use words borrowed from other languages to the dialect in their own way for convenience to them: *tumaqay* (Konyrat, Kanlykol) – kalpachok (cap), and in the Bozatau speech of the Northern dialect *malaqay* is called *tumaqay*.

In short, the vocabulary of the Northern dialect of the Karakalpak language is very rich. There are dialectisms in the language of the local people, which are not found in the modern Karakalpak literary language, and have a pair or no pair in the literary language. Such words are semantically homonyms, antonyms. They are used in both literal and figurative senses. Some words are used in several senses, and create multi-meaning of words in the dialect. The dialectical synonyms, on the other hand, form a series of synonyms of words in a literary language and help to enrich the vocabulary.

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**Rezyume:** *Maqolada qoraqalpoq tilining shimoliy dialektida qo'llaniladigan kiyim-kechak atamaları, jumladan, bosh kiyim atamalarining semantikasi va qurilishi bo'yicha tahlil qilindi. Bosh kiyim atamalarini erkak kishilarning bosh kiyim atamaları, xotin-qizlarning bosh kiyim atamaları deb ikki guruhga ajratib tahlil qildik. Shuningdek, bosh kiyim atamalarining fonetik va leksik variantda qo'llanilishini, so'zlarning o'z va ko'chma ma'noda kelishi, omonim shaklda ishatilishini shimoliy dialekt materiallari asosida tahlil qildik. Shevaga boshqa tillardan o'zlashgan so'zlar haqida ham so'z yuritdik.*

**Резюме:** *В статье анализируется употребление терминов одежды в северном диалекте каракалпакского языка, в частности терминов головных уборов с точки зрения семантики и структуры. Мы разделили термины «головные уборы» на две группы: мужские головные уборы и женские головные уборы. В то же время мы проанализировали употребление терминов «головной убор» в фонетическом и лексическом вариантах, употребление слов в многозначном, прямом и переносном смысле, употребление в качестве омонимов в контексте диалектных материалов. Мы также рассказали о словах, заимствованных в диалект из других языков.*

**Kalit so'zlar:** *Shimoliy dialekt, lug'at tarkibi, fonetik variant, leksik variant, so'zlarning ko'p ma'noliligi, so'z ma'nolarining ko'chish usullari, omonim so'zlar, o'zlashma, etnografizm, prefix, qo'shma so'z, ot, sifatdash.*

**Ключевые слова:** *Северный диалект, речь, фонетический вариант, лексический вариант, многозначность слов, способы трансформации значения слов, омонимичные слова, ассимиляция, этнография, приставка, составное слово, существительное, герундий глагола.*

## **IMPORTANCE AND EFFICIENCY OF USING NEW TECHNOLOGIES IN FOREIGN LANGUAGE TEACHING**

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**Summary:** *The article discusses the new types of pedagogical methods in teaching English and the methods of its application in the classroom, as well as the practical importance of the effective use of methods. Therefore, it is noted that these methods are useful for students to master another language and speak it fluently.*

**Keywords:** *method, English, effective, education, student, foreign language ICT.*

### **INTRODUCTION**

As we know, this year, during a video conference chaired by President Shavkat Mirziyoyev, dedicated to improving the system of teaching foreign languages, it was noted that from 2021, foreign language teachers will be required to obtain national and international certificates. This places a huge responsibility on our foreign language teachers. Now we need to organize the teaching process on the basis of interactive methods, using new ICT instead of traditional teaching methods. This education is also a requirement of the time, and the teacher has to work even harder on himself. In the article we will focus on new methods of teaching, first of all, it is necessary to pay attention to the type and effectiveness of these methods.

It should be noted that in our country, new methods and requirements for foreign language teaching, assessment of knowledge and skills of foreign language teachers have been developed in accordance with the recommendations of the European Framework (CEFR). According to him, textbooks are being created for students of secondary schools and vocational colleges. In accordance with these requirements, classrooms are equipped with stands and new information and communication technologies. The demand for learning a foreign language has also increased day by day. Foreign language science is divided into four aspects (reading, reading, listening comprehension and speaking), each of which is given specific concepts and skills.

### **LITERATURE ANALYSIS AND METHODOLOGY**

One of the most effective ways is to teach and learn a foreign language using modern technology. In this process, including:

- When using computers, the student can watch and listen to videos, demonstrations, dialogues, movies or cartoons in a foreign language;
- It is possible to listen and watch radio broadcasts in foreign languages and TV programs;
- use of tape recorders and cassettes, which is a more traditional method;
- CD players are available. The use of these tools will make the process of learning a foreign language more interesting and effective for students.

In the process of teaching foreign languages it is necessary to use advanced pedagogical technologies, interactive, innovative methods, communication and media.

### **DISCUSSION AND RESULTS**

Advanced methods act as a compass in the thorough study of a foreign language.

One such method is to use role-playing games in this lesson. Role-playing games are the application of various situations in our real life in the process of learning a foreign language. This method helps to create a language environment in the classroom.

For example: In case 1, old friends meet by chance. Case 2 A child who does not follow the rules of the road crosses the road. Case 3. A customer enters the store to buy food. 4 Scenes are performed on these situations. Such vital role-playing games create a language environment in the classroom, allowing students to express themselves freely. In the process of participation in role-playing games, students learn to think, to express their emotional state in a foreign language. In preparation for role-playing games, they correct each other's lexical, grammatical and pronunciation errors. Making mistakes and correcting them also helps to learn the language and teaches students to pronounce correctly. The use of role-playing games in the classroom ensures that all students are actively involved in the lesson at the same time. In addition, role-playing games increase students' interest in learning a foreign language and create a lively, fun environment for the learning process. This will increase the effectiveness of foreign language lessons.

The next method is the "Case Study" in English ("case" - a real situation, event, "study" - to study, analyze) a method aimed at the implementation of teaching based on the study, analysis of real situations is

One of the most interesting methods is to divide the game "Pantomime" into 3 groups. One person from each group is brought to the board. They are given a list of different words. They should explain the words to the rest of the group through gestures and actions without saying a word.

To use this method, the beginning of the story is read, and the students are judged on how to solve it. - "Merry Riddles" Teaching riddles to students is important in teaching English, they learn words they are unfamiliar with and find the answer to a riddle; - Quick answers help to increase the effectiveness of the lesson; - "Warm-up exercises" to use a variety of games in the classroom to engage students in the lesson [3]; - Pantomime can be used in a class where very difficult topics need to be explained, or when students are tired of writing exercises; - A chain story method helps to develop students' oral skills; - Acting characters This method can be used in all types of lessons. Professionals such as Interpreter, Translator, Writer, and Poet can participate in the class and talk to students; - Poets and writers such as U.Shakespeare, A.Navoi, R.Burns can be "invited". At the same time, using the words of wisdom they say in class will help young people grow up to be perfect people; - The "When pictures speak" method is more convenient and helps to teach English, to develop students' oral speech, it is necessary to use thematic pictures; - Quiz cards are distributed according to the number of students and allow all students to attend classes at the same time, which saves time. As we have seen, each innovative technology has its own set of advantages. All of these methods involve collaboration between teacher and student, active participation of the student in the educational process.

### **CONCLUSION**

In short, the use of innovative methods in English lessons develops students' logical thinking skills, fluency, and the ability to respond quickly and accurately. Such methods stimulate the student's desire for knowledge. The student tries to prepare well for the lessons. This makes students active participants in the learning process. As the education system sets itself the task of nurturing a free-

thinking, well-rounded, mature person, in the future we will contribute to the further development of effective use of innovative technologies by future teachers. possible.

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***Rezyume:*** maqolada ingliz tilini o'qitishda pedagogik usullarning yangi turlari va uni sinfda qo'llash usullari hamda usullardan samarali foydalanishning amaliy ahamiyati haqida fikr yuritiladi. Shuning uchun bu usullar o'quvchilarning boshqilni o'zlashtirishlari va ravon gapirishlari uchun foydali ekanligi ta'kidlanadi.

***Резюме:*** В статье рассматриваются новые виды педагогических методов в обучении английскому языку и методы их применения на уроках, а также практическая значимость эффективного использования методов. Поэтому отмечается, что эти методы полезны для студентов, чтобы овладеть другим языком и свободно говорить на нем.

***Kalit so'zlar:*** metod, ingliz tili, samarali, ta'lim, talaba, chet tili AKT.

***Ключевые слова:*** метод, английский язык, эффективный, обучение, студент, ИКТ иностранного языка.



**THE IMPORTANCE OF MEDIATION AND THE CONCLUSION OF A MARRIAGE  
CONTRACT IN DIVORCE PROCEEDINGS**

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**Summary:** *This article discusses the importance of mediation and the conclusion of a marriage contract in court proceedings in cases of divorce.*

**Keywords:** *Mediation, marriage, Babylon, Ancient Greece and Ancient Rome.*

Today, as the number of cases in the courts increases, society is looking for alternative ways to resolve disputes. This includes dispute resolution through arbitration and commercial arbitration. It is also important to use mediation as a method of achieving the final outcome of disputes.

The introduction of the mediation institute is a new event for our society.

On July 3, 2018, the Law of the Republic of Uzbekistan "On Mediation" was adopted. "Mediation is also important because it allows the parties to solve their problems in less time and at less cost. But at the moment there are a number of problems to make this happen.

The history of the development of law records the use of mediation in Babylon, Ancient Greece and Ancient Rome. Since the time of the Code of Justinian (VI century BC), mediation has been recognized in Roman law for the resolution of disputes. Mediation technology was used mainly in commerce. The Romans described the specialists who resolved disputes with the word "medium" — "mediator". Intermediaries were treated with special respect. Their ranks included geniuses and priests. Mediation in modern terms began to develop in the second half of the twentieth century in the USA, Australia, Great Britain. In Europe, intermediaries are involved in resolving family disputes.

For centuries mediation has been successfully used in interstate relations, in resolving conflicts between families, neighbors, political parties, professional, religious and other social groups, in parliament. The word "mediation" comes from the latin word "mediare", which means mediation, intervention for the purpose of reconciliation. Therefore, the concepts of mediation and mediation in the legal literature are synonymous.

The legal definition of mediation (mediation) is defined in the Law of the Republic of Uzbekistan "On Mediation", according to which mediation is a way to resolve a dispute with the participation of a mediator on the basis of his voluntary consent so that the parties reach a mutually acceptable solution.

World experience shows that meditation is very effective in resolving civil disputes. In particular, the Anglo-Saxon legal system has developed conciliation processes, and mediation is widespread in European countries. Over the past decade, there has been a tendency in the European Community to treat mediation as one of the opportunities to ensure the protection of the rights, freedoms and interests of participants in public relations. In particular, in 2002, the European Commission developed a Green Book on Alternative Dispute Resolution in the Field of Civil and Commercial Rights. Today mediation is widely developed in the USA, New Zealand, Canada, Australia, Great Britain, France, Spain, Italy, Belgium, Austria, Germany.

The purpose of mediation is to help the parties to the conflict resolve their disputes independently, satisfy mutual demands and reach an agreement equally beneficial for both sides. The effectiveness of such conflict resolution is achieved by detecting the ability to cooperate and communicate through the long-term efforts of the conflicting parties, which saves the parties to the conflict time, money and emotional resources.

The following are the basic principles of mediation.

Mediation is based on the principles of a) confidentiality, b) voluntariness, c) cooperation and equality of the parties, d) independence and impartiality of the mediator.

According to article 7 of the law on Mediation, mediation is applied if the parties have a mutual voluntary expression of will expressed in an agreement on the use of mediation. In accordance with part 1 of article 15 of this law, mediation is applied at the request of the parties.

Today, fundamental, applied and innovative studies of the causes of family divorces show that the problem is largely related to spirituality, psychology and education. However, we should not forget that problems such as unemployment in economic terms, migration, and an imperfect system of preparing young people for family life are also obstacles to correcting the situation. Therefore, the creation and implementation of deeply scientifically based methods to overcome these causes and problems should also be on the agenda.

The use of mediation in divorce proceedings is also important because the reconciliation process is simpler and easier to achieve the main goal.

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***Rezyume:*** Ushbu maqolada ajrashish holatlari bo'yicha sudda ko'rib chiqishda vositachilik va nikoh shartnomasini tuzishning ahamiyati muhokama qilinadi.

***Резюме:*** В данной статье рассматривается значение медиации и заключения брачного договора в судебных разбирательствах по делам о расторжении брака.

***Kalit so'zlar:*** vositachilik, nikoh, Bobil, Qadimgi Yunoniston va Qadimgi Rim.

***Ключевые слова:*** посредничество, брак, Вавилон, Древняя Греция и Древний Рим.

**SEMANTICS AND FUNCTIONING OF THE PASSIVE VOICE IN THE KARAKALPAK LANGUAGE**

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**Summary:** *This article deals with the using of the passive voice in the Karakalpak language, which is formed by lexical and syntactic means, which is most often found in determinative combinations with a participial definition expressed by a transitive verb and standing in a position before the defined.*

**Keywords:** *passive voice, Transitive verbs, Intransitive verb, grammatical object.*

The passive voice, as one of the universal phenomena in the languages of the world, where they exist, denotes an action that is performed by a grammatical object and is transferred to a grammatical subject. In other words, with the passive voice, the grammatical subject turns out to be an object from the logical side, and the grammatical object is rendered by a logical subject.

For example «The window was opened by me» where the word «window» is a grammatical subject but a logical object, I (or rather «by me») is a grammatical object, but a logical subject.

The passive voice is formed mainly from transitive verbs, as it indicates that the subject, («window» is a logical direct object, but it's a grammatical subject) is exposed to the action (opening) of another object or person («by me» is a logical subject - I, but a grammatical object).

Therefore, if there is, at least logically, a direct object, the original verb must necessarily be transitive (forms of the passive voice can only be formed from transitive verbs).

For the Karakalpak language, the use of the passive voice is generally more rarely than in other languages, since the presence of the form of the passive voice is limited in some cases by the semantics of both the verb itself and the subject and object that related to this action.

It is curious, for example, for the Karakalpak language, that in cases where a given object in relation to a given action can only be an object, the form of the passive voice can be impossible.

In the following sentences, in which the form of the passive voice in predicates is impossible:

- 1) «Уйаны куслар джасайды» or «Куслар уйа салады» --
- 2) «Мени коркыныш басты»
- 3) «Бензинди от алды» --
- 4) «Оны ашыклык бийлеп алган»
- 5) «Багды шён басып кеткен»
- 6) «Онын бетин сакал туюк басып кеткен»
- 7) «Оны ерлиги тутты»
- 8) «Онын тилин он баскан»

Thus, transitive verbs under certain conditions cannot be transformed into intransitive and, consequently, in the Karakalpak language, the passive voice is largely limited to use even in relation to transitive verbs, not to mention intransitive ones, from which it is usually not formed, although in some cases it occurs as an exception.

The passive voice, like other pledge forms, can be formed by lexical and syntactic means, which is most often found in determinative combinations with a participial definition expressed by a transitive verb and standing in a position before the defined, which by its semantics can only be the object of this action. For example:

«Окылган китап» «окыган адам» «Алган ат»

Compare, for example, «Окыган намазын төккен суына жетпейди. where the logical subject of the action is formally expressed by the affix of belonging to the object.

In modern literary language, in similar cases, both constructions are sometimes used optionally, compare, for example: *Колумб ашкан Америка. Колумб тарепинен ашылган Америка*. America, which was discovered by Columbus, etc.

Syntactic methods of formation of passive constructions include constructions in which the predicate is expressed by the form of the motive voice. More often, the forms of the passive voice are formed by means of special affixes- *ыл/-ыл/-л*, which joins the verb bases ending in a consonant sound, except for the consonant *л* and *-ын/-ин/-н*, which joins the bases ending in a vowel or consonant *-л*.

The affix *ын/-ин/-н* is thus common to both the passive and the reflexive voice. The semantics of the form with the affix *-ын/-ин/-н* is differentiated only in context. However, in the modern language there is a tendency to erase the semantic difference between some forms of passive and reflexive voice, which gradually merge into one category of reflexive-passive voice.

It was already noted earlier that the passive voice, as a rule, is formed from transitive verbs. In some cases, there are forms from intransitive verbs.

1. The passive voice from transitive verbs forms intransitive verbs denoting an action in which a passive person or object - a grammatical subject (logical object) is exposed to the action of another active person or object - a grammatical complement (logical subject).

A grammatical object, if it semantically corresponds to an acting person - a person, is formed by a name with an afterword - *тарепинен* (from his side), for example:

*Джинаят тергеуши тарепинен ашылды. The crime was solved by the investigator.*

*Шыгарма тилмашлар тарепинен аударылды. The work was translated by a translator.*

In the same case, when a grammatical object is expressed by a word with the semantics of an object (not a person), it is formed by combining the name with the afterword - *менен / бенен / пенен*. For example

*Дак суу менен жуулып кетти.*

However, both in this example and in such examples as:

*Агаш балта менен жарылды the tree was cut with an axe*

*Созсиз тек ым менен ойналатугын театр ойыны* a theatrical performance performed only by pantomime without words; the logical subject keeps undeclared and the indirect object with *менен/бенен/пенен* also performs only a passive function in fact, both grammatically and logically does not correspond to the complement with the after word *тарепинен*, which is a substitute logical category of the subject of action in the above examples of passive constructions.

More often, the forms of the passive voice are found without a grammatical complement (logical subject), for example:

1. *Соз пияздын кабыгы, сойлесен зейинин ашылар*

2. *Тауга барып – ашыл тауым ашыл деп айкайлайды, тау ашылады.*

3. *Баягы баласы табылып бир неше кун той береді.*

4. *Соннан сон ол аттын ишинен озине жаксы ат табылмады*

5. *Созден женилип кеулинды кайтарып ийесине алып берген.*

6. *«Мен каякка тыгыламан» – дейди.*

7. *Тагыда еки гарры косылды.*

8. *Оны олтирейин деп жургенинен бала да кабарланады.*

9. *Ах, агам менин ауырыуим жазылмады.*

10. *Бала бийик таудын басына минип тынлап турса йиттин дауысы еситилди.*

11. *Дау арканга асылып шыкты.*

2. Passive voice from intransitive verbs in the Karakalpak language is rare. This form of passive voice is characteristic in two cases:

a) When rethinking an intransitive verb, when a verb in the form of a passive voice acquires a completely new meaning, different not only in its collateral shades, but also in its internal content.

For example

Джюрилган джол the "well-trodden path", where the semantics of the verb джол - in the passive voice has only a distant connection with the semantics of the original verb and, apparently, has passed the following stages of comprehension in its development: the road along which they walk, "the well-trodden road "

*Менин тислеримнин бари кетилип болды.* – All my teeth are crumbled

Here, the verb «кетил» is a form of the passive voice from the intransitive verb «кет»- «to leave» with the new semantics of "crumble", which appeared due to the fact that the verb «кет» – to leave, in addition to its main meaning, there is an additional one that occurs in combination with some words, for example «сууга кет» – to drown, auxiliary – suddenness of action and its completeness, from which was formed a new meaning.

b) the form of the passive voice from intransitive verbs is also formed in cases when this intransitive verb performs the service function of an auxiliary verb with the main transitive, together with which it forms a lexical unity from which the passive voice is formed, as from an ordinary transitive verb. For example:

1. Бул китап олар тарепинен алып келинген -( This book was brought by them.)
2. Бул китапты олар алып келди. (They brought this book.)
3. Олар тарепинен алып кетилген китап (The book that was taken away by them.)
4. Бул хаккында барха соз етип келинди. – (It was constantly talked about)
5. Жанадан дузилип шыгыу. ( Transform.)

All the examples given here show that the forms of the passive voice from intransitive verbs are neologisms in the Karakalpak language, characteristic more for literary than for spoken language.

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**Rezyume:** Bu maqolada Qoraqalpoq tilida fe'l nisbat bilan ifodalangan aniqlovchi va aniqlanmishdan oldin pozitsiyada turgan aniqlovchi birikmalarda yeng ko'p uchraydigan leksik va sintaktik vositalar bilan yasalgan passiv ovozning ishlatilishi o'rganiladi.

**Резюме:** В этой статье рассматривается употребление страдательного залога в каракалпакском языке который образован лексическими и синтаксическими средствами, что встречается чаще всего в определительных сочетаниях с причастным определением, выраженным переходным глаголом и стоящим в позиции перед определяемым..

**Kalit so'zlar:** fe'l nisbat, o'timli fe'llar, o'timsiz fe'l, grammatik aniqlovchi.

**Ключевые слова:** страдательный залог ,переходный глагол, непереходный глагол,грамматическое определение.

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## PREFIXATION AND ITS PECULIARITIES

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**Summary.** *This article investigates the prefixation and its peculiarities which now firmly rooted in linguistic literature has undergone a certain evolution.*

**Key words:** *process, element, prefixation, large, goal, meaning, research, word*

Prefixation is the formation of words with help of prefixes. It is a morphological process whereby a bound morpheme is attached to the front of a root or stem. The kind of affix involved in a process is called a prefix. In the Oxford dictionary it is given the following definition to the word prefix, a prefix is a verbal element placed before and joined to word or stem to add or qualify its meaning [1;177].

The interpretation of the terms prefix and prefixation now firmly rooted in linguistic literature has undergone a certain evolution. For instance, some time ago there were linguists who treated prefixation as part of word-composition (or compounding). The greater semantic independence of prefixes as compared with suffixes led the linguists to identify prefixes with the first component part of compound word.

So we found out that prefix is a letter or a group of letters that has special meaning and appears in front of a word. Prefixes are added to some root words to create new words. Words do not always have a prefix. By learning some key prefixes you will learn the meanings of many words without using a dictionary. Sometimes you may recognize a letter or group of letters as a prefix, but find that it does not carry the meaning of the prefix. For instance, look at the word internal. It has nothing to do with the prefix “inter”, which means between.

Prefixes modify the lexical meaning of the stem, but in so doing they seldom affect its basic lexico-grammatical component. Therefore both the simple word and its prefixed derivative mostly belong to the same part of speech. The prefix *mis-*, for instance, when added to verbs, conveys the meaning “wrongly, badly, unfavorably”; it doesn’t suggest any other part of speech but verb. Compare the following oppositions: *behave-misbehave*, *calculate-miscalculate*, *inform-misinform*, *lead-mislead*, *pronounce-mispronounce*. The above oppositions are strictly proportional semantically, i.e. the same relationship between elements holds throughout the series. There may be other cases where the semantic relationship is slightly different but the general lexico-grammatical meaning remains, *giving-misgiving*, *take-mistake*, and *trust-mistrust* [2; 48].

The semantic effect of a prefix may be termed adverbial because it modifies the idea suggested by the stem for manner, time, place, degree and so on. A few examples will prove the point. It has been already shown that the prefix *mis-* is equivalent to the adverbs *wrongly* and *badly*, therefore by expressing evaluation it modifies the corresponding verbs for manner. The prefix *pre-* and *post-* refers to time. E.g. *historic-prehistoric*, *pay-prepay*, *view-preview*. The last word means to view a film or a play before it is submitted to the general public. Compare also *graduate-postgraduate* (about the course of study carried on after graduation), *Impressionism: Post-impressionism*. The latter is so called because it came after Impressionism as a reaction against it. The prefix *in-*, *a-*, *ab-* modify the root for place: e.g. *income*, *abduct*. Several prefixes serve to modify the meaning of the stem for degree. The examples are *out-*, *over-*, and *under-*. The prefix *out-* means “in a manner that surpasses”: *outlive* “to live longer”, *outnumber* “to exceed in number”, *outrun* “to surpass in running”.

Of late some new investigations into the problem of prefixation in English have yielded interesting results. It appears that the traditional opinion, current among linguists, that prefixes modify only the lexical meaning of words without changing the part of speech is not quite correct with regard to the English language. In English there are about 25 prefixes, which can transfer words to a different part of speech in comparison with their original stems. Such prefixes should perhaps be called convertive prefixes. For example: **to begulf** (**gulf** n), **to debus** (**bus** n), **prewar** (**war** n), **etc.** If further investigation of English prefixation gives more proofs of the convertive ability of prefixes, it will then be possible to draw the conclusion that in this respect there is no functional difference between suffixes and prefixes, for suffixes in English are also both **convertive** (**hand** – **handless**) and **non – convertive** (**father** – **fatherhood**, **horseman** – **horsemanship**, etc.).

At present the majority of scholars treat prefixation as an integral part of word – derivation regarding prefixes as derivational affixes, which differs essentially both from root-morphemes and non-derivational prepositional morphemes. Opinion sometimes differs concerning the interpretation of the functional status of certain individual groups of morphemes which commonly occur as first component parts of words. H. Marchant, for instance, analyses words like *to overdo*, *to underestimate* as compound verbs, the first component of which are locative articles, not prefixes. In a similar way he interprets words like *income*, *onlooker*, *outhouse* qualifying them as compounds with locative particles as first elements. R.S. Grinzburg states there are about 51 prefixes in the system of word-formation in modern English [3: 54].

Unlike suffixation, which is usually more closely bound up with the paradigm of a certain part of speech, prefixation is considered to be more neutral in this respect. It is significant that in linguistic literature derivational suffixes are always divided into noun-forming, adjective-forming and so on; prefixes, however, are treated differently. They are described either in alphabetical order or sub-divided into several classes in accordance with their origin. Meaning or function and never according to the part of speech. According to their meaning prefixes are divided into following groups: negative and positive prefixes, prefixes of size, location, time and order, and prefixes of number.

Prefixes may be classified on different principles. Diachronically distinction is made between prefixes of native and foreign origin [4; 88].

Synchronically prefixes may be classified:

1. According to the class of words they preferable form. Recent investigations allow one to classify prefixes according to this principle. It must be noted that most of the 51 prefixes of Modern English function in more than one part of speech forming different structural and structural-semantic patterns. A small group of 5 prefixes may be referred to exclusively verb-forming (*en-*, *be-*, *un-*, etc.)

2. As to the type of lexical-grammatical character of the base they are added to into : a) deverbal, e.g. *rewrite*, *outstay*, *overdo*, etc; b) denominal, e.g. *unbutton*, *detrain*, *ex-president*, etc. and c) deadjectival, e.g. *uneasy*, *biannual* etc. It is interesting that the most productive prefixal pattern for adjectives is the one made up of the prefix *un-* and the base built either on adjectival stems or present and past participle, e.g. *unknown*, *unsmiling*, *untold*, etc.

3. Semantically prefixes fall into mono- and polysemantic [5; 278].

4. As to the generic denotational meaning there are different groups that are distinguished in linguistic literature: a) negative prefixes such as *un-*, *non-*, *in-*, *dis-*, *a-*, *im-/in-/ir-* (e.g. *employment* (unemployment), *politician* (non-politician), *correct* (incorrect), *advantage* (disadvantage), *moral* (amoral), *legal* (illegal) etc.); b) reversative or privative prefixes, such as *un-*, *de-*, *dis-*, *dis-* (e.g. *tie* (untie), *centralize* (decentralize), *connect* (disconnect), etc.); c) pejorative prefixes, such as *mis-*, *mal-*, *pseudo-* (e.g. *calculate* (miscalculate), *function* (malfunction), *scientific* (pseudo scientific), etc); d) prefixes of time and order, such as *fore-*, *pre-*, *post-*, *ex-* (e.g. *see* (foresee), *war* (pre-war), *wife* (ex-wife) etc.) e) prefix of repetition *re-* (e.g. *do* (redo), *type* (retype), etc.); f) locative prefixes

such as super-, sub-, inter-, trans-, (e.g. market (supermarket), culture (subculture), national (international), Atlantic (trans Atlantic) etc.)

5. When viewed from the angle of their stylistic reference, English prefixes fall into those characterized by neutral stylistic reference and those possessing quite a definite stylistic value. As no exhaustive lexico- stylistic classification of English prefixes has yet been suggested, a few examples can only be adducted here. There is no doubt, for instance, that prefixes like un-, out-, over-, re-, under-, and some others can be qualified as neutral (e.g. unnatural, unlace, outgrow, override, redo, underestimate, etc) On the other hand, one can hardly fail to perceive the literary-bookish character of such prefixes as pseudo-, super-, ultra-, uni-, bi-, and some others (e.g. pseudo-classical, superstructure, ultra-violence, unilateral, bifocal, etc).

Sometimes one come across pairs of prefixes, one of which is neutral, the other is stylistically coloured. One example will suffice here: the prefix

Over – occurs in all functional styles, the prefix super – is peculiar to the style of scientific prose.

6. Prefixes may be also classified as to the degree of productivity into highly-productive, productive and non-productive.

A derivational affix may become productive in just one meaning because the community specially needs that meaning at a particular phase in its history. This may be well illustrated by the prefix de- in the sense of “undo what has been done, reverse an action or process”, e.g. de acidify (paint spray), decasualize (dock labor), decentralize (government or management), duration (eggs and butter), de reserve (medical students), desegregate (colored children), and so on.

So we studied different classifications of prefixes and now let us consider some prefixes, their usual meanings, and how they change the meanings of English words.

**Ab-**(also abs- before certain consonants) is an English prefixes. In Latin it was both a prefix and a preposition meaning “off, away (from)” and expressed the idea of removal, **ab-** sence, separation, or a lower value. It first appeared in English in the Middle English period in words borrowed from Old French, and continued to be borrowed in Modern French words and eventually from Classical Latin, especially in the vocabulary of science, medicine, botany, etc.

The prefix **ab-** (short for **ab-** solute) is also used to indicate “absolute” in units used in electromagnetism such as *abhenry* for inductance, *abohm* for resistance and *abvolt* for potential.

**ad-** is an English prefix. It was both a prefix and preposition in Latin meaning “toward, to, near, at”. As a prefix, the consonant (d) became assimilated to the initial consonant of the verb that it attached to.

Forms.

- ad- + c = ac- (example accident)
- ad- + f = af- (example affectation)
- ad- + g = ag- (example aggression)
- ad- + l = al- (example allegation)
- ad- + p = ap- (example appeal)
- ad- + s = as- (example assumption)
- ad- + t = at- (example attenuation)

The term “**libertarianism**” is sometimes used to denote similar concepts; however, in the US. The term **anarcho-** has been used to denote a number of other very differing ideologies which relate in different (and controversial) ways to anarchy.

Anarcho-syndicalism - Focusing on the building an anti-authoritarian labor movement, creating worker solidarity, and also using militant direct action such as general strikes.

**Anarcho-primitivism** - A critique of industrial capitalism, technology, and agriculture. Favors anarchist structures based around hunter gathering, permaculture, and non-industrial production.



**Anarcho-feminism** (substitutes masculine “o” for feminine “a”) - A kind of radical feminism that is opposed to patriarchy and class hierarchy.

**Anti** can have multiple different meanings such as:

The prefix anti- means “the opposite of”.

In particle physics, **anti-**refers to a particle with the same mass but opposite charges, an antiparticle.

In Egyptian mythology, **Anti-** was the ferryman who carried Isis to Set’s island.

**Anti-**, or **Campa**, a tribe of South American Indians.

**ANTI** - American record label.

**ANTI** (band), a cyber metal band from Latvia.

The English derivational prefix be- is a hold over from Old English. For the majority of native speakers the prefix *be-* is no longer productive; a possible exception to this is presented by the word *be smitten*, which numerous speakers seem to have recreated. Meanings and uses of *be-* include: thoroughly, excessively, or more generally, used as an intensifier; on, around, over, or generally indicating contact; finally, it is also used to form transitive verbs from nouns (e.g. befriend, behead, be night), adjectives (e.g. bedim, be wet) or otherwise intransitive verbs (e.g. bewail, be weep).

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**Rezyume:** *Ushbu maqola prefiksni o'rganadi va hozirda lingvistik adabiyotda mustahkam ildiz otgan uning o'ziga xos xususiyatlari ma'lum bir evolyutsiyani boshdan kechirgan.*

**Резюме.** *В данной статье исследуется префикс и его особенности, которые в настоящее время прочно укоренились в лингвистической литературе, претерпели определенную эволюцию.*

**Kalit so'zlar:** *jarayon, element, prefiksatsiya, katta, maqsad, ma'no, tadqiqot, so'z*

**Ключевые слова:** *процесс, элемент, префиксация, большой, цель, смысл, исследование, слово.*

**DEVELOPMENT OF A COURSE ON HEALTH EDUCATION TECHNOLOGIES.**

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**Summary:** *The article presents specific developments in the planning and implementation of health-oriented training technologies in environmentally unfavorable regions..*

**Keywords:** *educational technologies, healthcare, social life, education, environment, region, auxiliary materials, planning, activities, physical education, lesson, class, training, practical classes, personality.*

The purpose of the reforms being carried out in all spheres of social life in our country is to ensure the interests of man, and his security, and the upbringing of a harmoniously developed generation. Raising a harmoniously developed generation is inextricably linked with raising a healthy generation. [1.184]

The process of raising a healthy generation will be effective only if a healthy lifestyle is formed in society. It is well known that human health is affected by many factors, one of which is the natural environment around us. Unfortunately, there are ecologically disadvantaged areas in our country.

We have developed specific course developments in the planning and implementation of training technologies aimed at health in environmentally disadvantaged areas. One of them is the following course development related to health education technologies.

The purpose of the training: to form a valued attitude towards their own health in children and adolescents. [7.55]

Functions:

- Demonstrate the urgency of healthy lifestyles and health care issues.
- Determining the level of initial understanding of school students and their relevance to current health technologies.
- Develop a need for physical activity.

Teacher's aids:

A-4 paper, pens, pencils, "health index", "tests", paper on which sentences like below are written "when I'm sick, I want to ....."

Available materials are prepared for each teacher.

Conducting type

-Training (practical exercise) for grades 2-4

-Training (practical exercise) for grades 5-9

-1-3 year college students -intellectual game

Duration: 40 minutes

Below is a sample business plan for taking health classes with high school students. Additional materials can be added at the discretion of the teacher, taking into account the specifics of the region and district

Teacher's introduction. 2010 is a special year for our republic. By the decree of the President of the Republic of Uzbekistan, it has been designated as the Year of harmoniously developed generation. That's why we're talking today about being fit and healthy.

Grades 8-9

Plan ; Part I - Creative assignment.

There will be a poster drawing competition related to the formation of a healthy lifestyle.

Part II - Intellectual game "Healthy body - pure mind" (25-30 min)

Materials needed to organize the first part of the lesson

- 4 sheets of A-2 form paper
- Paints
- Flamasters
- Markers
- Pencils (4 sets)
- 4 colored cubes (25 \* 25 \* 25) are exactly one color cube for each team.

At the beginning of the lesson, students are divided into 4 groups. Dividing into groups can be accomplished in a variety of ways. For example, according to blood type, eye color, zodiac sign and other qualities. Organizational commanders choose a name for themselves.

The teacher explains that today's lesson is dedicated to the most pressing issue - the formation of a healthy lifestyle, and introduces the content sections of a healthy lifestyle

1. not to smoke
2. not to drink alcohol
3. not to take drugs
4. not to get sick
5. doing physical exercises and sports
6. not to say bad words.

The first part of the lesson - the teams are given the task: to draw posters promoting healthy lifestyles in 5-10 minutes.

Requirements for images on posters: clarity, content, memorability, reference and originality.

Posters will be evaluated based on these criteria.

The winning team will receive ten game coins, and the rest will receive five game coins. The stage is decorated with these posters.

The second part of the lesson consists of 4 stages. At each stage, the rules and the meaning of questions change. Stage 1 is conducted individually with each team. The teacher asks each team to throw the cube and determine the score they can get for the correct answer. Each team can throw the cube once.

Questions for the first round ("Stop smoking!")

1. At the beginning of the last century, American doctors knew that the weight gain of pregnant women was harmful. But their suggestions are great for us at the moment. American doctors suggested that women should exercise less to lose weight, not eat tasty foods, and what not to do at the same time (smoking).

2. According to Khaldfan Moyerdin, former director of the World Health Organization, what is the most common but preventable disease (smoking)?

3. Bismarck's family doctor warned him that smoking was harmful and that it was bad for his health. But Bismarck said the diplomatic industry was just like that.

What kind of industry is this? (covering people's eyes with smoke)

4. It became fashionable after the Second World War. It was customary to do this at home and in the office. But in 1957, doctors proved that this habit has a detrimental effect on the body. In some places, people with this habit are not hired.

What kind of habit are we talking about? (smoking)

5. According to A. P. Chekhov, what is "..... equal to kissing a woman who smokes"? (kissing the ashtray)

Stage 2 will be conducted jointly with all teams. The teacher orders the teams to throw the cubes. The team with the highest score starts answering the question. The score of this question is equal to the number of points in the cube. In this case, the questions are mainly on the topic "drugs, alcohol-free."

1. What did the ancient Greek philosophers call those who were stupefied? (drug addict, Greek pachke-hardening, -addicted)
  2. According to A. P. Chekhov, "vodka, even if it is white, it reddens nostril and darkens ....."? (Reputation)
  3. It is known from a Chinese folk proverb that what brings a hundred worries and one joy. (Alcoholic beverages).
  4. In France, the disease accounts for 25% of all youth deaths. What disease is this? (Alcoholism)
  5. What kind of drinks are not allowed in Islam (Alcoholic beverages)
- Stage 3 is conducted individually with each team. Questions for the third stage "We are not afraid of diseases!"

1. According to doctors, the most common infectious disease is the flu, which disease is considered as the most common non-infectious disease? (caries).
2. According to the Romans, which disease combines the mind and spirit? (Schizophrenia)
3. According to the World Health Organization, one of the occupational diseases of teachers is polio. This disease is not serious disease and is common in the life of every human being. Show the symptoms of this disease (gray hair).
4. In the United States, they are the main carriers of influenza. They are the causes of the epidemic in the autumn. Who are they? (school students)

Stage 4 will be conducted jointly with all teams. Each team responds to the number of questions specified in the cube. 3 points are awarded for each correct answer.

Questions for the fourth stage "If you want to be healthy – do physical exercises".

1. The inventor of this thing said so about his invention. This thing helps with postage and weight loss. What is this? (Bicycle).
2. According to P. Bregt, there are nine physicians. Starting with the fourth, these are: natural nutrition, sports, having a rest, proper posture and intelligence. Tell the first three doctors (sun, air, water).
3. Which sport is mentioned in the following English phrase "Exchange of knowledge with the help of facial expressions" (Boxing)
4. For a long time, only one type of athletics was preserved at the Olympic Games in Rome. What kind of sport was that? (running).
5. A simple apple was the cause of which game appeared. (Badminton)
6. What was the name of the process of delivery of urgent mail in the XVIII century? (Relay)

#### **Note for teacher:**

All teams will be fully involved in answering all questions. However, they will score different points depending on the correctness of their answers. Cubic points determine the points earned.

The 'main player' can have points in the cube, while the remaining five teams get 1 point for the correct answer. At the end of the game, it is necessary to encourage teams with the most correct answers.

Points are calculated at the end of the lesson. The team with the most points wins.

These course developments are aimed at shaping a healthy lifestyle as a value, and with the help of mental game, competition, students' responsibilities for their own health will increase. Attitudes towards the environment will change, and medical, hygienic and environmental knowledge will increase. Interest in physical education and sports is aroused.

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***Rezyume:*** Maqolada ekologik jihatdan noqulay hududlarda sog'liqni saqlashga yo'naltirilgan o'qitish texnologiyalarini rejalashtirish va joriy etish bo'yicha aniq ishlanmalar keltirilgan.

***Резюме:*** В статье представлены конкретные разработки по планированию и внедрению оздоровительно-ориентированных технологий обучения в экологически неблагоприятных регионах.

***Kalit so'zlar:*** ta'lim texnologiyalari, sog'liqni saqlash, ijtimoiy hayot, ta'lim, atrof-muhit, mintaq, yordamchi materiallar, rejalashtirish, faoliyat, jismoniy tarbiya, dars, sinf, mashg'ulot, amaliy mashg'ulotlar, shaxs.

***Ключевые слова:*** образовательные технологии, здравоохранение, социальная жизнь, образование, среда, регион, вспомогательные материалы, планирование, деятельность, физическое воспитание, урок, занятие, обучение, практические занятия, личность.

**THE RELATIONSHIP BETWEEN LANGUAGE AND CULTURE AND THE  
IMPLICATIONS FOR LANGUAGE TEACHING**

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**Summary:** *This article deals with the topic interconnection of language and culture that arose on the basis of the research works. The article describes language and culture interaction within social, historical and linguistic aspects. Comparative methods of analysis and contradictory ideas of different linguistic schools are brought forward to discussion.*

**Keywords:** *Culture, language, concept, social, national, linguistic, phraseology, component, cognition, analyze.*

Language is considered as the way by which we penetrate not only into the modern mentality of the nation, but also the views of ancient people, society and ourselves over the world. Today echoes of the past years, survived centuries, are preserved in proverbs, sayings, phraseologies, metaphors, symbols of culture and etc. It is known that the individual only develops himself as a person when from his childhood he learns the language and also the culture of his nation. All the subtleties of the culture of the people are reflected in its language, which is specific and unique, because the language itself includes the world and the person in different ways.

This article begins by introducing the concepts of language and culture, and then considers the connection between them through the plausible relationships forwarded by W. Humboldt, E. F. Tarasov and the others: language structure determines language usage, cultural values determine the way we use language, and the claim how a relationship between the language and culture exists. In the latter part of the research, the implications of such a relationship are discussed depending on the phraseological units with various examples.

Language - this is what lies on the surface of human being in culture, therefore from the 19<sup>th</sup> century to the present day (J. Grimm, R. Rajek, W. Humboldt, A. A. Potebnja) the problem of interconnection, interaction of language and culture is one of the central issues in linguistics. The first attempts to solve this problem are seen in the works of W. Humboldt (1985), the main provisions of the concept which can be reduced to the following: 1) material and spiritual culture are embodied in language; 2) every culture is national and its national character is expressed in language through a special vision of the world; language is specifically inherent for all the people as an internal form; 3) the internal form of language is the expression of the "national spirit" which is its culture; 4) language is the mediating link between the humankind and the world around it. The concept of W. Humboldt received a peculiar interpretation in A. A. Potebnja's work "Thought and Language", in the works of Ch. Bally, J. Vandriesa, I. A. Boduen de Kurtene, R. O. Jakobson and the other researchers.

E. F. Tarasov notes that language is included in culture, because the "body" of the sign appears a cultural object in the form of which the linguistic and communicative ability of a person is defined, and the meaning of sign is also a cultural education that arises only in human activity. Also, culture is included in language, since all of them are modeled in the text. [1, 59]

Language is a fact of culture because: 1) it is an integral part of the culture that we inherit from our ancestors; 2) language is the main instrument by means of which we assimilate the culture; 3) language is the most important of all cultural phenomena, because if we want to understand the essence of culture - science, religion and literature, we should consider these phenomena as codes formed like a language, because a natural language has the best developed model. Therefore, the conceptual understanding of culture can occur only through the natural language.

So, language is a component of culture and the language and its instrument is the reality of our spirit and culture; it expresses in the clearly specific features of a national mentality. Language is a mechanism opened to the region of human mind (N. I. Zhinkin).

As Claude Levi-Strauss notes, language is simultaneously both a product of culture, and its important component, and a condition for the existence of culture. Moreover, language is a specific way of the existence of culture and a factor of the formation of cultural codes.

The relationship between language and culture can be considered as a relationship of the part and the whole. Language can be perceived as a component of culture and an instrument of culture (which is not the same thing). [1, 62]

Culture forms and organizes the thought of a language personality and shapes both language categories and concepts. The study of culture through language is an idea that has been "floating in the air" in recent years: that a linguistic material is the most significant and often self-contained information about the world and the man in it.

The best minds of the XIX century (W. Humboldt, A. A. Potebnja and so on) considered language as a spiritual power. Language is such an environment around us, outside of which we cannot live without participation. As W. Humboldt writes, language is "a world lying between the world of external phenomena and the inner world of the man." Consequently, being the environment of our dwelling, language does not exist outside of us as an objective reality: it lives in ourselves, in our concept and in our memory; language changes its shape with every movement of thought, with every new socio-cultural role.

People can see the world in different ways - through the prism of their native language. For its supporters, the real world exists insofar as it is reflected in the language. Each language in its own way divides the world, i.e. has its own way of conceptualization. Hence we conclude that each language has a special picture of the world. Language is the most important way of forming and existence of man's knowledge about the world. Reflecting an objective world in the process of activity, a person gains the results of knowledge in the word. The totality of this knowledge, embodied in a linguistic form, is what is called as "a linguistic intermediate world", "a linguistic representation of the world", "a linguistic model of the world" and "a linguistic picture of the world" in various concepts. Due to the greater prevalence, we choose the last term. A man is able to understand the world and himself thanks to the language in which a social and historical experience is consolidated, like both universal and national. [1, 64]

Phraseological units play a special role in creating a linguistic picture of the world. They are the "mirror of the life of the nation". The nature of the meaning of phraseological units is closely related to the background knowledge of native speakers, to the practical experience of the individual, to the cultural and historical traditions of the people speaking the language. Phraseological units ascribe attributes to the objects, which are associated with a picture of the world, imply the whole descriptive situation (text), evaluate it and express its attitude to this text. The semantics of phraseological units are directed to the characteristics of a person and his activities.

The phraseological fund of language is the most valuable source of information about the culture and mentality of the nation and in them as if the ideas of the people about myths, customs, ceremonies, rituals, habits, morals, behaviour and etc. are preserved. It is no coincidence that B. A. Larin notes that phraseological units always indirectly reflect the views of the people, the social order, the ideology of their epochs. Reflect how the morning light is reflected in a drop of water. [1, 43]

Phraseological units (PU), reflecting a long process of development of culture of the nation in their semantics, make and transmit cultural settings and stereotypes, etalons and archetypes from this generation to the other one. According to F. I. Buslaev, phraseological units are peculiar microcosms which contain "both a moral law and a common sense, expressed in a brief utterance

that have been bequeathed to ancestors in the management of descendants." It is the soul of every national language, in which the spirit and uniqueness of a nation are expressed in an unrepeatable form. [4, 37]

In the consideration of phraseology, we put forward the following hypotheses.

1. In most phraseological units there are "traces" of the national culture, which must be identified.

2. Cultural information is stored in the internal form of the phraseological units, which as a figurative representation about the world gives a cultural and national colour to the phraseology.

3. The main thing when identifying the cultural and national specifics is to reveal a cultural and national connotation.

Phraseology is a fragment of a linguistic picture of the world. Phraseological units are always addressed to the subject, i.e. they arise not to describe the world but interpreting, evaluating and expressing to it as a subjective attitude. This is exactly what distinguishes phraseological units and metaphors from the other nominative units.

V. N. Teliya notes that the phraseological composition of language is "a mirror in which the linguocultural community identifies its national morale," and they are the phraseological units that impose a special vision of the world and the situation on the carriers of language. For example, the information about the life of the Russian people (красный угол - the red corner, печки-лавочки - chummy relationship), about etiquettes (садиться не в свои сани - one is not fit for something, как путь дать - there are no two ways about it, несолоно хлебавши - empty-handed, ломать шапку - to break), about traditions and customs (из полы в полу - pass something from hand to hand, вывести на чистую воду - to bring to light) and so on. [1, 82]

However, not all phraseological units can become carriers of cultural and national information. There are many phraseological units in the Slavic languages that are associated with the universal knowledge about the properties of realities including a figurative basis – смотреть в корень - to delve in the very essence of some matter; между двух огней - caught in the middle; не вешать нос – be discouraged and etc. Their difference from similar ones in the other languages is explained not only their cultural originality, but also the discrepancy of the technology of the secondary nomination in different languages. For example, the Chinese expressions like протекая вода не гниет - flowing water does not rot (in the meaning of uselessness, aimlessness of actions) and в дверной петле червь не заводится - in the door loop the worm does not start (in the meaning of hope for a successful outcome, confidence in it) is used in Russian as как мертвому припарки – too little too late, как дважды два – as easy as ABC and комар носу не подточит – it leaves nothing to be desired and i.e. have a different imaginative basis in the Russian linguistic concept. But if we take into account that these phraseological units are based on figurative-metaphorical meanings and also they participate in the formation of the linguistic picture of the world and differ in cultural and national relationship. Hence as a conclusion, despite some stretches, they can be considered as carriers of cultural information. [1, 84]

The image as a culturological marker allows us to talk about the culturological markings of phraseology like "can't make head or tail of it" (= to be unable to understand someone or something), which contains a negative assessment informing about, what the speaker is talking about, in its pragmatic component.

Similarly, you can analyze the phraseology like "to have a foot in both camps" (= to support or belong to two different groups). In this case, the negative assessment lies in the connotation of phraseological units. [2, 139]

The latter is due to the fact that, according to E. Hutchins, culture is "a process of cognition taking place within the human psyche, in which involve our everyday cultural practices like endopsychic and exopsychic simultaneously" (Mid. Greek "endon" – "inside"; "exo" – "outside").



[5, 356] Language is the channel by which these external and internal practices merge into a single linguocultural education. Language signs as a means of social mutual influence develop commonly for all members of this ethnocultural community value becoming a means of communication. It is with the emergence of iconic linguistic systems that can mediate between the external and internal empathy of this community, we can talk about the beginnings of culture and eventually forming the value-semantic dominants of any discursive activity of an individual. This, in fact, determines the invisible, but nevertheless really the tangible connection between language and culture.

In conclusion we can express how language and culture are related while it is evident through the linguistic choices that people employ that a relationship exists. There is a need for language learners to understand why people think and speak the way they do, and to understand possible agreements that may be in place between a culture and its language. Integrated studies of language and culture are needed if language learners are to become competent language users.

If language policy reflects the need for learners to become socially competent language users, learners will be able to better understand their own language and culture as well as any other they may choose to study. For language learners and instructors alike, an acknowledgement that there is more to any language (i.e. 'the ways of...') than the sum of its parts is imperative if any level of real competency is to be achieved. Creating language policy that reflects the importance of the relationship(s) between language and culture will force teachers to educate learners on the authenticity of language (i.e. the how and why behind its use in real life). Such policy would not only offer language learners insight into their own language and cultural competency, but also provide them with an educated base for how to view other languages and cultures as well. With the unfortunate realities of time and budgetary constraints at the forefront of language education, judgments inevitably have to be made concerning the role of cultural education in the second language classroom. And, as strong evidence ties together culture and language, creating a program reflective of this relationship should be nothing short of top priority.

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**Rezyume:** *Ushbu maqola tadqiqot ishlari asosida vujudga kelgan til va madaniyat o'rtasidagi munosabat mavzusiga bag'ishlangan. Maqolada til va madaniyatning ijtimoiy, tarixiy va lingvistik jihatlardagi o'zaro ta'siri tasvirlangan. Muhokama uchun turli til maktablarining qiyosiy tahlil usullari va qarama-qarshi fikrlar taklif etiladi.*

**Резюме:** *В этой статье рассматривается тема взаимосвязи языка и культуры, которая возникла на основе исследовательских работ. В статье описывается взаимодействие языка и культуры в социальном, историческом и лингвистическом аспектах. Сравнительные методы анализа и противоречивые идеи различных языковых школ предлагается на обсуждение.*

**Ключевые слова:** *Культура, язык, концепция, социальный, национальный, лингвистический, фразеология, компонент, познание, анализировать.*

**Kalit soʻzlar:** *Madaniyat, til, tushuncha, ijtimoiy, milliy, lingvistik, frazeologiya, komponent, bilish, tahlil.*

## **THE IMPORTANCE OF PARENTAL INVOLVEMENT IN EARLY EDUCATION OF A FOREIGN LANGUAGE**

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**Summary:** *Successful foreign language acquisition at an early age is becoming an important issue in the field of education in the whole world. Although educators are striving to produce knowledgeable students implementing various effective teaching methods, why do some children not make any progress in learning a foreign language and lose motivation? So, the root of the problem may be seen in insufficient involvement of parents in early education. This article presents the results of an experiment conducted with the aim of clarifying the significance of parents in early education of English language.*

**Keywords:** *early education of foreign languages, the importance of parents in early education, parental involvement in second language acquisition.*

Contemporary English language teachers are endeavoring to provide high quality English lessons in order to maximize effectiveness of teaching. Nonetheless, some children have to struggle with strange grammar structures and unfamiliar words at the beginning of learning process. A cooperation of a teacher and parents generates positive learning atmosphere for a child. In spite of considerable efforts of an educator, children need a constant support of their parents during a foreign language acquisition. The experiment, which was conducted in “Barkamol Avlod” Children’s Centre in Nukus (Uzbekistan), aimed to identify how parents with minimum English language experience can strongly influence their children to learn English successfully.

### **Description of the research**

The research included an experimental program with 35 children aged 7-10 who demonstrated limited English and their mothers with no prior experience of the target knowledge. The experiment was divided into 2 parts which lasted a month each. The first month of the research program required no parental involvement, as opposed to the second part in which all parents were insisted to collaborate with the teacher. Moreover, they were demanded to note the emotional and behavioral changes of their children throughout the experiment.

### **Structure of the research**

The first part of the experiment consisted of one month English class in which the children were educated about the basic English grammar and vocabulary through interactive games and demonstrative materials. The lesson lasted for an hour three times a week. At the beginning of the experiment, the children showed a strong motivation to acquire new information. Nevertheless, after a two-week period, a considerable lack of enthusiasm to learn the English language was observed by both the teacher and the parents. According to the parents’ personal observations, their children started complaining about forgetting new grammar rules and

The second part of the research program provided English lessons for the parents and children separately within a month three times a week. The parents were explained the same grammar rules which their children struggled to comprehend and memorize. Furthermore, the parents were suggested to discuss and practice explained grammar rules with their children at home in order to reinforce obtained knowledge.

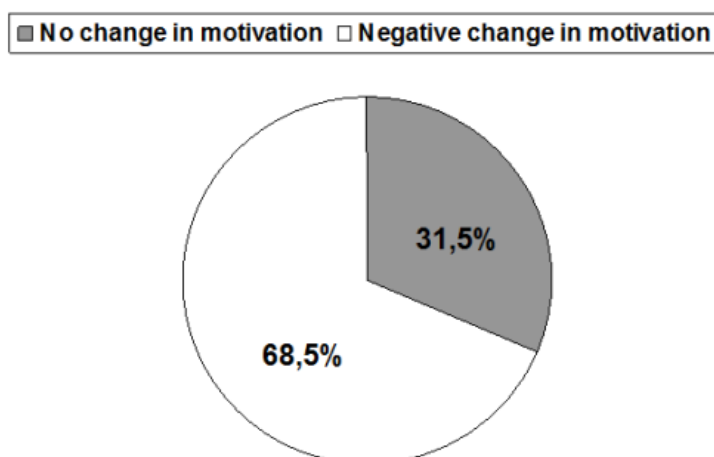
### **Results of the research**

At the end of each part of the experiment, the parents were asked to complete a questionnaire with their children to identify how the children’s motivation level changed throughout the period. The first month of English class with no parental participation showed that almost 70 per

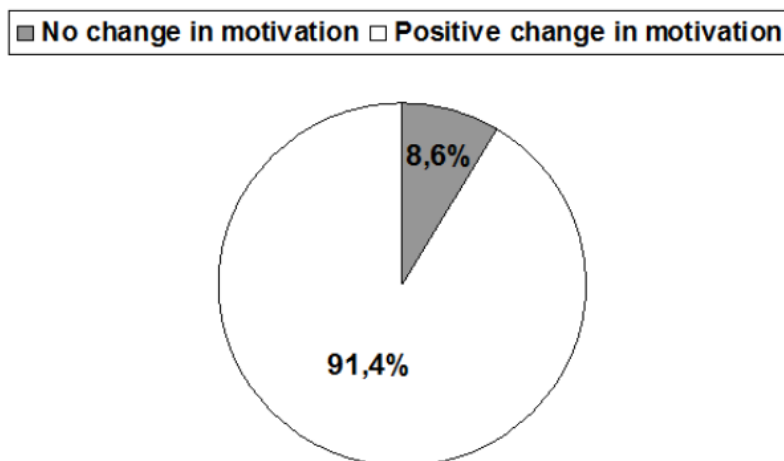
cent of the children expressed low desire to learn the target language, while the others noticed neither positive nor adverse change. (Diagram 2)

As for the second part of the experiment conducted to identify the significance of parental participation in early foreign language education, it was discovered that parents have positive influence on successful acquisition of second language at early ages of a child.

According to the results of the questionnaire, the parents claimed that discussing explained grammar rules with their children had a positive impact on effectiveness of learning process. Furthermore, joint efforts of the parents and their children strengthened the participants' motivation to learn English. The diagram 3 below illustrates the results of the questionnaire in which about 90 per cent of the children expressed a strong desire to learn English through a "teacher-child-parent" method. Meanwhile, the rest of the participants did not feel remarkably positive shift in motivation after the experiment.



*Diagram 2. Change in motivation of the children after the first experimental class*



*Diagram 3. Change in motivation of the children after the second experimental class*

### **Conclusion**

High quality of education of a foreign language is commonly considered to be a full responsibility of teachers only. Nonetheless, children may derive more benefit from a close cooperation between an educator and parents. The research carried out with the aim of identifying

positive impact of parental involvement on successful English language acquisition demonstrated following outcomes:

1. Parents can enhance the effectiveness of learning a foreign language. In other words, parents even with limited English knowledge can make a valuable contribution to a successful learning by taking position of “second teacher” at home.

2. Parents can minimize the risk of discouragement during learning process. Parents’ involvement increases child’s motivation to acquire new information due to parental support. Taking a positive influence of parental involvement in early education of English into account, organizing special English courses for parents with no English language knowledge may facilitate effective education of the target language.

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**Rezyume:** Erta yoshdan chet tilini muvaffaqiyatli o‘zlashtirish butun dunyoda ta’lim sohasidagi muhim masalaga aylanib bormoqda. Pedagoglar o‘qitishning turli samarali usullarini qo‘llagan holda bilimli o‘quvchilarni yetishtirishga intilayotgan bo‘lsa-da, nega ba’zi bolalar chet tilini o‘rganishda muvaffaqiyatga erisha olmaydilar va ishtiyoqlarini yo‘qotadilar? Demak, muammoning ildizi ota-onalarning erta ta’limga etarlicha jalb qilinmaganligida ko‘rish mumkin. Ushbu maqolada ingliz tilini kichik yoshdan o‘rganishda ota-onalarning ahamiyatini aniqlash maqsadida o‘tkazilgan eksperiment natijalari keltirilgan.

**Резюме:** Успешное изучение иностранных языков в раннем возрасте становится актуальным вопросом в сфере образования во всем мире. Хотя педагоги стремятся воспитать смысловых учеников, применяя различные эффективные методы обучения, почему некоторые дети не добиваются успехов в изучении иностранного языка и теряют мотивацию? Итак, корень проблемы можно увидеть в недостаточной вовлеченности родителей в дошкольное воспитание. В данной статье представлены результаты эксперимента, проведенного с целью выяснения значения родителей в раннем обучении английскому языку.

**Kalit so'zlar:** chet tillarini erta yoshdan o‘rganish, maktabgacha ta’limda ota-onalarning ahamiyati, ikkinchi tilni o‘zlashtirishda ota-onalarning ishtiroki.

**Ключевые слова:** раннее обучение иностранным языкам, роль родителей в раннем обучении, участие родителей в изучении второго языка.

## ACADEMIC RESEARCH AND ITS TYPES

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**Summary:** *The article deals with academic research especially types of research, such as quantitative and qualitative research types, which play essential role in collecting and surveying various data for research paper. Qualitative research concerns with words and meanings, while quantitative research concerns with numbers and statistics.*

**Keywords:** *Academic research, researching skill, method of inquiry, quantitative and qualitative research, data collection, to examine data, to verify theories, hypothesis.*

The very term research is a pejorative one to many practitioners, conjuring up images of white-coated scientists plying their arcane trade in laboratories filled with mysterious equipment. While research, and the conduct of research involves rigour and the application of specialist knowledge and skills...[2]

In the Decree of the President of the Republic of Uzbekistan Sh.Mirzoyoyev PP-2909 "On measures to further development of the system of higher education" adopted on April 20 in 2017 it is stated about close partnership with leading foreign scientific-educational establishments, wide use of modern pedagogical technologies, curriculums, studying-methodical materials based on international educational standards; creation and wide implementation into the system of higher education textbooks and manuals of the new generation; steady increasing of the level and quality of professional skill of pedagogical staff and other actual issues. [1]

In order to fulfil the tasks of the government there needs some new attitudes in the education system. In the sphere of higher education, academic research is the way to investigate previously studied information and new information to transfer collected data and note down new information. Research takes the level of writing research papers in the study process of bachelor and magistracy degree. Academic research paper is the principal document that is mainly required for undergraduate, postgraduate and doctorate students. Research is the way of gathering pivotal information and there are many views on it. Initially, we need to clarify what research is.

According to 'Longman Dictionary of Language Teaching and Applied Linguistics' research is the study of an event, problem or phenomenon using systematic methods, in order to understand it better and to develop principles and theories about it. [4]

Research is undertaken within most professions. More than a set of skills, research is a way of thinking: examining critically the various aspects of your day-to-day professional work; understanding and formulating guiding principles that govern a particular procedure; and developing and testing new theories that contribute to the advancement of your practice and profession. It is a habit of questioning what you do, and a systematic examination of clinical observations to explain and find answers for what you perceive, with a view to instituting appropriate changes for a more effective professional service. [6]

According to David Nunan, *research* is a systematic process of inquiry consisting of three elements or components: (1) a question, problem, or hypothesis, (2) data, (3) analysis and interpretation of data. [2]

Research is to use systematic skills for studying event, problems and phenomenon to comprehend and develop principles and theories about it. It is the way of examining, understanding and formulating principles and testing new theories.

Research can be one of the most interesting features of any degree course as it offers a measure of control and autonomy over what you learn. It gives you an opportunity to confirm, clarify, pursue or even discover new aspects of a subject or topic you are interested in. [5]

According to types of using data, the two main types of research are distinguished: quantitative and qualitative research. They are very distinctive and are implemented in various ways to give very different types of information and knowledge.

Qualitative research	Quantitative research
<ul style="list-style-type: none"><li>• Advocates use of qualitative methods</li><li>• Concerned with understanding human behaviour from the actor's own frame reference</li><li>• Naturalistic and uncontrolled observation</li><li>• Subjective</li><li>• Close to the data: the 'insider' perspective</li><li>• Grounded, discovery-oriented, exploratory, expansionist, descriptive, and inductive</li><li>• Process-oriented</li><li>• Valid: 'real', 'rich', and 'deep' data</li><li>• Ungeneralisable: single case studies</li><li>• Assumes a dynamic reality</li></ul>	<ul style="list-style-type: none"><li>• Advocates use of quantitative methods</li><li>• Seeks facts or causes of social phenomena without regard to the subjective states of the individuals</li><li>• Obtrusive and controlled measurement</li><li>• Objective</li><li>• Removed from the data: the 'outsider' perspective</li><li>• Ungrounded, verification-oriented, confirmatory, reductionist, inferential, and hypotheticaldeductive</li><li>• Outcome-oriented</li><li>• Reliable: 'hard' and replicable data</li><li>• Generalisable: multiple case studies</li><li>• Assumes a stable reality</li></ul>

**Figure 1. Terms commonly associated with quantitative and qualitative approaches to research (adapted from Reichardt and Cook 1979) [7]**

Traditionally, writers on research traditions have made a binary distinction between qualitative and quantitative research, although more recently it has been argued that distinction is simplistic and naïve. [2] Reichardt and Cook, for example, argue that in practical terms, qualitative and quantitative research are in many respects indistinguishable, and that 'researchers in no way follow the principles of a supposed paradigm without simultaneously assuming methods and values of the alternative paradigms'. [7] Those who draw a distinction suggest that quantitative research is obtrusive and controlled, objective, generalisable, outcome oriented, and assumes the existence of 'facts' which are somehow external to and independent of the observer or researcher. Qualitative research, on the other hand, assumes that all knowledge is relative, that there is a subjective element to all knowledge and research, and that holistic, ungeneralisable studies are justifiable (an ungeneralisable study is one in which the insights and outcomes generated by the research cannot be applied to contexts or situations beyond those in which the data were collected). In metaphorical terms, quantitative research 'hard' while qualitative research is 'soft'. Terms commonly associated with the two paradigms are set out in Figure 1. [2]

Grotjahn (1987) provides an insightful analysis of research traditions in applied linguistics. He argues that the qualitative-quantitative distinction is an oversimplification and that, in analysing actual research studies, it is necessary to take into consideration the method of data collection (whether the data have been collected experimentally or non-experimentally); the type of data yielded by the investigation (qualitative or quantitative); and the type of analysis conducted on the data (whether statistical or interpretive). [3]

The emphasis of quantitative research is on collecting and analyzing numerical data; it concentrates on measuring the scale, range, frequency, and mean of phenomena or variables. This type of research, although harder to design initially, is usually highly detailed and structured and results can be easily collated and presented statistically. [5]

Qualitative research is a method of inquiry aimed at gathering an in – depth understanding of human behaviour and the reasons that govern such behaviors. It is more subjective in nature than quantitative research and involves examining and reflecting on the less tangible aspects of a research subject, like values, attitudes, and perceptions [8]. Although this type of research can be easier to start, it can be often difficult to interpret and present the findings; the findings can also be challenged more easily. [5]

When you are gathering and examining data, quantitative research handles with numbers and statistics, whereas qualitative research handles with words and meanings. Both types of research are essential for acquiring different kinds of knowledge. If you work with numbers and graphs that they express quantitative research and it is used to examine or verify theories and hypotheses. Quantitative research can be used to form universal facts about a theme. During the research, qualitative research is expressed in words and it can be used to understand concepts, thoughts or experiences. This type of research allows you to collect complete insights on topics that are not clear.

In conclusion, the term research is concerned to search for the information and knowledge on a particular topic or subject. To be specific, research is an art of systematic investigation. Quantitative and qualitative research types can be collected using various methods. Quantitative research assumes the existence of facts, whereas qualitative research deals with meanings and words and it assumes the knowledge is relative, that there is a subjective element to all knowledge and research. It is important to use a data collection method that will help answer your research questions. Various types of data collection methods can be either qualitative research or quantitative research.

It is very important to know these types of research for a beginning researcher as these types identify all other actions of a researcher. Therefore, this article aimed to give a slight impression of the research and types of research, which will be helpful for any researcher who has just begun his/her activity: the other ideas about researching will be written in further publications.

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**Rezyume:** Maqolada ilmiy tadqiqotlar, xususan, tadqiqot turlari muhokama qilinadi. Miqdoriy va sifatli tadqiqot turlari tadqiqot ishi uchun turli ma'lumotlarni to'plash va o'rganishda muhim rol o'ynaydi. Sifatli tadqiqotlar so'zlar va ma'nolarga bog'liq, miqdoriy tadqiqotlar esa raqamlar va statistikaga bog'liq bo'ladi.

**Резюме:** В статье рассматриваются научное исследование, а именно виды научных исследований, такие как количественные и качественные исследования, которые играют важную роль в сборе и анализе различных данных для исследовательской работы. Качественное исследование касается слов и значений, в то время как количественное исследование касается чисел и статистики.

**Kalit so'zlar:** Ilmiy tadqiqot, tadqiqot qilish mahorati, so'rov usuli, miqdoriy va sifatli tadqiqotlar, ma'lumotlarni yig'ish, ma'lumotlarni tekshirish, nazariyalarni tekshirish, gipoteza.

**Ключевые слова:** научное исследование, исследовательское мастерство, метод исследования, количественное и качественное исследование, сбор данных, изучение данных, проверка теорий, гипотеза.



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## INTERNATIONAL COMPUTER TERMINOLOGY AS A WAY TO ENRICH THE VOCABULARY OF THE UZBEK LANGUAGE

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**Summary:** *This article is dedicated to impact of computer and information technology on languages and vice versa today are explored in different countries.*

**Keywords:** *linguistic, sublanguage, sphere, neologisms, denote, phenomena.*

As a rule, the distribution of names of new items and phenomena originates precisely in the place where they appeared, and accordingly, in the language of the inhabitants of this area. Therefore, the neologisms that occur in the Uzbek language often come from the English language and belong to the most diverse spheres of life. The impact of computer and information technology on languages and vice versa today are explored in different countries. Especially a lot of work in modern foreign linguistics associated with the study of the English cyber-language (the term which is proposed to denote a functionally new sublanguage in English, formed on the basis of computer-network technologies).

The intensification of the borrowing process in different languages attracts attention researchers, and in different works, there is an increase in Anglo-American influence on languages belonging to different language families. Statistics show intensive borrowing of anglicisms and americanisms in all languages Europe.

In terminological literature, we find considerations that are relevant only to some aspects of terminological borrowing.

In relation to the words borrowed can be observed frequent collision two extremes: on the one hand, a glut of speech in foreign words and revolutions, on the other - their denial, the desire to use only the original word.

It is well known that the borrowing of a word is always preceded by the borrowing of a concept. A concept is transferred from language to language and then a need arises for its verbal expression. The easiest explanation of this process is when along with the concept the ready word is borrowed. An example of this is the term computer.

In itself, there was a desire to leave tracing paper and use the term computer existing in the source language. The choice, besides saving the word, was justified by the fact that there was no need for the opposite translation.

In the controversy on the above problem, it is often forgotten that many borrowing is completely adapted and has no equivalents, being the only names of the corresponding realities. Lack of scientific approach to the problem of mastering foreign language vocabulary is manifested in the fact that its use Sometimes it is considered in isolation from the functional and stylistic consolidation of linguistic of means: it does not take into account that in some cases reference to foreign language books stylistically not justified, and in others - necessarily, since these words form an integral part of the vocabulary assigned to a particular style, serving this or that sphere of communication (*xaker*).

As is known, the absence in the system of the language of translation of the sign corresponding to the sign in foreign language, necessitates borrowing.

According to the observations of linguists, he also appeared to be more adapted to the word production in a new branch than our native Russian. In the Russian language there are not always

worthy equivalents to capacious English terms. The massive introduction of computer terminology could not but affect the state and further development of the modern Uzbek language.

Some tracing paper successfully take root, and it is hardly possible for anyone today to use the word peephole or a wire line along the familiar term browser. But very often the lack of competent translation of foreign special words leads to the fact that even the professionals begin speak primitive slang. Of particular difficulty is the procedure for distinguishing a term from non-termini, which is explained by the use in English computer terminology of a number of lexical units with branched value system.

The main resource of computer vocabulary is English. For this reason, most of it is borrowing, represented by all types: unadapted and adapted by the successor language actually borrowed words that developed in Russian the grammatical categories of gender, numbers and case; half-breeds; word-building and semantic tracing paper. An example of adapted borrowing is the word Internet itself, which was originally was unknowable. An example of semantic tracing are the words memory - memory (English), hard disk - hard disk (English), mouse - mouse (English), etc.

Currently, we are witnesses of how the translated literature and periodicals actively introduce in computer lexicon new terms. The question arises as to how well their translation is.

As a result of data analysis, several ways of borrowing were identified, namely:

### **1. Direct borrowing**

Direct borrowing is called a foreign language word or phraseological turn into a new language system preserving its sound features:  *fayl (Eng. file.)*.

D.S. Lotte shares direct borrowing of terms on literal borrowing and convertible borrowing [1;11]. Literal borrowings are terms borrowed in the same form in which they exist in source language. For example: interface-интерфейс - *interfeys*, scanner-сканер - *skaner* , server-сервер-server.

With literal borrowings associated with such concepts as transcribing and transliteration. Transcribing is the transmission of foreign sounds, words (usually a proper name, geographical name, scientific term) using letters of the Russian alphabet [2;33].

For example: driver - driver, byte - bait. Transliteration is understood as the transfer of letters of one script by means of letters of another script. For example: *processor* - *protssessor* , *monitor* - *monitor* , *script* - *skript* .

Transformable borrowings are formed according to the word-formation of the Uzbek language, i.e. by adding affixes, suffixes, endings, etc. to borrowed terms. For example: *interactive* - *interaktivli*, *compilation* - *kompilatsia*.

### **2. Tracing paper**

One way of borrowing is tracing - forming new words or expressions formed by copying the morphological structure or meaning of a foreign language words, expressions [3,63]. These new words are called traces, these words like for example:

*parol* - *password*, *parol*

*жесткий диск* - *hard disk*, *qattiq disk*

*доступ* - *access*, *kirish*

*киберпространство* - *cyberspace*, *kibermakon*

*быстрые клавиши* – *quick keys*, *klaviatura yorliqlari*

*круговая диаграмма* – *pie chart*, *dumaloq diagramma*

Tracing paper are divided into semantic and lexical (derivational). It appears as a result of which it appears .

*user manual* - *foydalanuvchi qo'llanmasi*, *installation* - *o'rnatish* , *keyboard*- *klaviatura* , *folder*- *papka*, *protection key*- *xavfsizlik kaliti* , *user* - *foydalanuvchi*, *mail* - *pochta*, *screen* - *ekran* , *floppy disk* - *disket* , *box* - *oyna*, *lazy commit*- *dangasa topshiriq*.

Lexical (derivational) tracing - the word created on the foreign language derivational model, but from the material this language [4;24]. For example: disk drive - *haydash*, reloading - *qayta ishga tushirish*, data carrier- *saqlash vositasi*, main memory- *operativ xotira*.

**3. Mixed borrowing** (half-breeds or hybrids) - terms formed by combining the previous two types. For example: flash drive - *saqlash qurilmasi*, temporary file - *vaqtinchalik fayl*, electronic address - *elektron manzil*, database- *malumotlar bazasi*, sound card - *ovoz kartasi*, dialogue box - *dialog oynasi*.

Uzbek is actively borrowing abbreviations :

(IP address - *IP manzil*, PDF file - *PDF fayl*).

The development of English is largely due to the development of its word-formation system, the emergence of new word-formation patterns of words. The creation of new words is carried out, first of all, as a reflection in the language of the needs of society in the expression of new concepts that constantly arise as a result of the development of science, technology, culture, and public relations. This study is devoted to the study of one of the most dynamically developing professional sublanguages - the sublanguage of computer technology. This language is experiencing internal differentiation and is divided into the language of professionals and the language of users.

Uzbek computer vocabulary began to develop on the basis of Russian and English languages. However with the proliferation of a personal computer in our language hit a huge amount of English-language vocabulary, and many familiar concepts have been replaced by borrowed counterparts. The electronic computing machine became known as the personal computer.

alphanumeric printing device - linear printer,

plotter - plotter, etc. To date, the computer the language has a pronounced English coloring.

The analysis of borrowed computer terms shows a relatively high frequency of using all methods of borrowing. The most active Uzbek language borrows terms using tracing, as well as transliteration and transcription.

There is not a single language in the world in which there are no borrowed words. Before becoming close, dear, borrowed word adapts, passing along this path several stages - from use of a foreign language word in the text in its original spelling (and in oral speech - phonetic) and grammatical form, without transliteration and transcription, in as a kind of impregnation, (on line) before the loss of unusualness for the carrier language and use on an equal footing with other vocabulary units of the native language.

In this case, as a rule, the foreign language word is registered in the explanatory dictionary. Some foreign words never become another fact. language, this may interfere with, for example, the sound of the word *nou-hau*.

Non-linguistic, or, as experts say, extra linguistic reasons linguistic borrowings are different: the historical contacts of peoples and the presence certain level of bilingualism, the need for naming a new thing, a new notions, innovation of a nation in any particular field of activity, prestige foreign words compared to the original, saving language means (*the kursor, interfeys, modem*).

There are also linguistic reasons for borrowing: the need to replenish the missing links in the lexical system of the language; the need to express semantically more precisely with the help of borrowed words other concepts (directory instead of directory); tendency to eliminate homonymy (*manzil*) or polysemy of the original word (*tarmoq*); tendency to replenish expressive language tools; euphemization (use of one word or phrase instead of inappropriate, in terms of the speaker).

The foreign word was not only necessary, but also attractive, prestigious. In this case, the measure and selectivity in the use of foreign language vocabulary begins to be lost. The overall mood wins, fashion, the desire to be «on a par with the century». Here are some lexical parallels, testifying to the absence of need for borrowing because there are lexical equivalents (although, sometimes somewhat coarse).

The use of terms in terms of computer terms can be divided into the following groups:

1) the terms which express special concepts:

In Uzbek language:

*annlem* - *amaliy qo'llanma*, *vaʼyn* - *ma'lumotlarni to'liq o'chirish*, *веб-дизайн* - *veb-dizayn*, *дефејс-хакерлик hujumi turi*, *мэйнфрейм-resurslarga ega yuqori unumdor kompyuter*.

2) Scientifically-technical and equilibrium-based inter-sectoral terms:

In Uzbek language: *apparat*, *kod*, *tunnel*, *forum*, *fotodiod*, *fotokamera*, *dizayn*, *generator*, *faza*, *filtr*, *format*.

Uzbek language have emerged as hybrid or hybrid terms with internationally accepted elements. As you can see, the development of hybrid and double hybrid terms has been greatly increased. In this case, we consider the effects of interactive terminology and affixes great: *gipermatn*, *gipermuhit*, *kibermakon*, *kibertizim*, *superkalit*, *kompyuter-bosma*, *veb dizayn*, *veb-sahifa*, *veb-boʻzlama*, *veb-hujjat*, *kros-dastur*, *modem-dastur*, *internet tarmogi*; *shifrlash algoritmi*, *axborot tizimlarini klonlash*; *kompyuter ma'lumotlarini turlanishi*; *kompyuter tarmogi*; *yoshil kompyuter*; *qattiq disk*; *apparat ta'minot*; *geterogen tarmoq*.

There are also some of the most commonly used computer horses and place names. At the same time, these terms of international character are widely used in the scientific and technical sphere.

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**Rezyume:** *Ushbu maqola kompyuter va axborot texnologiyalarining tillarga ta'siriga bag'ishlangan va aksincha, bugungi kunda ular turli mamlakatlarda o'rganilmoqda.*

**Резюме:** *Данная статья посвящена влиянию компьютерных и инфор-мационных технологий на языки, и наоборот, сегодня они исследуются в разных странах.*

**Kalit so'zlar:** *tilshunoslik, subtil, sfera, neologizmlar, belgilanish, hodisalar.*

**Ключевые слова:** *лингвистика, подъязык, сфера, неологизмы, обозначение, явления.*

## **EFFICIENT TECHNIQUES TO INSPIRE STUDENTS TO LEARN LANGUAGE IN THE CLASSROOM**

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**Summary.** *The paper describes and provides with the techniques for the students who are learning a language classroom its practical usage in language classroom. The author comes to the following conclusions: motivating students to learn language easily and achieve more success.*

**Keywords:** *techniques, language skills, personal abilities, motivation ,efficient, collaboration.*

In today's fast-paced world, knowing a language is essential and major.

Almost all teachers spend a lot of their time working on themselves, developing themselves in every way and students have perfect knowledge of at least 2 or 3 languages and receive b2 and c1 degrees and international certificates trying to expend their energy. Of course all the conditions are being created by our motherland.

It is important to note that, given the diversity of students' abilities, teachers in the classroom should use a variety of methods to stimulate the student's interest and if necessary encourage them to learn to language as friends is one of the most important responsibilities of a teacher.

Of course, every student is unique and the way one person works may not work in another even one student has to use one method one time, another method. It depends on his/her mental state, family situation and many other factors.

In this article, we are going to talk about 30 effective ways to inspire our students to learn a language.

1. At the beginning of each lesson, motivate students by telling them they are capable that they can do a lot, they have confidence, and that they are future.

2. Recognize the student's hard work and accomplishments. It could be a simple word of praise or some kind of reward. However , hearing praise or rewarding should not become the goals of the students

3. Remind students of the importance of learning and their original goals that learning is a personal choice, not an obligation.

4. Avoiding of uniformity. It is possible to change the form of assignments from time to time or sometimes invite another teacher, celebrity, parent to the lesson

5. Connect with real life. Examples in the lesson, assignments may be more interesting to students if they are well-versed in the events around them.

6. The teacher himself is passionate. It is difficult for a mentally exhausted person to motivate others.

7. To show students the process of growth or decline.

8. Making lessons and assignments more interesting than the content where the fun does not have to turn into childish.

9. Selecting the level and complexity of the tasks according to the student's level.

10. Arousing curiosity –for example, presenting a problem, quoting common misconceptions about a particular thing, telling how it actually is, quoting unusual facts, and so on.

11. Evaluate aspiration, not outcome.

12. Rewarding for factors that depends on the child is more effective. For example, It is not a good idea to say that whoever gets the most points will be rewarded. Because getting a lot of points depends not only on the child's movement ,but also on factors such as his natural ability, how much he has learned the science before. As a result, interest may decrease in students who realize they will not get the most points and the students who know that even if they try ,they will get better grades than the others will lose interest.

13. Creating collaboration and healthy competition among learners. You have to be careful in the competition department. It is better not to have competition at all than to have unhealthy competition

14. Comparing students to each other, showing one as an example to another can spoil the atmosphere in the classroom.

15. Demonstrate the goals to be achieved.

16. Be formed in advance about topics and assignment that are expected to be covered. It is good idea for the child to guess what they need to learn and how long it will take.

17. Involve students more actively in the lesson. Not only the teacher or a small number of students in the lesson, but all of them should be involved in questions and answers , at least a little (better if more)

18. To study the needs and desires of learners.

19. Respect for students.

20. Explain why specific tasks are performed.

21. Giving a certain degree of freedom. Sometimes telling them interesting stories, talking about events that happened to be students themselves.

22. Making exams credible.

23. All students should be asked questions that are not the same for all students, especially without going beyond the themes as much as possible

24. Sample models. Giving information about the lives and work of famous and unpopular people who have achieved some success can also have a positive effect in some cases.

25. Be persistent, consisted in your endeavors. Motivation does not from overnight. The motivation formed also fades without regular promotion.

26. Being ready to help. Attention should be paid to students' questions on science or to various organizational problems related to the lesson in general.

27. Justice. Learners need to be treated the same not see each other more than the other, the original, not to oppress a particular students. The child should not be punished on suspicion. It is better for the guilty to go unpunished than for the innocent to be punished.

28. Environment change has a magic effect. When in a new environment, people tend to work more productively. Just have a class outside the school or let students change their seats in the classroom.

29. Vary teaching. If the lessons combine various learning styles, teaching methods and classroom activities ,there is a greater chance that almost all students will be engaged.

30. Make sure the material is clear and understandable for all students .Examples are the best way to illustrate words and clear things up.

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6. Motivating academic engagement and lifelong learning among vocational and adult education students via self direction in learning. Samson Onyeluke Chucwaldo,Felicia O Mbagwu,Therese Chinyere Ogbuanya

**Rezyume:** *Maqolada lingafon sinfini o'rganayotgan talabalar uchun undan lingafon sinfida amaliy foydalanish usullari tasvirlangan va taqdim etilgan. Muallif quyidagi xulosaga keladi: talabalarni tilni oson o'rganishga va ko'proq muvaffaqiyatlarga erishishga undash.*

**Резюме.** *В статье описаны и представлены методы для студентов, которые изучают язык в классе, его практическое использование на уроке языка. Автор приходит к следующим выводам: мотивация учащихся к легкому изучению языка и достижению большего успеха.*

**Kalit so'zlar:** *texnikalar, til qobiliyatlari, shaxsiy qobiliyatlar, motivatsiya, samarali, hamkorlik.*

**Ключевые слова:** *методы, языковые навыки, личные способности, мотивация, эффективность, сотрудничество*

**THE INFLUENCE OF EXTRINSIC MOTIVATION ON  
INTRINSIC MOTIVATION IN TEACHING ENGLISH**

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**Summary:** Motivation is considered as a key factor in learning foreign languages. However, keeping motivation in a steady level can be problematic for both teachers and students. In this case, appropriately used external rewards during teaching can encourage learners to better intrinsic motivation. This article presents the results of an experiment conducted with the aim of clarifying a positive impact of extrinsic motivation on intrinsic motivation.

**Keywords:** motivation, intrinsic motivation, extrinsic motivation, positive effect of extrinsic motivation on intrinsic motivation.

Motivation is one of the most significant and inseparable part of successful foreign language acquisition. In terms of language learning, it can be defined as a desire that comes from within a learner to acquire the target foreign language. Mostly, the educators of English language mention that some of their students acquire the second language effectively and meanwhile, the others are not able to make progress in the same learning atmosphere. In fact, it can be explained with the motivation level of each learner in the class. In order to clarify how this situation occurs, we must have a deep understanding of two types of motivation in language learning and how they affect each other. Basically, motivation is divided into two different groups known as intrinsic and extrinsic motivation.

Intrinsic motivation is performing an activity to seek out pleasure and enjoyment, even the individual is not affected by external rewards. Intrinsically motivated students eagerly do activities since they obtain satisfaction from language learning process. Nevertheless, observations in English language classes demonstrate not all students are intrinsically moved to learn the language. They take participation in lesson-related activities for being rewarded with good marks or, even avoiding punishment. It can be defined as an extrinsic motivation that triggers learners to acquire English language with the help of external factors. So, how these two fundamentally different types of motivation can be utilized in teaching English in order to maintain stable motivation level of learners? Do extrinsic factors have a positive impact on intrinsic motivation? These questions were the most important tasks of our survey which was carried out with the help of volunteer students of Department of English Language and Literature at Karakalpak State University in Uzbekistan.

**The definition and structure of the experiment.**

The experiment in which 30 first-year students took part was aimed to investigate whether extrinsic motivation enhances intrinsic motivation. The students participated in the experiment have been learning the English language for at least 4 years and some of them complained about weak motivation to study English. Twenty one of them were female and nine of them were male students. The participants of the experiment were divided into two groups. The first group included 11 female and 4 male students, whereas there were 10 female and 5 male participants in the second group. The topics and grammatical materials for lessons for both groups were the same. The experiment carried out for a week. The duration of each lesson was 2 hours.

**Experiment with Group One**

Number of participants: 15 (female: 11; male: 9) The first group had lessons for a week without any external rewards (praise and prizes for participation). Each lesson contained the explanation of new topic and English grammar rules followed by checking homework. At the beginning of each lesson, a new topic was introduced and some grammar rules were explained. Then, the students were asked to perform some activities related to the topic. It should be mentioned



that the students of the first group were not praised for active participation and they were not rewarded for correct answers during the lesson.

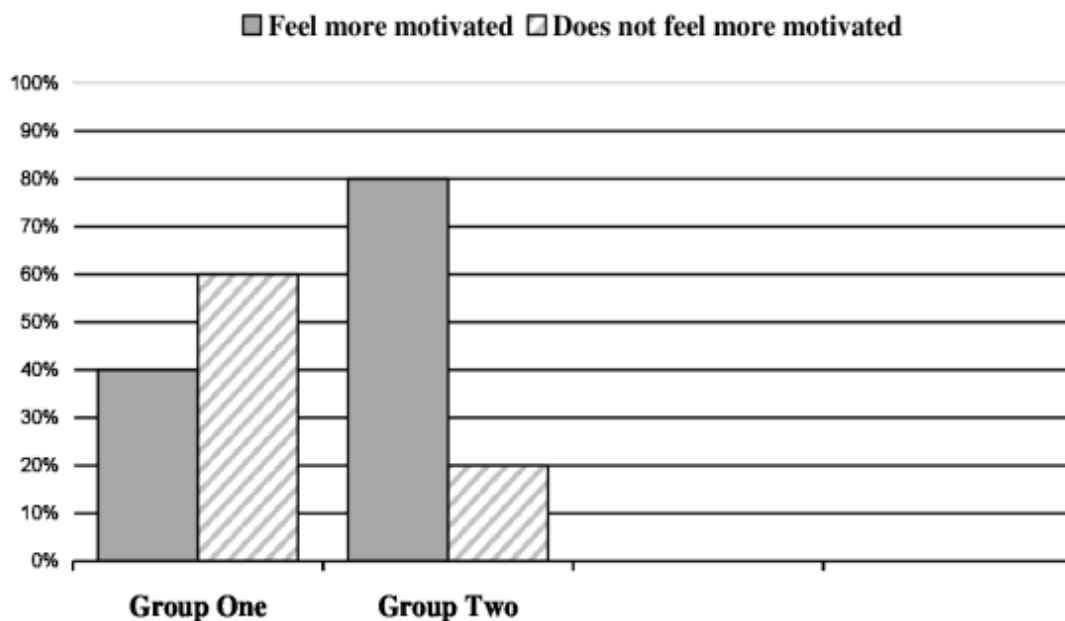
#### **Experiment with Group Two**

Number of participants: 15 (female: 10; male: 5) The students of the second group had seven lessons for a week as the group one. During all lessons, the students were praised and given different prizes for active participation, correct answers and doing homework. Furthermore, each lesson included different kinds of interactive activities and intellectual games in which winners were given special rewards. Firstly, the new topic of a day was introduced and some grammar rules were explained. After explanation, the students were given tasks connected with the topic. Then, some activities were performed. The main part of our experimental lessons was intellectual games in which the students' knowledge of explained topic was examined. We tried to create a competitive atmosphere among students. So, the students were divided into small groups. According to the rules, the group who won was awarded with certificates and prizes. As a result, they were extrinsically motivated to perform the tasks with great enthusiasm. Moreover, all students were regularly praised during the lessons. Secondly, at the beginning of our experiment the students of the second group were informed that their behavior and active participation would have a considerable impact on the aggregate grades for the semester. Having known the possibility of improving their grades for the semester, they were much more active during the lessons.

**Results of the experiment.** At the end of our investigation, the students of both groups were asked two questions with the aim of identifying how the motivation level of the students altered:

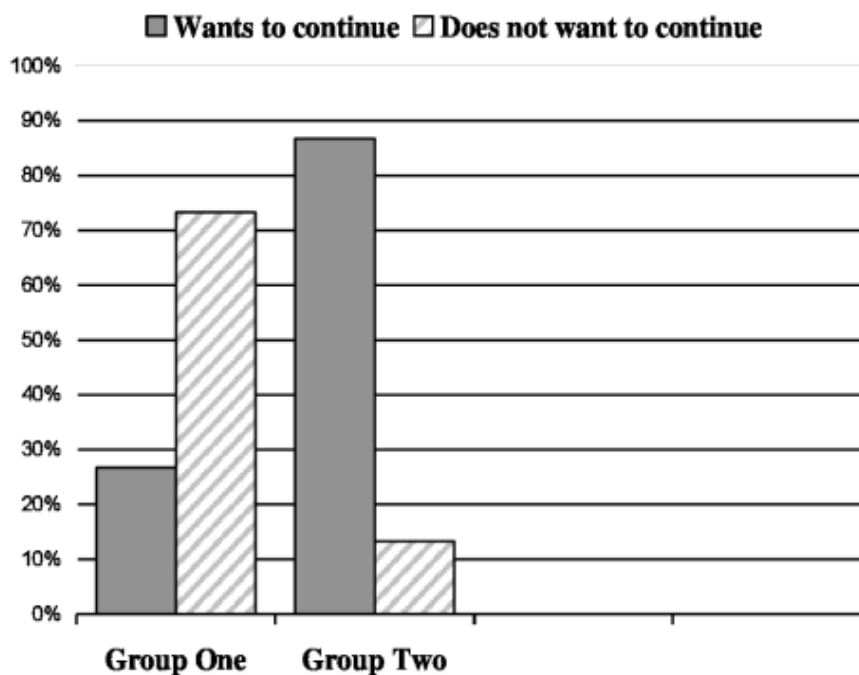
1. Do you feel more motivated after our experimental class.
2. Would you continue attending our experimental class?

According to the answers of the students from the first group, only six of them feel positive effect. They claimed that their motivation to learn English became stronger. Nine of them reported that the lessons were mundane without competitions and praise for active participations and that is why, they did not feel more motivated than they were before our experiment. The answers of the participants of second group reveal that more than half of the students (12) became more encouraged after our lessons. They claimed that the lessons were remarkably unusual and enjoyable. Nevertheless, three students of the second group did not notice any change in their motivation to learn the English language. Comparison of the results reveals that the proportion of participants noticed positive effect of external rewards in the second group is twice as high as the students of the first group(80% and 40% accordingly).



*Diagram 1. Comparison of participants' motivation level after the experiment*

With regards to the second question, the participants of the first group reported that our experimental class was informative. However, only 4 students expressed desire to continue attending the lessons, whereas the rest of the students reported the reverse. As for the answers of the second group, only 2 participants did not have any willingness to attend our experimental lessons, while the rest of the students informed that they would continue to take part in the lessons with a great pleasure. As it can be evidently seen that almost 87% of the students from the second group conveyed their intentions to keep attending the class, while the percentage of the participants, who were willing to continue attending the experimental lessons, was nearly 27.



*Diagram 2. Comparison of participants' willingness to continue the experimental lessons.*

**Conclusion.** At the end of the experiment conducted with 30 students, who have been studying English, the results show that external factors such as praise, prizes, and interactive games can enhance intrinsic motivation of foreign language learners. The outcome of the investigation may be utilized not only in teaching English but also any foreign language.

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**Rezyume:** *Motivatsiya chet tillarini o'rganishda asosiy omil sifatida qaraladi. Lekin, motivatsiyani barqaror darajada ushlab turish ham o'qituvchilar, ham talabalar uchun muammoli bo'lishi mumkin. Bunday holda, o'qitish jarayonida to'g'ri foydalanilgan tashqi omillar o'quvchilarning ichki motivatsiyasiga ta'sir qilishi mumkin. Ushbu maqolada tashqi motivatsiyaning ichki motivatsiyaga ijobiy ta'sirini aniqlash maqsadida o'tkazilgan eksperiment natijalari keltirilgan.*

**Резюме:** *Мотивация рассматривается как ключевой фактор в изучении иностранных языков. Однако поддержание мотивации на постоянном уровне может быть проблематичным как для учителей, так и для учащихся. В этом случае правильно используемые внешние вознаграждения во время обучения могут стимулировать учащихся к повышению внутренней мотивации. В данной статье представлены результаты эксперимента, проведенного с целью выяснения положительного влияния внешней мотивации на внутреннюю мотивацию.*

**Kalit so'zlar:** *motivatsiya, ichki motivatsiya, tashqi motivatsiya, tashqi motivatsiyaning ichki motivatsiyaga ijobiy ta'siri.*

**Ключевые слова:** *мотивация, внутренняя мотивация, внешняя мотивация, положительное влияние внешней мотивации на внутреннюю мотивацию.*

