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INFLUENCE OF THE PERIOD OF SOWING ON YIELD OF SILPHIUM PERFOLIATUM

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In Akmola region of Northern Kazakhstan under irrigation *Silphium perfoliatum* L. has a high yield – up to 87,2...88,4 t/ha of green mass in the amount of 2 mowing. With the years there has been a convergence in the value of the yield of green mass and harvest of dry matter for different variants of sowing of culture. In the year of sowing leaf-stem mass fees are low, and the highest yield of green mass of culture is celebrated on 3...4 years of life. The best times of *Silphium* sowing is late autumn and early spring. When sowing seeds in the summer time the mass of leaves and stems is decreased.

Keywords: *Silphium perfoliatum*, yield, fertilizer, terms of sowing

Silphium perfoliatum L. is a nonconventional culture which yet has not received a wide circulation in our country, and as a whole in the world. Therefore it is important to define optimum terms of sowing with reference to various climatic conditions, zones of cultivation and to other factors.

In the last century N.I. Ievlev found, that in the North of the country on lands of the Republic of Komi *Silphium* it is advisable to sow in the spring [3]. A.N. Makarova in her research determined that in the southern regions of Kazakhstan is optimum fall sowing date [4]. To the same conclusion on the results of the experiments N. Amirkhanov in Uzbekistan [1], N. Bakhmat and D.D. Drachuk in the Khmelnytsky region of Ukraine [2], Rata L. in Latvia [5] came.

The purpose of our researches was studying influence of term of sowing on yield of *Silphium perfoliatum* L. Experiences were spent on an irrigated site of the Akmola agrarian university of Republic Kazakhstan. Frequency of experience was 4-fold. The area of an allotment was 25 m². Crop of *Silphium* spent with distance 70 sm on depth 1...2 sm. The irrigation, entering of mineral fertilizers was spent to the next years in norm N₆₀P₆₀K₉₀ under the first and second mowing by equal dozes.

Silphium with norm of 10 kg/hectares were sowed in various terms. Early-spring crop was spent on April, 29th after corresponding preparation of ground. In 2 variant term of seeding in the beginning of summer – on June, 2nd, 3 variant – on July, 15th. In 4 variant sowing was carried out on November, 1st after steady downturn of temperature of ground with that calculation, that seeds in the autumn have not sprouted.

In the first year of a life yield of green weight is insignificant, plants of *Silphium perfoliatum* during the vegetative period in a year of sowing of seeds developed slowly. At sowing in the middle of summer because of very short vegetative period it was not possible to receive any yield. The height of plants was insufficient for mowing. At 2 variant yield of culture has made the minimal size – 2,4 ton/hectares (Table).

Early-spring crop differs the best development of plants of culture because of the long vegetative period therefore yield of green weight was essentially above, than in 2 and 3 variants and it is equaled 6,3 ton/hectares. At 4 variant seeds of *Silphium* start to sprout earlier on calendar term, than in all other variants, therefore duration of the vegetative period of plants of *Silphium* in this variant was the greatest. Accordingly gathering of green weight of

Yield of green mass of *Silphium perfoliatum*, t/ha

Variant	Term of crop	The year of living culture				In total, over 4 years	In an average 4 years	Change to control version (±)
		first	second	third	fourth			
1	early-spring (control)	6,3	71,1	88,4	81,9	247,7	61,925	–
2	early-summer	2,4	56,2	83,2	79,6	221,4	55,35	–6,575
3	mid-summer	–	36,9	65,4	74,4	176,7	44,175	–17,75
4	last-autumn	9,8	83,5	87,2	82,5	263,0	65,75	+3,825

culture also was the highest among studied variants – 9,8 ton/hectares. In the second year of a life a degree of development of plants in a year of sowing continues to affect. So, the least gathering of leaves and stalks is received in 3 variant at sowing in the middle of summer – 36,9 ton/hectares. This parameter has increased in 2 variant up to 56,2 ton/hectares. At early-spring sowing yield of green weight was 71,1 ton/hectares. And the maximal gathering of weight of leaves and stalks in 4 variant – 83,5 ton/hectares. In the third year by all variants, except for the third, the highest yield of leaves and stalks is noted. In 1 variant it is equal 88,4 ton/hectares, 2 variant of 83,2 ton/hectares and 4 variant – 87,2 ton/hectares. Only in 3 variant the maximal gathering of weight of leaves and stalks from investigated years is received for the fourth year of a life – 74,4 ton/hectares. In other embodiments, the yield was slightly lower than in the previous year.

As a whole on the sum of gathering of green weight for 4 years it is least received in 3 variant – 176,6 ton/hectares. At sowing in the beginning of summer total gathering makes already 221,4 ton/hectares or on 45,8 ton/hectares more, than in 3 variant. At early-spring sowing the given parameter is equal 247,7 ton/hectares are on 72,1 ton/hectares more, than in a variant with crop of cul-

ture in the middle of the summer period. The maximal result will reach at 4 variant – 263,0 ton/hectares.

Conclusions. At cultivation on silage in conditions of irrigation in Akmola region of Kazakhstan *Silphium* are recommended to be sowed in the late autumn for 2...3 weeks up to steady frosts or early in the spring in the end of April. If necessary, *Silphium* can be sown in early June by the stratified seeds. It is undesirable to sow in mid-summer.

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TREE RING ANALYSIS FOR ASPEN BREEDING: POSSIBILITIES AND PERSPECTIVES

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The plantings of aspen clones collections, as well as wild populations, may be used as an experimental plots for dendrochronological diagnostics of useful interspecies forms of aspen, especially resistant clones. The first investigation of aspen stands in these directions was made by us in 2015 in Izmailowski natural park. The study of tree rings variability at this objects will give us practical results at identifying valuable clones and ensure the improvement of methodical approaches for identifying valuable clones.

Keywords: tree rings, dendrochronology, radial growth, aspen, forest tree breeding, drought resistance

The problem of the growing and breeding of healthy aspen is widely discussed in Russian forestry. Aspen wood is characterized by specific features and may be indispensable in particular parts of economy. The main difficulty for wide exploitation of aspen forests is a low quality of wood in the most part of aspen stands, which explained by lose of aspen polypore. This problem was the first discussed by academician A.S. Yablokov (1949) and in the USSR the great number of investigations were made, but for the present time this problem is relevant for Russian forestry. Last two decades together with traditional research methods the methods of molecular genetics, gene engineering and biotechnologies become available for the scientists. Also, the sphere for using traditional research methods, for example, dendrochronological method become wider.

The plantings of aspen clones collections, as well as wild populations, may be used as an experimental plots for dendrochronological diagnostics of useful interspecies forms of aspen, especially resistant clones. The investigations may be developed in some directions.

On one hand, radial growth is the indicator of rot wood resistance. The large tree ring widths correlate with quick overgrown of dry twigs, which makes impossible for fungal disease to penetrate in the tree trunk. Dendrochronological investigation helps to select clones with high rate of radial growth.

On the other hand, dendrochronological investigation can help to identify those ecological conditions, which caused the forming of wide tree rings. If such conditions are identified, we can give recommendations for microclimate regulation in planting that changes radial growth size for desirable direction for us. For example, temperature regime may be changed to higher temperatures thanks to the cuttings, which leads to tree stand density re-

duction, or, on the contrary, we can make microclimate cooler by the introduction of the shrubs under the stand canopy. If it is necessary it is possible to change the phytocenosis structure in such way, that will lead to better snow retention. Watering of plantings is a common operation at the urban environment, but the dendroclimatic diagnostics only makes it possible to identify the months when trees have critical water status, and so to make the watering more economically effective.

Also, if the most significant for growth climatic factors are found, we will have the information about instruments for radial growth rate stimulation and increase of planting resistance to rot.

The third direction is the possibility to assess hereditary ecological plant qualities and to climatic impact resistance diagnostics. Various clones will differ by the radial growth reactions for different ecological conditions and, thanks to that indicator it is possible to identify drought-resistant clones, frost-resistant clones and other similar qualities. The dendroclimatic information is non-alternative source here. The fact is that the laboratory studies do not give the objective information about tree growth at the ecosystem conditions, because there is a plant in competition with other plants and in environment with many changed ecological factors. However, such kind of information is difficult to receive by the direct experiments in nature, because it is necessary to observe the object for a long time in different periods of vegetation season, and after that repeat the observation from year to year. Also, the inability to replay experiment when the scientist needs this makes such kind of investigation more difficult. For example, it is impossible to plan the development of drought or the cold snap, or another climatic factor impact. But the tree ring analysis together with climatic data analysis allows

to achieve all these tasks. Dendrochronological information may be demonstrated as a record of experimental series, that was implemented by the wild nature under the current genotype in different environmental conditions.

And the first direction is related with the fact that the tree ring investigation enables to study the technical qualities of wood, which are improved by the reduction of radial growth size.

Thus, we offer to use aspen clones planting as a model object for dendrochronological investigations. The study of tree rings variability at this objects will give us practical results at identifying valuable clones and ensure the improvement of methodical approaches for identifying valuable clones and ensure the improvement methodical approaches for identifying valuable aspen forms at the other plots.

Materials and methods of research

The first investigation of aspen stands in these directions was made by us in 2015 in Izmailowski natural park.

As was established, tree ring width for aspen model trees is very variable from year to year.

The geobotanical characteristic of plots is at the Table.

The sampling was made by coring. From each model tree was taken one core at 1,3 m height of stem. Each plot was presented by 12 model trees. The tree rings was measured by using Lintab with accuracy 0,01 mm and after that cross dated by using computer program TSAP Win.

Results of research and their discussion

As was established, at the first plot abnormally thin ring width was formed in 1995, 1999, 2002, 2011 years. In 1995 83 % of trees demonstrated strong synchronous ring reduction at the plot 1. In 1999 this feature is 92 %, in 2002 is 92 %, in 2011 is 75 %.

At the second plot abnormally thin ring width was formed in 1995, 1999, 2011 years. In 1995 100 % of trees demonstrated strong synchronous ring reduction at the plot 2. In

1999 this feature is 100 %, in 2002 is 100 %, in 2011 is 83 %.

So, the years of minimums belong to trees from both plots.

Times series of radial growth was indexed by two variant. By the first the tree ring width shared on the average tree ring width by the last five years. By the second tree ring width shared on the average tree ring width by the three years: previous, calendar and next year. After that the correlation analysis for time series of meteo parameters (temperature, precipitation) and time series of radial growth indices was made.

According to the results of correlation calculation it was established that reliable, sustainable and biologically interpretable correlations between radial growth fluctuations and climatic data fluctuations are absent in considering chronologies.

It is due to the fact that the trees on considering plots are in the conditions of existence near the optimum zone and the factors, which are limiting the radial growth size, change from year to year. One year one factor has strong deviation from optimal for species parameters, and another year it will be another factor. In this case the correlation analysis gives results about the lack of the correlation, but it does not mean that climatic factors have no impact on tree ring forming.

The climagramm analysis for year can help in this case to identify climatic response at the time series of radial growth.

The climagramm analysis was made for the years group of strong synchronous reduction of radial growth (1995, 1999, 2002, 2011). The average month meteo parameters for this group are compared with the all-year average meteo parameters. The results of analysis are presented at Fig. 1 and 2.

Geobotanical features of plots

Code	Stand structure	Understory	New growth	Forest live cover
Plot 1	50 % – aspen 40 % linden 10 % willow	Viburnum opulus, Prunus padus, Corylus avellana, Cornus alba	Acer negundo, Acer platanoides, Populus tremula, Quercus robur, Tilia cordata	Géum urbánum, Arctium láppa, Impatiens parviflora, Ranunculus repens, Urtica dióica, Taraxacum officinale, Gramíneae, Lámium galeóbdolon
Plot 2	30 % aspen 30 % oak 10 % ash Penn 10 maple American	Cornus alba, Prunus padus, Sorbus aucuparia, Salix caprea, Viburnum opulus, Lonicera xylosteum	Acer negundo, Acer platanoides, Populus strémula, uércus róbur, Úlmus glábra	Urtica dióica, Solánum dul- camára, Cárex sp., Gramíneae, Athýrium filix-fémína, Impatiens parviflora, Lámium galeóbdolon, Ajúga réptans

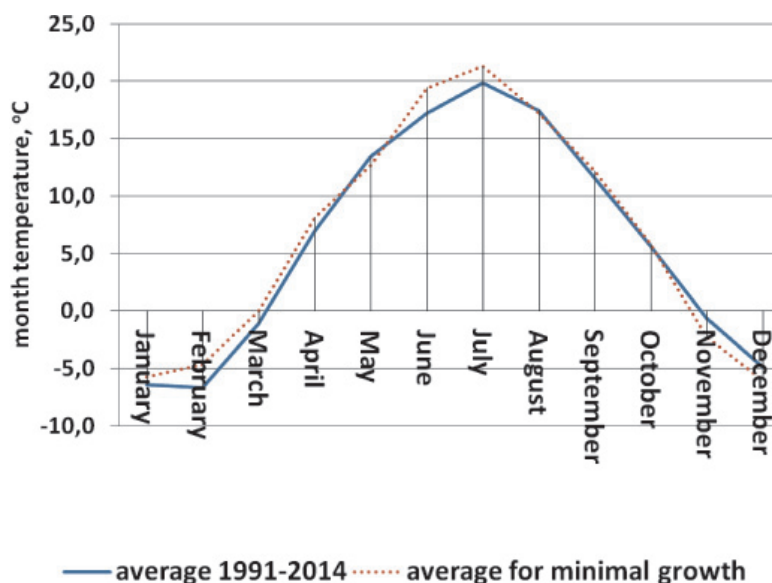


Fig. 1. The comparison of average values for month temperatures: average for all years and the average for years with radial growth minimums

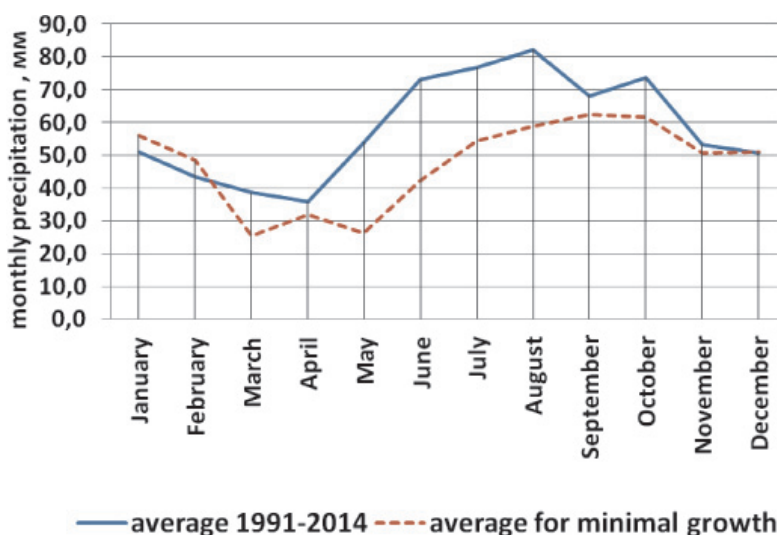


Fig. 2. The comparison of average values for month precipitation sum: average for all years and the average for years with radial growth minimums

As a result it has been established, that this year group is characterized by below average values of precipitation sum in May, June, July and August. However, for this year group the above average monthly temperatures for June and July are recorded. Thus, the main reason for forming extremely thin tree rings considering aspen cenopopulations was a water stress.

An important conclusion is that in years of water stress there are some parts of trees in cenopopulation, which have asynchronous radial growth reaction in comparison with the main part of cenopopulation. These in-

dividuals should be considered as potentially genetically more drought resistant and perspective for future microclonal reproduction and test in planting.

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CALCULATIONS THE CHEMICAL BONDS OF HYDROCARBONS

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Quantum-chemical modeling of surface processes, such as adsorption and catalytic processes require the use of methods to adequately reproduce the effects of weak intermolecular interactions. Knowing the wave functions, you can determine the electron density distribution, and calculate its resonance spectroscopic characteristics, describe its reactivity, calculated band structure of the crystal, and etc. All particles in the molecule react with each other; thereby calculating the wave function problems for complex systems is simplified, since the problem is reduced to one-electron wave functions defining each particle remaining in the average field of molecular orbitals. Article quantum-chemical methods calculated spatial configuration of the coal and oil asphaltenes, built profiles of the potential energy surface of the reaction of hydrogenation. It shows the energy rating possible routes of destruction of coal asphaltene.

Keywords: destruction, oil, coal, asphaltene, quantum and chemical methods, dissociation energy

Complexity of studying of the mechanism of transformation of coal and oil substance in the conditions of process of a destructive hydrogenation is defined by that their properties change in the wide range depending on element structure, degree of a metamorphism and the nature of an oil field. It is known that all this variety leads to change of kinetic characteristics of separate reactions and their share importance in the course of a hydrogenation, but a community of mechanisms, its orientation and the main regularities remain. At a destructive hydrogenation of solid and heavy hydrocarbon raw materials leads to formation of various radical fragments that are stabilized hydrogen radical. Definition of the reactionary centers of hydrogenation of molecules of oil and coal asphaltene was carried out by means of quantum and chemical methods.

Oil and coal asphaltene are represented by the flat structural units containing aromatic, alicyclic

rings, the having deputies. These structural units are associated in particles in such a way that the planes formed by aromatic atoms of carbon approach to each other at distance of 0,35–0,37 microns while aliphatic chains will defend from each other on 0,55–0,60 microns. Such particles having, therefore, in small degree crystal character, in turn associate, forming a colloidal micelle [1].

Apparently from Fig. 1, molecules of an oil and coal asphaltene have extremely complex structure, but coal asphaltene differ from oil in bigger carbon saturation, the main heteroatom in them is oxygen, whereas in oil – sulfur [2].

Spatial configurations of oil and coal asphaltene are received by the *PM3* method. On the Fig. 1 the spatial configuration of an oil asphaltene is presented. It includes aromatic, cyclic and heterocyclic rings and, apparently is lower from drawing, the right and left parts of a molecule are focused relatively each other at an angle ~45–50° [3].

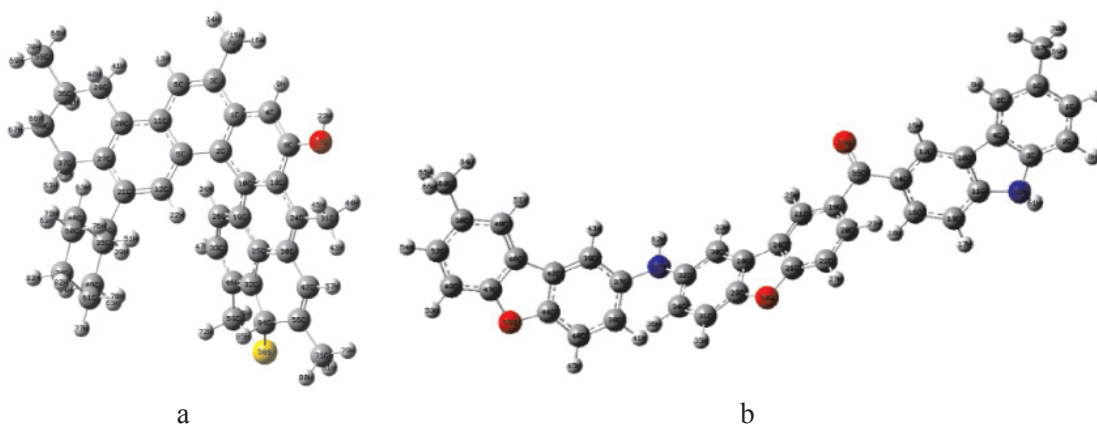


Fig. 1. The spatial configuration of oil (a) and coal (b) asphaltene (according to calculation by PM3 method)

In Fig. 1 the spatial configuration of a coal asphaltene which also includes aromatic and heterocyclic rings is presented. Numbering of atoms in molecules of oil and coal asphaltene corresponds to models for semi-empirical and not empirical calculations.

For calculations structures which geometry is optimized by the semi-empirical *PM3* method were used. Further discussion is carried out by means of data of calculation by the *RHF/3-21G (d)* method [4].

One of further transformations of asphaltene is hydrogenation of a molecule. As hydrogenation reaction step, for preliminary studying direct accession of a radical (atom) of hydrogen to an asphaltene was considered. Atom of hydrogen is electron-seeking reagent. Its connection to the target molecule should occur, apparently, to an unsaturated aromatic portion asphaltene. To determine the direction of attack used the approach of frontier orbitals. HOMO

(the highest occupied molecular orbital) and LFMO (lower free molecular orbital) of oil and coal asphaltene are given respectively (Fig. 2, 3) below.

According to the theory of boundary orbitals the centers of chemical reactions are in places of localization of electronic density of HOMO or LFMO. As energy of the orbitals of hydrogen radical is $-0,11747$ a.u., and LFMO energy of the oil and coal asphaltenes respectively $-0,06663$ a.u. and $-0,08668$ a.u., the small energy difference suggests the interaction of these orbitals. On the basis of this molecule for the asphaltene was chosen reaction center *C10*, coal asphaltene molecules *C19* was chosen (numbering according to Fig. 1). However owing to a trifle of power intervals nearby orbitals can also interact with attacking the electron-seeking reagent. Therefore, the number of atoms – the centers of attack can be more.

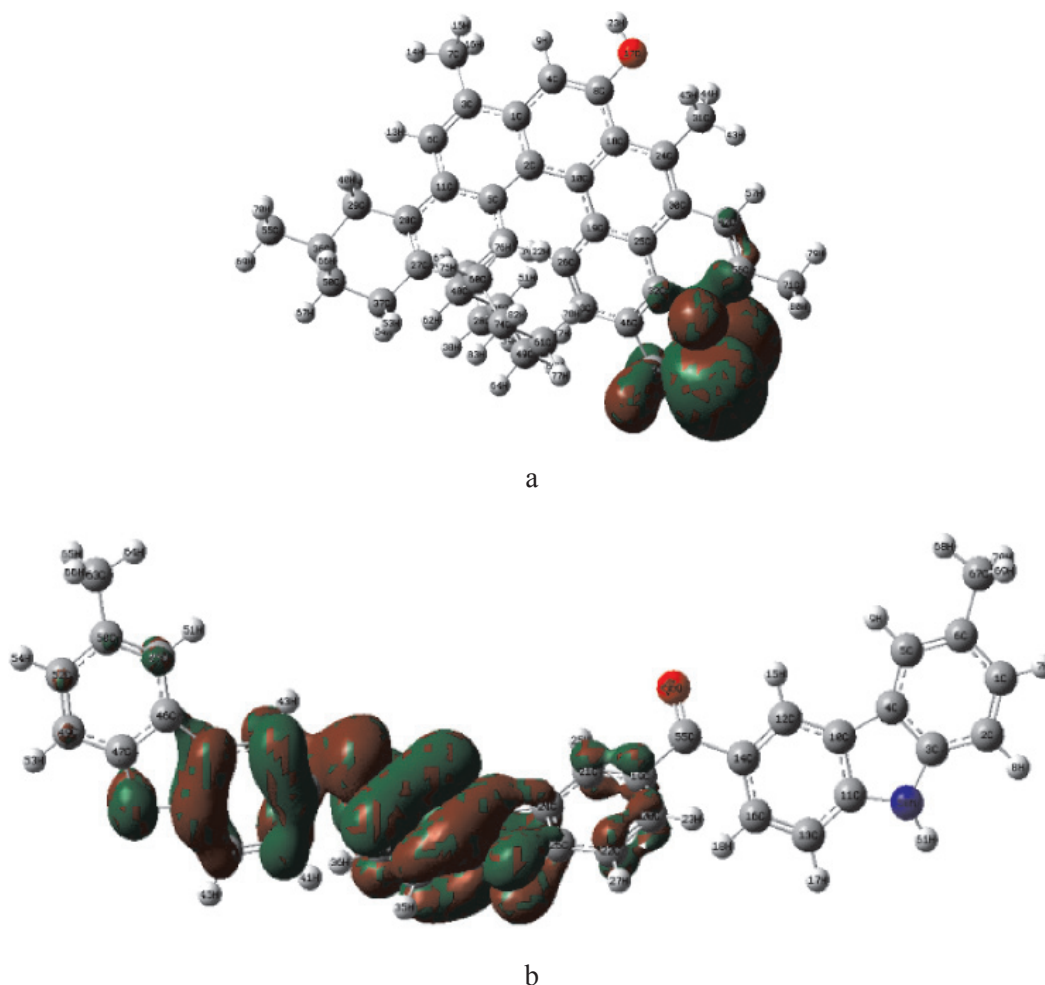


Fig. 2. The highest occupied molecular orbital of oil (a) and coal (b) asphaltene (according to calculation by *RHF/3-21G (d)* method)

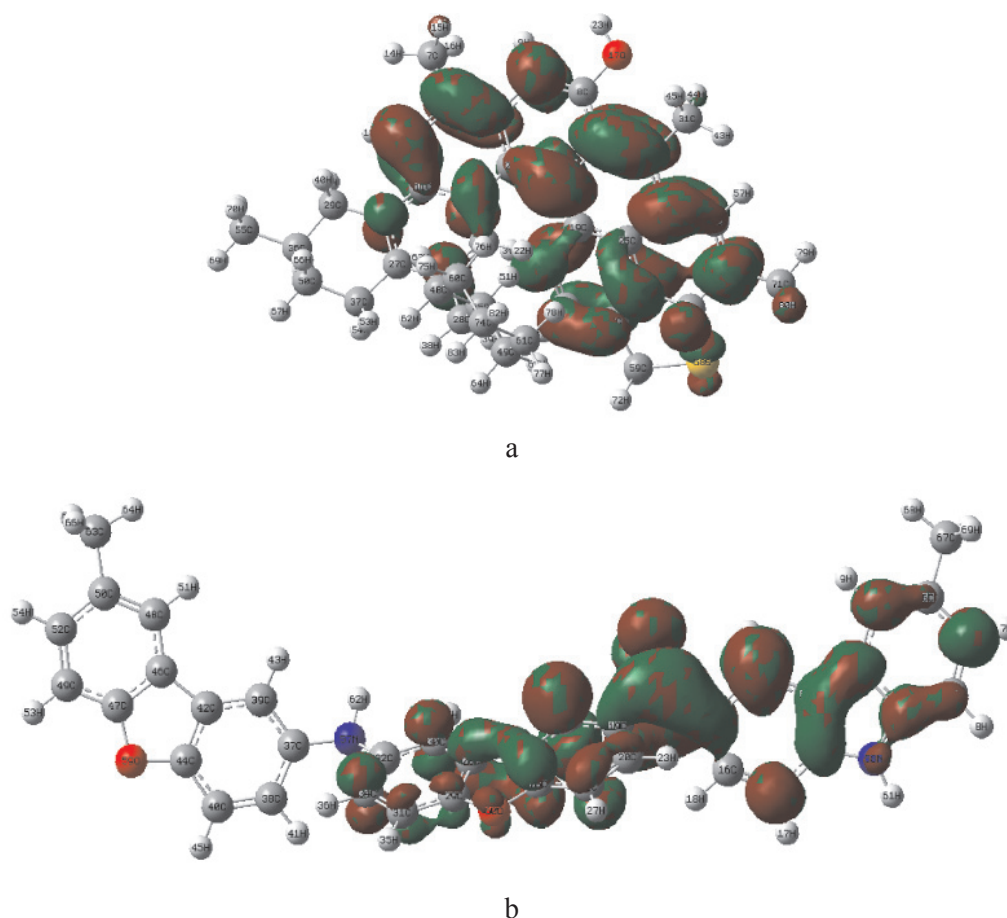


Fig. 3. The lower free molecular orbital of oil (a) and coal (b) asphaltene (according to calculation by *RHF/3-21G (d)* method)

Thus, the recombination of oil and coal asphaltene will happen to the atom of hydrogen which is the free radical of the first type, obviously in places of excess spin density. In attempt of quantum and chemical calculation of such system, optimization of geometry, perhaps, will lead to disclosure of a heterocycle. Destruction of a coal asphaltene it will be energetically favorable to pass on an amino group.

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INTRODUCTION OF PLANTS WITH THE AIM OF ESTABLISHING PLANTATIONS TO PREVENT FURTHER DEVELOPMENT OF DESERTIFICATION PROCESSES IN THE SOUTHERN REGIONS OF RUSSIA AND IMPROVEMENT OF THE ENVIRONMENT

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The most effective way of improving the environment, prevent further deepening of ecological crisis, the neutralization of desertification processes in southern and Central regions of Russia is the creation of plantations for various purposes (intensification of the development of protective afforestation, sand fixation, ravines, creation of vegetation along small rivers and streams, the development of silvicultural production, greening of towns and villages). For establishing and reconstructing the man-made ecosystems of different designated use it is necessary to work out the range of plants characterized by the great stability, decorative value, and other commercially valuable features differentiated according to the natural environment of the region under study. While introducing plants by means of the ecological method it is necessary to pay a special attention to the theoretical selection of species composition prospective for being introduced in the region. The next important stage is singling out the factors limiting the introduction, defining the possibility of their neutralization in the region of establishing the man-made ecosystems and modeling the conditions which are optimal for keeping the introduced species in the culture. The whole research process should be based on the environmental laws, patterns, rules and phenomena directed at reducing the terms of the empiric research into developing new species and introducing them into the culture.

Keywords: introduction, plants, crisis, desertification, environment, ecology, resistance

The most effective way of improving environment, prevent further deepening of ecological crisis, the neutralization of desertification processes in southern and Central regions of Russia is the creation of plantations for various purposes (intensification of the development of protective afforestation, sand fixation, ravines, creation of vegetation along small rivers and streams, the development of silvicultural production, greening of towns and villages).

The poverty of the natural flora, especially in the deserts and semi-deserts, dry steppes, steppes and even in the forest-steppe zone of trees and shrubs defines the relevance of its enrichment at the expense of introduction of new species from other regions of the world. The lack of theory-based, effective methods for the introduction of plants improves the relevance of research in this direction [1–7].

The purpose of the study

Development of environmental method of introduction of woody plants, allowing to create a sustainable artificial ecosystem differentiated natural conditions of the study area, plantations, allowing to neutralize the negative impact of desertification processes on the environment.

Materials and methods of research

Studies were conducted on the Mangyshlak Peninsula (Kazakhstan) is in Lipetsk, Saratov and Bryansk region (Russia). The development of science in physiolo-

gy and ecology of plants contributed to the explanation of many natural laws that formed the basis for the selection of promising types, depending on the conditions of introduction region.

Of practical importance is the use in the process of selection of promising regional species of plants and their relocation to a new region environmental laws that explain the formation of species composition of phytocenoses, their biological productivity and life-form, habitat and tolerance within the phytocenosis species. Of particular interest in plant introduction present research, devoted to studying of mechanisms of their adaptation. It is established that the adaptation of plants manifest in the dynamic compliance of morphological organization and their adaptive reactions to typical and leading factors of the Environment in which this happened. Physiological adaptation of organisms is the basis of their adaptations to changes in environmental factors within the area and aims to save populations and species as a whole. Each species has its own ecological valence in relation to the factor and in the process of evolution formed their own, inherent ecological spectrum. Selection and introduction of exotic species in the mobilization of the area requires the development of practical recommendations, with a clear program and sequence of its implementation [5]. Particular attention should be paid to the study of the biology and ecology of the species, the development and introduction of advanced agricultural methods of mass reproduction, breeding of plants, depending on the environmental spectrum type, kind of resistance to the introduction of the main limiting abiotic factors and the natural conditions of the study area. This study showed the importance of the comparative analysis of the hydrothermal regime in the area of natural habitat to species introductions area [2–5]. During the research, it is necessary to pay attention to the possibility of neutralization in the introduction region of those of abiotic factors, which are beyond the

tolerance of the species. Only in this case it is possible to ensure the establishment of forest plantations for different purposes, i.e. sustainable plantings that meet the requirements of modern landscape gardening, protective afforestation and silvicultural production. Unfortunately, environmental laws are not always applied in practice for the selection and relocation of plants [6, 7]. Methods of introduction were built without reference to the theory of evolution, the development of biocenoses, forming of tolerance of the species, its life form and habitat. Studies were limited to the search for sustainable species to the natural conditions of the region of plant introduction. Conducted the search is not existing in the nature of species. Biological productivity of the species, its life form, habit depends on environmental conditions of the habitat and, especially, the degree of security of the region with moisture and warmth, as evidenced by the periodic law of geographical zoning, as well as a comparative analysis of the dependence of biological productivity of ecosystems, phytocenoses, species from their characteristic hydro-thermal regime. Displacing the species in more stringent forest conditions, we will be faced with the problem of inconsistencies ecological spectrum of the species with the conditions of introduction region. Most often, in the area of introduction beyond the ecological valences of the species will leave the water deficit and heat, as well as the closely related edaphic and other factors. The solution of these problems provides, our proposed ecological method of plant introduction [2, 4–5]. The base of the formation, ecological method of introduction is a complex environmental laws, laws, rules and phenomena, revealing the evolution of the species, the formation of the environmental spectrum. Axiom adaptability of Darwin, namely that each species has adapted to a strictly defined, specific set of conditions of existence leads to the need to identify the main limiting factors to the introduction, followed by neutralization of their negative influence on the exotic species. The need for these actions in the introduction is confirmed by a number of laws and, above all, the fundamental laws of the optimum, minimum and tolerance. Need to address the negative influence of the environmental factors that go beyond sustainability, providing an artificial kind of energy resources is determined by the phenomenon of ecological succession. As a result of development of the phenomenon of ecological succession, in place of the man-made ecological community, the left, for example, without the provision of moisture and nutrition always restored natural landscape. In the desert restored desert landscape, desert – steppe, taiga – taiga, what you need to remember when developing recommendations for the creation and care of plants. Therefore, only the modeling of optimal conditions in the introduc-

tion region corresponding to the natural habitat of exotic plants, to ensure the normal growth and development, will implement the exotic plants its biological potential. Use in introduction of the law of variability, variability and diversity of responses to environmental factors in individual individuals of a species, allows to minimize experimental studies to test the mobilized species. Visual observations of juvenile and immature plants on the background of natural conditions and dynamics of water-salt regime of soils, to determine their stability and prospects for the region. In the introduction of plants ecological method, it is proposed to focus on the selection and theoretical justification of the prospects of the species, identifying the limiting factors to the introduction, the determination of their neutralization and modeling of optimal conditions for the species in the introduction region [5].

Results of research and their discussion

To achieve this goal was the analysis of Russian and foreign experience in the migration of plants, carried out comprehensive studies on the introduction of woody plants in the extremely harsh conditions of the desert of the Mangyshlak Peninsula, characterized by a high moisture deficit, widespread soil salinity close occurrence of impermeable layer, high temperatures and intense wind regime. Introduction of the species on the Mangyshlak Peninsula was carried out based on the comparison and analysis of the minimum temperatures of atmospheric air at home with the minimum temperature of the study region, which for the Peninsula are coastal – 26°C, and in continental – 34°C [4].

Table 1 shows the percentage of attracted to the Peninsula Mangyshlak species of plants and species introduced to the greening of cities and villages of the Peninsula, according to their degree of frost resistance, in accordance with the zones A. Rehder [8].

The minimum temperature in the zones of Raeder are: area II – 46–40; III – 40–34; IV – 34–29; V – 29–23; VI – 23–18; VII – 18–12°C.

The Table 2 presents data on the distribution of plant species, Botanical collection exhibits Mangyshlak experimental Botanical garden (the city of Shevchenko, Mangyshlak Peninsula Kazakhstan).

Table 1

Distribution of exotic species in zones of Raeder (Rehder, 1949)

Zone	II	III	IV	V	VI	VII
1	2	3	4	5	6	7
Percentage of the total number of species in the collection	12	15,5	55,3	16,2	1	–
Percentage to the number of species introduced to the greening of cities and villages of the Peninsula of Mangyshlak	10,8	18,9	43,3	27	–	–

Table 2

Distribution of species of the plant collection
of the Botanical garden in zones Rehder, 1949 (Rehder, 1949)

Zone	II	III	IV	V	VI	VII
1	2	3	4	5	6	7
Distribution of species of the plant collection of the Botanical garden in zones Rehder, 1949	40	74	241	76	5	–

Similarly, the representation of species of plants and planting stock of the cities and towns of the Peninsula Mangyshlak. Statistical analysis of minimum temperatures, characteristic for the country of exotic species, showed that the average for exotic species, the minimum air temperature (M. ar.) is $-28,3 \pm 0,4^{\circ}\text{C}$, With coefficient of variation (Cv) – 24%, the accuracy rate of experience (P) – 1,27%, criterion of reliability (t) – 78. The greatest number of species of plants in the collection of the Mangyshlak experimental Botanical garden of Academy of Sciences of Kazakhstan presented the fourth and fifth zones. Representatives of the sixth and seventh zones are practically absent in the collections of the garden, and planting a range of settlements of Peninsula Mangyshlak. Their tolerance is already the strength of the effect of the temperature factor in the conditions of introduction region. Representatives of the second and third zones promising for all of the Mangyshlak Peninsula and can be recommended in the southern regions of Russia. Botanical exposition introduced among angiosperm species of trees and shrubs, there are 428 species, hybrids, forms and varieties from 80 genera belonging to 32 families. Table 3 shows the distribution of the areas most promising for Peninsula families: Rosaceae Juss., Salicaceae Mirb., Oleaceae Lindl. and Leguminosae Juss. The highest percentage in families represent the types of the fourth and fifth zones. The most promising source for introduction of the material, especially in

arid regions are Circumboreal, Asian, Atlantic North American, Rocky mountains and The Iran-Turan floristic region.

In terms of Mangyshlak (Kazakhstan), and then in Lipetsk, Saratov and Bryansk region (Russia) conducted research to identify techniques and methods for optimization of the hydrothermal regime for reproduction, growth and development of exotic species. As a result of the study determined the feasibility of using the method of growing plants with closed root system, as well as drip irrigation and use for sowing seeds waterproofed with checks constantly fed through a drain moisture [2, 5].

Scientific novelty and practical value of the work

As a result of years of research developed environmental method of introduction of woody plants, that allows you to create a sustainable wood plantations for various purposes, differentiated natural conditions of the study area. Practical value of the work attributable to higher volumes in the enrichment of the cultural dendroflora of Russia's regions and neighboring countries economically valuable exotics, as well as the proposed practical activities in these regions to create effective spaces for various purposes and primarily for the creation of anthropogenic ecosystems in areas exposed to desertification. The purpose of creation of anthropogenic ecosystems is the neutralization of the negative impact of desertification on the environment and public health.

Table 3

Distribution of species of several families, introduced
on Mangyshlak, in the zones Rehder, 1949

Family	Zones Raeder					
	II	III	IV	V	VI	VII
<i>Rosaceae</i> Juss.	8,9	8,9	34,5	47,2	0,5	–
<i>Salicaceae</i> Mirb.	11,5	7,7	42,2	38,6	–	–
<i>Oleaceae</i> Lindl.	7,8	5,1	30,6	56,5	–	–
<i>Leguminosae</i> Juss.	11,9	9,5	34,5	44,1	–	–

The reliability of the research results

The reliability of the results provided by the analysis of research conducted in the field of woody plant introduction modern methods in different soil and climatic conditions from semi-desert and to steppe, forest-steppe and forest zones, as well as processing of the obtained results using computer programs Microsoft Excel 2010.

Conclusion

The use in the practice of evidence-based environmental methods and recommendations for the introduction of plants will facilitate the establishment of effective forest plantations for various purposes, including in regions that are prone to the development of the environmental crisis and desertification processes. The introduction of new for the region species of woody plants will increase the smartness and sustainability of forest plantations and their health effects. Implementation of advanced technologies for the propagation and cultivation of exotic species will allow to reduce terms of establishing plantations, will reduce the cost of planting material and to conserve

natural, including water and land resources. In arid regions of Kazakhstan and Russia was successfully tested methods of drip irrigation, cultivation of plants with the closed root systems and use for sowing seeds sowing water-proofed with checks constantly fed through a drain moisture.

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OUR EXPERIENCE ON TREATMENT OF CHILDREN WITH PURULENT OMENTITIS

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Experience of treatment of 224 patients with acute appendicitis, omentitis, was analyzed. Studying of histological changes in epiploon tissues with determination of optimal linear sizes of resection was carried out. Investigating results of the conducted research, it is possible to claim that the linear dimensions determined by us and the area within which the epiploon resection was carried out were characterized by minimum inflammatory changes in fabrics. It defined a smooth current of the postoperative period and minimized risk of a repeated operative measure, and also reduced terms of treatment of patients.

Keywords: purulent omentitis, acute appendicitis, epiploon tissues, resection, patient

Relevance of research. Diagnostics and treatment of a purulent omentitis' children is one of actual problems of children's surgery.

The inflammation of a big epiploon is noted at the destructive form of an acute appendicitis at 30% of children under 7 years and at 70% of patients 7 years and more senior [2, 3, 5, 7]. Involved in an inflammation, the epiploon comes into immediate contact with destructively changed shoot. At pathological states the epiploon gets absolutely special characteristics: plasticity, ability to an union with the injured, inflamed surface and to immunologic reaction [1, 2, 10].

At surgical treatment of a purulent omentitis often there is the difficult situation with the bound to delimitation of a resection of an epiploon [7, 9].

I.Y. Karpova and V.V. Parshikov (2002), citing data about a resection of a big epiploon at an acute appendicitis, in 11,6% of supervision in the postoperative period diagnosed secondary subacute omentitis.

As complication postoperative infiltrative subacute omentitis arises in 0,02–4,52%, being the heavy and the least studied complication of surgical interventions on abdominal organs at childre [2, 4].

Thus, in treatment of a purulent omentitis at children there are a lot of controversial issues that defines need of further researches. We stopped on a solution of the problem of the epiploon resection caused by lack of uniform idea of borders. The solution of this problem will allow to reduce the number of complications in early and late postoperative the periods.

Research objective. Decrease in frequency of the early and remote postoperative complications, the bound to a purulent omentitis at children. Research problems:

To define optimum borders of a resection of a big epiploon at a contact omentitis at chil-

dren. Research materials. From 1998 to 2015 at department of the children's surgery of the Samara state medical university located on the clinical SCCHN№ 1 base. N.I. Pirogova and SRCH of V.D. Seredavin, were on treatment of 267 children aged from 1 year till 15 years with an acute appendicitis, a contact omentitis, a local form of peritonitis and postoperative infiltrative subacute omentitis.

The analysis of case histories of children, with identification of the most often found forms of an acute appendicitis and an omentitis is carried out. When studying protocols of operations the special attention is paid to the linear dimensions of a rezetsirovanny epiploon.

All patients are divided into two groups. 209 patients entered a basic group. From a basic group at 32 children for the purpose of definition of optimum borders of a resection studying of histologic changes in an epiploon is carried out throughout. In each age group about 8 researches are carried out.

Control group made the 58th patient. The retrospective analysis of protocols of operations showed that in the postoperative period children of this group had complications, the bound to an inadequate resection of an epiploon.

In most cases patients with various forms of an appendicitis and an omentitis entered in the first days from the beginning of a disease – 224 (84%). 43 (16%) the patient entered for the 5–6th days.

In the analysis it is revealed that authentically high frequency of an acute appendicitis and omentitis is the share of age of children of 11–15 years (45,3%) with advantage at boys.

The group of patients with an infiltrative subacute omentitis included 58 children who are earlier operated concerning the destructive forms of an acute appendicitis, and a contact omentitis. The epiploon resection on border

of visually changed and healthy epiploon with use as a suture material of capron and a catgut was executed. At 44 (75,8 %) patients in the early postoperative period uncomplicated infiltrative subacute was created omentitis, at 14 (24,2 %) – abscess. The most often infiltrative subacute omentitis meets at the age of 8–10 years. Complication is more often noted at boys.

Pathomorphologic changes in a big epiploon at children with an acute appendicitis, a contact omentitis, and a local form of peritonitis. The most often unsatisfactory results of treatment of a contact omentitis at children are bound to inadequate definition of border of a resection of an epiploon that in certain cases causes the necessity of a repeated operative measure. In the majority of supervision at a resection of an epiploon the elementary technique based on a visual assessment of appearance of the epiploon involved in inflammatory process is applied, and the resection is carried out on border between the healthy and inflamed fabrics.

The solution of this problem consisted in studying and the analysis of the linear dimensions and the area of a resection of an epiploon. In the analysis of control group of patients (58 children) by us it is revealed that in the postoperative period in this group of complication are bound to the improper definition of border of a resection, and results of treatment are recognized as unsatisfactory. The linear dimensions and the area of a resection in this

group were much less, than in a basic group. In a basic group of complications, the bound to an epiploon resection, were not. The studied linear dimensions and the area of a resection of an epiploon in this group allowed to draw a conclusion that they are optimum and minimize risk of postoperative complications. For confirmation of the obtained data at 32 children of a basic group studying of histologic changes in a resected epiploon is carried out. The free edge of an epiploon, the mid-range and border of a resection were investigated. 8 researches in each age group are conducted.

In a histologic picture of the free edge of an epiploon existence of an extensive site of the necrosis penetrated by segmented leukocytes and products of their disintegration attracts attention. They are localized in the center, forming the center and are distributed in the form of a narrow strip throughout one of the parties of an epiploon.

In adjacent sites fatty tissue was penetrated by a large number of venules and veins in a condition of a plethora. Vessels are numerous, there are traces of the former hemorrhages in the form of a fibrinous clot. On separate sites in fatty tissue infiltrates from segmented leukocytes are defined.

In fabrics of the mid-range of an epiploon the abscess penetrated by sectional leukocytes and products of its disintegration is found. In the fabrics surrounding abscess fresh hemorrhages and hemorrhages in the form of a fibrinous clot are revealed.

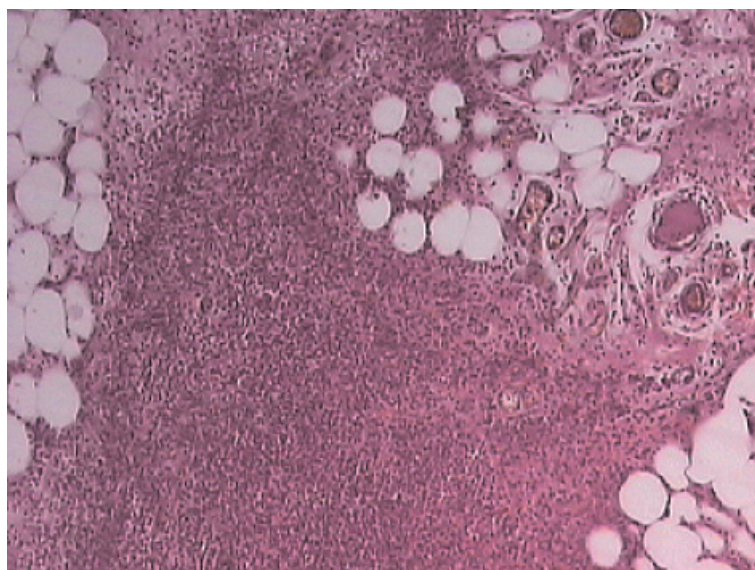


Fig. 1. Histologic picture of the free edge of an epiploon (coloring by a hematoxylin and eosine. Apprx. 8, about. 10)

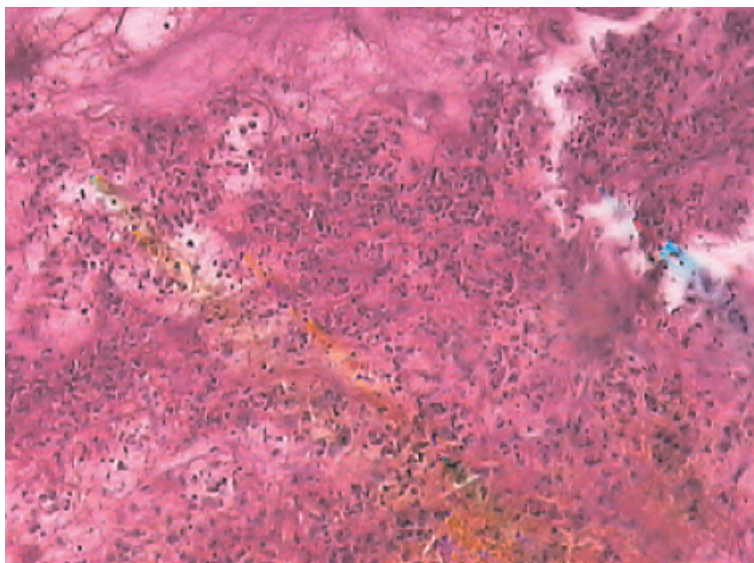


Fig. 2. Histologic picture of the mid-range of an epiploon (paint of a gematoksilino and eosine. Apprx. 8, about. 10)

Fabric of an epiploon consisted of islands of the fatty cages divided by wide layers of the formed connecting fabric presented generally by fibroblasts and gentle bunches of collagenic fibers. It was penetrated by a large number of vessels of a microcirculatory bed among which venules, shallow arteries and veins prevailed. Especially it was much observed elements of a venous component.

In connecting fabric around vessels perivascular infiltrates from sectional leuko-

cytes and lymphocytes which penetrated a wall of shallow arteries and plasmocytes are found. There was a moderate diffuse infiltration consisting mainly of lymphocytes.

In large venous vessels the venous plethora was noted. There was an inflammation site in the form of abscess, and also inflammatory changes of fabrics, adjacent to it, in the form of perivascular infiltrates. Around fatty cages fresh hemorrhages in a condition of the organization with diffuse leukocytic infiltration are found.

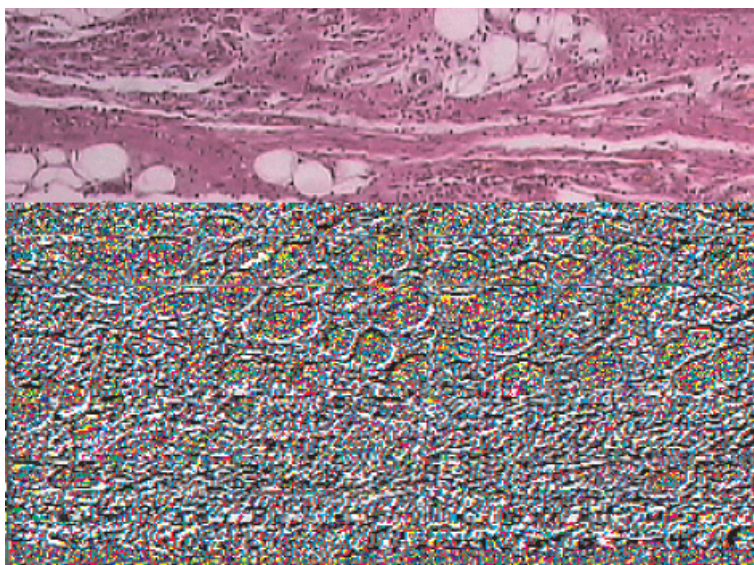


Fig. 3. Histologic picture of border of a resection of an epiploon (coloring by a hematoxylin and eosine. Apprx. 8, about. 10)

In a histologic picture on border of a resection of a big epiploon a large amount of fatty tissue which sites are divided by connective tissue layers is revealed. In connecting fabric traces of the former hemorrhages in a condition of the organization and the small perivascular infiltrates consisting mainly of plasmocytes are revealed. Fabric is penetrated by a large number of vessels: arteries, veins and venules. Existence of thin-walled venous vessels was noted, they were expanded, with the phenomena of a hemolysis of erythrocytes. Numerous expanded capillaries, arterioles in boundary sites are also revealed. Here traces of the former hemorrhages are found.

Fatty cages are partially destroyed, sometimes between them fabric liquid, simple restricted cell-like infiltrates, leukocytes were defined.

Also development of the connecting fabric consisting of fibroblasts, hystiocytes, separate lymphocytes is revealed. Fabric is penetrated by elements of a microcirculatory bed.

Considering what in a basic group of children of postoperative complications is not revealed and repeated operations were not performed, we made the conclusion that particular linear dimensions and the area of a resection are optimum. The conducted histologic researches at 28 patients of a basic group confirmed that the resection of a big epiploon is carried out in borders of minimum expressed inflammation.

Comparison of average linear dimensions of a resection of a big epiploon in the main and control groups allows to draw a conclusion that visually visible borders of a resection not always provide the favorable current of the postoperative period. It is proved by our clinical supervision. In a basic group of children of 1–3 years the average length of a resection makes 7,13 sm, width 3,75 sm, the area of a resection 26,73 sm². Length of a resection was equal in control group 2,5 sm, width – 2 sm, and the area of a resection – 3 sm².

Comparing the obtained data, it is possible to draw a conclusion that for the favorable current of the postoperative period it is necessary to recede from border of visible inflammatory changes of fabrics of an epiploon longwise on 4,6 sm, to width on 1,75 sm, and the area of a resection has to be increased by 23,7 sm².

In a basic group of 4–7 years the average length of a resection makes 7,5 sm, width 3,5 sm, the area of a resection of 26,5 sm². In control group length of a resection was 6,76 sm, width 3,11 sm, and the area of a resection of 24,48 sm². For the favorable current of the postoperative period in this group it is necessary to recede from border of visible inflammatory changes of fabrics of an epiploon longwise on 1 cm, width 0,4s m, and the area of a resection has to be increased by 2 sm².

In a basic group of children of 8–10 years the average length of a resection makes 5,88 sm,

width 8,06 sm, the area of a resection 39,17 sm². In control group length of a resection was 6,15 sm, width 3,63 sm, and the area of a resection 26,77 sm². Comparing the obtained data, it is possible to draw a conclusion that in this group it is necessary for the favorable current of the postoperative period that width of a resection was increased on 2,25 sm that will allow to increase also the area of a resection on 12,4 sm².

In a basic group of children of 11–15 years the average length of a resection makes 11,33 sm, width 3,67 sm, the area of a resection of 67 sm². In control group length of a resection was 7,08 sm, width 3,23 sm, and the area of a resection 25,03 sm². Comparing the obtained data, it is possible to draw a conclusion that for the favorable current of the postoperative period in this group it is necessary to recede from border of visible inflammatory changes of fabrics of an epiploon longwise on 4,25 sm, resection width sufficient, and the area of a resection has to be increased on 41,97 sm².

Investigating results of the conducted research, it is possible to claim that the linear dimensions determined by us and the area within which the epiploon resection was carried out were characterized by minimum inflammatory changes in fabrics. It defined a smooth current of the postoperative period and minimized risk of a repeated operative measure, and also reduced terms of treatment of patients.

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GENDER FEATURES OF BIOCHEMICAL AND IMMUNOLOGIC INDEXES OF ORAL LIQUID OF CHILDREN AT THE AGE OF 14–17 YEARS WITH THE DIFFERENT LEVEL OF GARMONIOUSNESS OF PHYSICAL DEVELOPMENT

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With the purpose of exposure of conformities to law between the value of row of biochemical and immunological indexes of mouth liquid and level of harmoniousness of physical development of child 168 children were inspected in age 14–17, constantly resident on territory of the city of Tver and student in the general schools located in different boroughs. All inspected children divided on sex and on the level of harmoniousness of physical development. The level cortisol was studied, DHEA, potassium, natrium, calcium, magnesium, phosphorus, secretory ig A in a mouth liquid. We conducted the analysis of features of biochemical and immunological indexes of mouth liquid of children with harmonious and disharmonious physical development. For an analysis were used non-parametric statistical method of comparison of two selections Whitney and grade cross-correlation analysis of Spirmen. Interesting appeared, that circumstance, that the similar reliable are Interesting appeared, that circumstance, that similar reliable correlative connections are for boys with harmonious development and for girls with disharmonious development. Alike, that for girls the disbalance of sexual hormones is guilty in disharmonious development.

Keywords: children, teenagers, formation of health, level of harmoniousness of physical development, oral liquid

An important index in the complex estimation of health of child is harmoniousness or disharmoniousness of his physical development.

Physical development of child is estimated usually by comparison of his individual indexes with the age-related standards. It is thus important to not only decide a question about accordance of length and body weight, circumferences of thorax and other indexes to age of child but also specify, as far as his development is harmonious. For the children of school age these indexes it is necessary to estimate taking into account biological maturity.

For the estimation of physical development of children different methods were used – indexes, sigmalnykh rejections, scale of regression, tsentil. However, the method of indexes is confessed by useless for the estimation of physical development of growing organism, as it is set that the separate sizes of body of child increase unevenly, and, anthropometric indexes change disproportionate. Method of sigmalnykh rejections and scale of regression are based on supposition, that the investigated selection corresponds to the law of normal distribution, although research of forms of distribution of row of anthropometric signs (body weight, circumference of breast, muscular force of hands of and other) specifies on their asymmetry more often right-side. Therefore, the borders of sigmalnykh rejections can be artificially set too high or understated, distorting a veritable estimation.

Tsentilny a method is unreserved character of distribution of variants. He is simple

in process, because at the use of tsentilnykh tables or charts calculations are eliminated. Two-dimensional centile scales “length of body is body weight”, “length of body is a circumference of breast”, in that mass and circumference of breast settle accounts on due length of body, allow to judge about harmoniousness of development.

At the individual estimation of physical development, determine the level of sign according to his regulations in a centile row. Five groups in this case estimate length of body (as well as body weight). Indexes getting in 25–75 tsentil, it is necessary to consider middle, in 10–25 – low middle, in 75–90 – hi middle, in 3–10 – subzero, in 90–97 – high. At accordance of mass bodies, circumferences of breast, are long and bodies are long it is talked about harmonious physical development.

Materials and methods of research

We surveyed 316 of teens (ages 14–17 years old) were divided into Group of comparison by gender (girls, boys) and degree of harmonious physical development (harmonious, disharmonious). Studies were conducted based on clinical-diagnostic laboratory UNIVERSITY clinics (lab code in the registry FSBOK: 10319, license № FS-69-01-000780 from 23.04.2015 g.) on automatic biochemical Analyzer Flexor XL (Germany, 2012) using commercial kits of reagents for clinical diagnostic laboratories company “Vital” (Russia). Potassium-turbidimetričeskim method without deproteinizacii, sodium-colorimetric enzymatic method kinetic colorimetric method, calcium with Arsenazo III, magnesium-colorimetric (blue ksili-dilovyy) method without deproteinizacii, phosphorus-UV method without deproteinizacii.

Determination of cortisol, DHEA in mixed saliva carried out by steadily immunosorbent assays (ELISA) at

mul'tidetektore 1100 Zenyth (Austria, 2005) with sets of reagents firm "HEMA" (Russia).

Determination of secretory immunoglobulin A and avidness secretory immunoglobulin A in two parallel samples were did by steadily immunosorbent assays using a set of reagents "sIgA-Elisa-best".

In one of the samples added urea solution (0,3 mol/l), which destroys the fragile immune complexes. Avidness antibodies was evaluated using the calculated index avidness index, which is the ratio of the enzyme result for determining the concentration of antibodies in the sample were subjected to processing of urea, to the result of the measurement of the concentration of antibody in a sample, urea is not processed. The definition of avidness is the differentiation of high and low avidness antibodies. Avidness characterizes the adhesive properties of antibodies.

For statistical data processing software package was used "Statistica 6". Statistical analysis included computation of descriptive statistics and data analysis for normality of the distribution, the investigation of relationships between the parameters and the comparison groups. Differences were considered significant when p groups $< 0,05$, where p is the level of significance.

Results of research and their discussion

Analysis descriptive the statistician of biochemical and immunological parameters in the mouth liquid of teenagers by comparison to the reviewer indexes of the studied parameters showed that the scope of vibrations of values of indexes of cortisol and DHEA (from minimum to maximal) for girls is considerably higher.

Maybe it related to their greater emotional label and feature of hormonal background. The mean values of DHEA for girls are higher than refrentnykh values of norm, minimum values both for girls and for boys below than refrentnykh values, and maximal values for girls sharply exceed the abstract borders of norm. Mean values of indexes of potassium, calcium and magnesium in a mouth liquid both for girls and for boys below than refrentnykh values, and natrium – higher. Maybe it related to the

ecological features of place of residence: water, food, features of feed and ecology of place of residence.

In order to judge the veracity of differences between groups, it was necessary to conduct an audit of the data on the normality of the distribution. Data validation on the normality of the distribution was carried out. It was revealed that most of the parameters is not a normal distribution. So for the analysis were used nonparametric statistical methods, in particular, when comparing two samples used U-Mann-Whitney test.

So when comparing two samples, with harmonious and disharmonious physical development has been a trend to differ ($p = 0,0896$) boys on the avidity of the secretory immunoglobulin a, but the girls a trend toward excellence by magnesium ($p = 0,077$).

Macro element composition of saliva very depends on composition of the used food and amount of the drunk liquid, from the state of gematosalivarny barrier and from maintenance of microelements in the serum of blood.

The decline of magnesium in saliva similarly can testify to propensity to the obstruction or at the presence of irritating the mucous membranes of harmful admixtures in an atmosphere [3].

In respect of pregnenetrioldione and DHEA, then it needed in every special case to understand individually: to know both weight and degree of stability to stress of child etc. It was desirable to add in future psychological tests for the inspection of children. Determination of DHEA replaces determination of 17 – KS in urine at the estimation of making of androgens. In the ovaries of synthesis DHEA does not take (a test is used therefore for determination of source of giperandrodenemiya in the organism of woman) place.

Results of researches of parameters of mouth liquid of children 14–17

Index	Group of children with harmonious physical development		Group of children with disharmonious physical development	
	Boys $n = 61$	Girl $n = 55$	Boys $n = 79$	Girl $n = 121$
cortisol	$1,8 \pm 0,3$	$1,96 \pm 0,3$	$1,6 \pm 0,2$	$3,3 \pm 0,6$
Dehydroepiandrosterone (DHEA)	$0,7 \pm 0,05$	$1,04 \pm 0,1$	$1,1 \pm 0,2$	$7,6 \pm 6,6$
potassium	$7,2 \pm 0,3$	$6,9 \pm 0,3$	$7,6 \pm 0,3$	$7,3 \pm 0,2$
natrium	$33,2 \pm 2,6$	$38,1 \pm 3,0$	$38,2 \pm 2,6$	$33,2 \pm 1,7$
calcium	$0,55 \pm 0,05$	$0,6 \pm 0,04$	$0,7 \pm 0,08$	$0,6 \pm 0,04$
magnesium	$0,3 \pm 0,02$	$0,32 \pm 0,03$	$0,3 \pm 0,02$	$0,27 \pm 0,02$
phosphorus	$2,9 \pm 0,2$	$2,8 \pm 0,3$	$3,3 \pm 0,3$	$3,2 \pm 0,2$
sIgA A	$167,9 \pm 24,1$	$163,1 \pm 27,6$	$156,2 \pm 20,7$	$184,3 \pm 19,5$
Avidness sIgA A	$63,4 \pm 2,8$	$74,9 \pm 2,3$	$70,9 \pm 2,1$	$76,5 \pm 1,5$

High avidness of sIgA can testify or about a chronic hearth in an epipharynx and adhesives properties of antibodies are high (antibodies ripen “quickly”, because constantly microorganisms remind about itself). High avidness of secretory antibodies A can testify and about propensity to the allergic reactions, (the best terms are created for sensitization of organism allergens).

It appears us, that a study of correlative intercommunications of biochemical and immunological indexes at different diseases and states of organisms is not only concrete recommendations for practice but also new going near understanding of adjusting of homeostasis and new perspective ways of management by metabolism.

We carried out rank-order Spearman correlation analysis, the result revealed a General authentic correlative connection of different forces, but are peculiar to girls and boys, and with harmonious and disharmonious development. Is a cortisol, potassium, cortisol, secretory immunoglobulin a, and DHEA – magnesium, secretory immunoglobulin A – phosphorus, secretory immunoglobulin A – potassium, potassium – phosphorus. Identify and respect unique to a specific group of girls or boys (harmonious or disharmonious physical development). It reliable correlations in boys and girls with disharmonious development much more than the general correlative relationships among boys and girls with a harmonious physical development. Interesting seems the fact that you have a similar authentic correlative connection that boys have with a harmonious development in girls with disharmonious development (cortisol – phosphorus, secretory immunoglobulin A – sodium, cortisol – DHEA), and girls with harmonious development and boys with disharmonious development of such pattern is not detected. It seems that in disharmonious development in girls caused by an imbalance of sex hormones.

Conclusion

Given that saliva is a biological material, work which started recently and the concentration of substances in it are subject to very large fluctuations, therefore, to interpret the results of biochemical studies it is necessary not only among themselves but also in correlative relationships with clinical data and instrumental data survey. Through every living organism constantly passes a stream of various substanc-

es involved in metabolic processes, and emissions into the environment in the form of products of metabolism. This flow of substances the body and maintains its existence [1]. The lack of minerals in the diet forces the body to use its reserves, which are in the body tissues. Assimilation of minerals depends on their relationship and interaction with each other [2].

Regulatory mechanisms to ensure the preservation of life of the whole organism, called homeostatic [3]. The central mechanism for implementation of the recovery process of homeostasis are all sorts of barriers. Conventionally distinguish internal and external barriers. External barriers to protect the body from physical and chemical changes in the environment. They prevent the penetration of microorganisms, toxins, and provide disposal and removing them from the body.

Internal barriers regulate the inflow of blood to the organs and tissues necessary substances, and the outflow from the tissue cell metabolism products. The structural nature of the barrier histogematogenous up the endothelium, basement membrane, a basic substance and nerve fibers. Under the conditions of normal lifeblood of their dynamic balance supported by external barriers. Endothelial dysfunction is one of the major pathogenesis mechanisms of many diseases and pathological conditions, especially cardiovascular system.

The study of endothelial function as a model of the cell membrane is possible by examining its permeability in various pathological conditions to determine the concentration of the substances on either side of the membrane [4, 5]. In clinical practice, a certain perspective is the study of gematosaliva's barrier function. It seems that expressed earlier hypothesis [3] on the existence of a close link between saliva and blood, and that the balance shifts in blood at the cost of violation of saliva biochemical balance is confirmed in the analysis of our data.

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CLINICAL AND IMMUNOLOGICAL ASSESSMENT OF SYSTEMIC ENZYME THERAPY EFFICIENCY IN THE TREATMENT OF MAXILLOFACIAL FURUNCLES AND CARBUNCLES

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In this article Furuncles and carbuncles are described, which are one of the most common diseases of maxillofacial region. In this regard, searching and testing of the new methods of furuncles and carbuncles treatment of maxillofacial region, problem of decrease in side effects of therapy is very actual. The modern, quickly developing therapy method at the immunopathological states and diseases connected with violation of immunity and a hemostasis is the systemic enzyme therapy of pyo-inflammatory processes including internal organs. The system and combined application of wobenzym for patients with maxillofacial region furuncles and carbuncles were followed in dynamics of treatment unlike antibacterial therapy by quantity increase of lymphocytes CD4+, by decrease of the complement activity and quantity of soluble fibrin-monomeric complexes.

Keywords: furuncles and carbuncles, pyo-inflammatory pathology, fibrin-monomeric complex, lymphocyte, wobenzym, therapy, leucocytes migration

Furuncles and carbuncles are one of the most common diseases of maxillofacial region, ranking the first place among neodontogenic pyo-inflammatory pathologies of maxillofacial region [4]. The high frequency of furunculosis and its recurrent course are largely due to immune deficiency which contributes to the rapid development of bacteremia with maxillofacial furuncles and carbuncles [6].

Numerous works are devoted to research of cellular and humoral immunity at furunculosis [5]. Considering the leading role of the immune system reactions in furunculosis pathogenesis, its antibacterial therapy, a use of immunomodulators in this disease is proved.

In furunculosis the positive effects of specific immune preparations are noted: staphylococcal anatoxin, antifagin, anti-staphylococcal plasma, antibacterial antilympholine, staphyloprotectin, tomycidum [1]. Also immunomodulators, sorbents and proteolytic enzymes are effective: Tactivin, myelopidum, tagansorbent, differin, galavit, polyoxidonium, imosimasum [2]. However, action of immunoactive preparations is studied insufficiently in pyo-inflammatory diseases of maxillofacial region where owing to person's anatomical topographical features the disease quickly progresses and the risk of development of complications is high.

In this regard, searching and testing of the new methods of furuncles and carbuncles treatment of maxillofacial region, problem of decrease in side effects of therapy is very actual. The modern, quickly developing therapy method at the immunopathological states and diseases connected with violation of immunity and a hemostasis is the systemic enzyme ther-

apy of pyo-inflammatory processes including internal organs. The preparation of the systemic enzyme therapy with wobenzym has anti-inflammatory, antiedematous, immunomodulatory and fibrinolytic effects [3].

Due to the above, in pyo-inflammatory diseases of maxillofacial region the carrying out of the researches allowing to assess the clinical and immunological efficiency of enzyme therapy of maxillofacial region furuncles and carbuncles is proved.

Examination and treatment results of 244 patients, from them with abscessed boils – 96 (39,3%), with recurrent boils (RB) – 86 (35,3%) and carbuncles – 62 patients (25,4%) are reflected in work. Patients aged from 18 till 65 years, including from 20 to 30 years (32,1%) and from 31 to 40 years (42,0%), from them 149 men (61,1%) and 95 women (38,9%) were observed.

Clinical examination of patients with maxillofacial region furuncles and carbuncles was being carried out from 2012 to 2015 on the basis of Maxillofacial Surgery Department of JSC «Astana Medical University» and further in out-patient conditions during clinical supervision of patients.

The examined patients taking into account the treatment methods have been divided into 3 groups (Table 1). Traditional therapy included prescription of an antibiotic after determination of sensitivity to it (gentamycinum of 120 mg a day), vitamins (Vit. B1, B6), deintoxication (haemodesum, saline) and desensibilizing therapy, local treatment by opening of an abscess, processing of a wound by an antiseptic, introduction of a drainage and daily

bandages with hypertensive solution. The systemic enzyme therapy (SET) assumed administration of wobenzym on 5 dragees 3 times a day within 2 weeks to the patient with maxillofacial region furuncles and carbuncles. The patients with recurrent boils in an aggravation stages were administered wobenzym on 5 dragees 3 times a day within 2 weeks and further on 3 dragees 3 times a day up 2 months.

timated on fibrinolysis research (Eremin G.F., et al. 1982), ristomycin induced aggregation of platelets (RIA) according to A.S. Shitikova (1982), fibrinogen (Rutberg R.A., 1984), the maintenance of soluble fibrin-monomeric complexes (SFMC) in using the phenanthroline test (Hawigen J., 1970).

Statistical processing of material was carried out by means of the software package of

Table 1

Distribution of patients depending on the carried-out therapy

Clinical form	Antibiotic therapy (ABT)	ABT + systemic enzyme therapy (SET)	ABT + SET and local enzyme therapy
Abscessed furuncle	33	35	28
Carbuncle	20	21	21
Recurrent furuncle	32	23	31

Local treatment of patients with the complicated course of disease assumed opening of an abscess, processing of a wound with antiseptic and introducing wobenzym in the form of powder on 240 mg. The wound was closed with the sterile napkin moistened with saline. Bandaging was carried out daily in the presence of purulent discharge from wound.

30 healthy people were examined for control. Primary examination was carried out on the first day of hospitalization, further in 10–12 days, the third was during process subsiding (in 1,5 months).

The indicators of total of T- and V-lymphocytes in peripheral blood were determined at all patients by the Jondal et.al method. (1972); subpopulations of T-lymphocytes (T_x , T_c) were defined by Limatibul et.al. (1978), and also with use of monoclonal antibodies to CD3+, CD4+, CD8+, CD20+ lymphocytes, a cages coloring technique in the immunofluorescent test of Sorbent LLP, the immunoregulatory index (CD4+/CD8+), the results were compared and they were more exact in determination with the use of monoclonal antibodies, but clinical manifestations of process reflected the changes of laboratory indicators, the content of A, M, G immunoglobulins (Mancini G., 1965), the circulating immune complexes (CIC) by Haskowa (1972). A factor level of the braking migration of leucocytes (BML) in leucocytes migration inhibiting reaction with staphylococcal allergens (Artyomova A.G., 1973), hemolytic activity of a complement on 50% to hemolysis, phagocytosis and phagocytic number were also considered (Stenko M.I., 1975). The system indicators of a hemostasis were es-

“Statistic 5.7” by the standard techniques of variation statistics with an assessment of results reliability, a confidential interval by Student criterion and by the method of the correlation analysis according to Pearson.

Research results and their discussion:

The indicators analysis of immune system of patients with maxillofacial furuncles and carbuncles has shown that they have reduced absolute quantity of CD3+ of lymphocytes in comparison with control (Table 2), at the same time the lymphopenia was characteristic of patients with recurrent furuncle ($p < 0,05$). The absolute quantity of CD4+ of lymphocytes has been authentically reduced in comparison with control at patients with recurrent furuncle ($p < 0,05$).

Sensibilization study to a specific antigen has revealed strengthening of the phagocytes migration factor (PMF) – producing activity of cells in response to staphylococcal allergen at patients with carbuncle and recurrent furuncle, at the same time the most expressed sensibilization was at recurrent furuncle ($p < 0,01$).

Research of humoral immunity indicators has revealed relative increase in quantity of CD20+ of lymphocytes at patients with carbuncle and IgG content increase in comparison with control at patients with maxillofacial region furuncles ($p < 0,05$). The CIC maintenance was reliable above control irrespective of a clinical form of a disease, at the same time increase of the CIC concentration happened in weighting process and synchronization process.

Phagocytosis indicators authentically exceeded control at patients with furuncles on

the face whereas the phagocytic cells quantity was 1,3 times lower than control at patients with carbuncle and recurrent furuncle. Phagocytic number increase was also registered at patients with furuncles ($p < 0,05$), at the same time at patients with recurrent furunculosis it authentically decreased. At patients with carbuncle and recurrent furuncle the increase of complement activity was noted in comparison with control, at the same time the highest rates were registered at patients with recurrent furunculosis.

Platelets increase was noted at patients with furuncles in comparison with control

group whereas its decrease was observed at patients with recurrent furunculosis. Fibrinogen concentration increase was the highest in comparison with control at patients with recurrent furunculosis ($p < 0,05$). In the same group of patients the lowest level of ristomin induced aggregation of platelets was noted ($p < 0,05$). Blood concentration of soluble fibrin – monomeric complexes at patients with maxillofacial region furuncles and carbuncles was high irrespective of a clinical form of a disease. Time lengthening of fibrinolysis was noted at patients with maxillofacial carbuncle and recurrent furunculosis.

Table 2

Indicators of immunity and hemostasis system of patients with maxillofacial region furuncles and carbuncles

Options	Healthy people	Furuncles	Carbuncles	RF
Lymphocytes, $\cdot 10^9/l$	$1850 \pm 59,9$	$1902 \pm 19,2$	$1736 \pm 27,1$	$1649 \pm 18,6^*$
CD3 ⁺ lymphocytes, %	$40,10 \pm 1,63$	$31,70 \pm 0,49^{**}$	$34,87 \pm 0,77^*$	$39,68 \pm 0,57$
exam. p. $\cdot 10^9/l$	$742 \pm 23,0$	$604 \pm 5,74^{**}$	$606 \pm 8,93^{**}$	$654 \pm 7,00^{**}$
CD4 ⁺ lymphocytes, %	$21,79 \pm 1,37$	$21,37 \pm 0,42$	$22,54 \pm 0,68$	$22,63 \pm 0,48$
exam. p. $\cdot 10^9/l$	$403 \pm 11,6$	$407 \pm 3,69$	$391 \pm 5,44$	$373 \pm 3,71^*$
CD8 ⁺ lymphocytes, %	$10,70 \pm 2,62$	$10,77 \pm 0,32$	$11,39 \pm 0,47$	$11,95 \pm 0,34$
exam. p. $\cdot 10^9/l$	$198 \pm 4,64$	$205 \pm 2,52$	$198 \pm 4,53$	$197 \pm 3,41$
CD4 ⁺ /CD8 ⁺	$2,03 \pm 0,47$	$1,98 \pm 0,10$	$1,97 \pm 0,13$	$1,89 \pm 0,14$
LIR, migration index	$0,91 \pm 0,07$	$0,96 \pm 0,06$	$0,71 \pm 0,06^*$	$0,54 \pm 0,05^{**}$
CD20 ⁺ lymphocytes, %	$11,18 \pm 0,41$	$11,14 \pm 0,21$	$12,50 \pm 0,20^*$	$11,46 \pm 0,96$
exam. p. $\cdot 10^9/l$	$207 \pm 10,2$	$212 \pm 12,0$	$217 \pm 14,2$	$189 \pm 11,0^*$
IgA g/l	$1,92 \pm 0,45$	$1,55 \pm 0,12$	$1,36 \pm 0,18$	$1,21 \pm 0,12$
IgM g/l	$1,86 \pm 0,45$	$2,04 \pm 0,14$	$1,78 \pm 0,21$	$1,45 \pm 0,13^*$
IgG g/l	$12,40 \pm 1,09$	$14,89 \pm 0,37^*$	$13,50 \pm 0,56$	$10,32 \pm 0,35$
CIC, conven.units	$72 \pm 9,10$	$136 \pm 12,3^*$	$163 \pm 14,2^{**}$	$220 \pm 23,0^{**}$
Phagocytosis, %	$49,8 \pm 1,67$	$58,0 \pm 0,51^{**}$	$38,9 \pm 0,79^{**}$	$39,4 \pm 0,57^{**}$
Phagocytosis numbers	$4,12 \pm 0,67$	$5,84 \pm 0,24^*$	$3,52 \pm 0,30$	$2,32 \pm 0,18^*$
Complement, %	$40 \pm 1,63$	$40 \pm 0,51$	$45 \pm 0,80^*$	$50 \pm 0,58^{**}$
Thrombocytes $\cdot 10^9/l$	$253 \pm 6,56$	$278 \pm 2,31^*$	$261 \pm 3,30$	$231 \pm 2,02^*$
IAR	$16,7 \pm 1,24$	$15,5 \pm 0,38$	$14,7 \pm 0,58$	$13,3 \pm 0,40^*$
Fibrinogen, g/l	$2,88 \pm 0,56$	$4,09 \pm 0,20^*$	$4,11 \pm 0,32$	$4,41 \pm 0,23^*$
SFMC, mcg/ml	$37,3 \pm 1,61$	$46,4 \pm 0,51^{**}$	$47,2 \pm 0,80^{**}$	$47,0 \pm 0,57^{**}$
Fibrinolysis,min	$4,50 \pm 0,70$	$5,30 \pm 0,10$	$7,30 \pm 0,41^*$	$8,80 \pm 0,32^{**}$

Note. * – reliability of distinctions with control ($p < 0,05$), ** ($p < 0,01$).

Thus, at the examined patients irrespective of a clinical form of a disease the low maintenance of CD3+ of lymphocytes, increase of soluble fibrin-monomeric and circulating immune complexes were registered. At the same time, sensibilization dependence to staphylococcal allergen from the number of the CIC (respectively $r = 0,4$ and $r = 0,5$), from the maintenance of CD3+ of lymphocytes ($r = -0,39$ and $r = -0,41$) and from phagocytic number is revealed ($r = -0,37$ and $r = -0,39$) only at patients with carbuncle and recurrent furunculosis. Number feedback of the CIC from PN ($r = -0,43$ and $r = -0,41$), positive correlation of the CIC level from activity of a complement is revealed ($r = 0,36$ and $r = 0,43$) in the same groups of patients.

Clinical efficiency of wobenzym at maxillofacial furuncles and carbuncles was estimated on terms of decrease in symptoms of intoxication, body temperature, time of an epithelization of furuncles and carbuncles (decrease in hypostasis and hyperaemia, clarification of a wound from purulent separated wound); on development frequency of the next complications and remote recurrence, at the same time indicators of ESR and quantity of leucocytes in peripheral blood were considered.

System and local application of a wobenzym for patients with maxillofacial region furuncles and carbuncles provided reliable reduction of intoxication symptoms in comparison with traditional therapy. So, after a wobenzym therapy of patients with maxillofacial furuncles and carbuncles, duration of symptoms, intoxications were authentically less in comparison with antibiotic treatment, temperature was normalized on average for 2 days in comparison with traditional treatment earlier ($p < 0,05$). Epithelization of a wound at the patients treated with wobenzym happened earlier than at the patients who have received traditional therapy (Table 3).

Combined (system and local) application of wobenzym has yielded the best immediate results of treatment in comparison with an antibacterial and systemic enzyme therapy (wobenzym per os).

Phlebitis of a facial vein (Table 4) was the most frequent complication developing at the examined patients. The patients treated by wobenzym had a phlebitis frequency considerably less than at the patients who have received antibiotic treatment ($p < 0,05$), and the smallest number of phlebitis is registered at the patients who have received combined (system and local) treatment of wobenzym ($p < 0,05$ in comparison with a systemic enzyme therapy).

After three months examination the frequency of recurrence in group of the patients treated with a systemic enzyme therapy and with the combined method of treatment (Table 5) was respectively 1,62–1,75 times less than in group of the patients who have received antibacterial therapy ($p < 0,05$). In 2 years examination results of the combined (system and local) treatments with wobenzym were much better than the results of one systemic enzyme therapy and antibacterial treatment ($p < 0,05$).

Clinical efficiency of wobenzym was confirmed by assessment results of the immune status and system of a hemostasis in treatment dynamics of patients with maxillofacial region furuncles and carbuncles.

The cellular immunity study at patients with maxillofacial region furuncles and carbuncle has revealed the quantity increase of CD3+ of lymphocytes after systemic enzyme therapy and combined (system and local) applications of wobenzym ($p < 0,05$). The maintenance of CD4+ of lymphocytes increased in dynamics of treatment with wobenzym at patients with carbuncles and recurrent furunculosis ($p < 0,05$), after antibiotic treatment the quantity of CD4+ of lymphocytes authentically didn't change or, on the contrary, decreased at patients with maxillofacial carbuncle ($p < 0,05$).

Table 3

Wound epithelization terms (in days) at patients with maxillofacial region furuncles and carbuncles

	Group of patients depending on therapy		
	Antibiotic therapy (ABT), $n = 85$	ABT + SET, $n = 79$	ABT + SET + local Wobenzym, $n = 80$
Furuncle	$7,7 \pm 0,43$	$6,1 \pm 0,31^*$	$5,2 \pm 0,32^{\#}$
Carbuncle	$10,8 \pm 0,60$	$8,4 \pm 0,42^*$	$7,1 \pm 0,45^{\#}$
RF	$9,2 \pm 0,62$	$6,7 \pm 0,54^*$	$5,3 \pm 0,34^{\#}$

Note.* – difference with ABT ($p < 0,05$), # – difference with a group of patients who took antibiotics and systemic enzyme therapy ($p < 0,05$).

Table 4

Development frequency of phlebitis at maxillofacial region furuncles and carbuncles depending on a way of treatment

Clinical form	Group of patients depending on therapy							
	Antibiotic therapy (ABT), $n = 85$		ABT + SET, $n = 79$				ABT + SET + local enzyme therapy, $n = 80$	
	Total	Number of rec.	Total		Number of rec.		Total	Number of rec.
		exam. p.	%		exam. p.	%		exam. p.
Furuncle	33	6	18,2	35	3	8,57	28	1
Carbuncle	20	4	20	21	3	14,2	21	2
RF	32	4	12,5	23	2	8,69	31	1

Table 5

Repeated development frequency of furuncles in patients with RF within the 3rd month and 2 summer supervision depending on the carried-out therapy (%)

Recurrence time	ABT, $n = 32$		ABT + SET, $n = 23$		ABT + SET + local enzyme therapy, $n = 31$	
	exam. p.	%	exam. p.	%	exam. p.	%
In 3 months	9	28,2	4	17,4	5	16,1
In 2 years	14	43,7	5	21,7	4	12,9

A decrease in the PMF – producing activity of leucocytes in response to staphylococcal allergen after systemic enzyme therapy and combined (system and local) applications of wobenzym was noted ($p < 0,05$) at patients with carbuncle and recurrent furunculosis. Reliable increase of lymphocytes CD20+ quantity and activity of a complement is revealed in treatment dynamics by antibiotics at patients with maxillofacial region furuncles. Complement activity increased after antibacterial treatment at patients maxillofacial region carbuncles. The system and combined enzyme therapy irrespective of a clinical form of an illness caused decrease of the complement activity ($p < 0,05$).

Application of wobenzym led to decrease in level of the CIC ($p < 0,01$) at the examined patients. Increase of phagocytosis and decrease in the CIC were reliable at the patients treated by combined (system and local) application of wobenzym irrespective of a clinical form of an illness.

The indicator of intravascular blood clotting (SFMC) authentically decreased after the combined enzyme therapy irrespective of a clinical form of an illness. Decrease in time of a fibrinolysis has been noted in group of patients with maxillofacial region carbuncles and recurrent furunculosis, accepting wobenzym ($p < 0,05$).

Thus, the system and combined application of wobenzym for patients with maxillofacial region furuncles and carbuncles were followed in dynamics of treatment unlike antibacterial therapy by quantity increase of lymphocytes CD4+,

by decrease of the complement activity and quantity of soluble fibrin-monomeric complexes. Decrease in fibrinolysis and the PMF – producing activity of leucocytes on staphylococcal allergen were noted at patients with carbuncle and recurrent furunculosis after treatment with wobenzym.

In the conclusion, the combined (system and local) treatment with wobenzym unlike system and antibacterial therapy led to decrease in the CIC and increase of phagocytosis irrespective of a clinical form of a disease. These changes of the immune status and a hemostasis at the patients who have received wobenzym contributed to reliable improvement of the next and further outcomes of therapy in comparison with antibacterial treatment.

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IMMUNOLOGICAL ASPECTS OF THE IMPACT OF ORGANOCHLORINE PESTICIDES DURING PESTICIDE PENETRATION INTO THE BODY THROUGH THE GASTROINTESTINAL TRACT

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The paper presents data on the analysis of breast milk samples collected from 201 women living in urban and cotton-growing areas of the Osh Province of the Kyrgyz Republic. Breast milk (BM) samples were screened for organochlorine pesticides (OCPs) in the course of their penetration into the body through the gastrointestinal tract and excretion from the body with BM considering lymph nodes and immune-forming eubiotics damaged by these pesticides in gastrointestinal tract. Reduced detoxification function of the liver and low levels of secretory immunoglobulins (SIgA and SIgM) in GM were also taken into account.

Keywords: immunological aspects, pesticides, gastrointestinal tract, breast milk, cotton-growing areas, Osh Province, Kyrgyz Republic

The higher the concentration of OCPs in the BM, the lower the level of secretory immunoglobulins SIgA and SIgM; the higher the concentration of OCPs in the gastrointestinal tract, the lower the level of eubiotics and liver detoxification function and the higher the risk of developing dysbiosis and the frequency of disturbances in biochemical parameters.

Background. The words spoken by L.I. Medvedev in 1970 “Even if we stop using DDT, people will remain its carriers for many years” are still relevant today and will remain true in the future [3]. In this respect, in Kyrgyzstan, sites polluted by organochlorine pesticides (OCPs) that were used in the 1970s for cotton and tobacco pest control (cotton and tobacco were strategically important raw materials in the Soviet Union) as well as for the protection of forest plantations, etc. [6, 7] are a constant source of concern. The impact of OCPs on human body, individual organs and systems were studied by A.I. Shtenberg, M.N. Rybakov [1970], P.P. Lyarskiy [1970], E.P. Krasnyuk et al. [1970], A.P. Schitskov et al. [1970], B.A. Revich [2000, 2004]. M.B. Shpirt et al. studied the effect of different doses of DDT on immunological reactivity of experimental animals [8] in 1969. Despite the numerous works devoted to toxic chemicals and pesticides, many questions still remain unanswered.

It was found that in the environment of the Osh Province, more than 95% of pesticides penetrate into the body through the gastrointestinal tract [7]. We have not met with the papers devoted to the comprehensive study of the impact of OCPs on the damage of immunity “defenders” during the penetration of OCPs and their excretion from the body depending on the functions of the body. Studying this problem may contribute to the development of

methods of protection and prevention of “primary” damaged organs, systems and beneficial microbes-eubiotics of the gastrointestinal tract from the toxic effects of pesticides.

The present study has been conducted and is being conducted under the projects of the Institute of Medical Problems of the Southern Branch of the National Academy of Sciences of the Kyrgyz Republic: “Studying the influence of negative factors of the environment and working environment on the health of the population” (2001–2005) and “Medical and biological aspects of health preservation and improvement of the gene pool of the population living in ecologically unfavourable areas of the Kyrgyz Republic with the development of complex measures using local raw materials” GR № 0000465, (2006–2016).

Materials and methods of research

Pesticides, when they get into the body through the gastrointestinal tract, first come into contact with the intestinal microflora that is involved in all processes in the gastrointestinal lumen, including the generation of antibodies and alter their enzyme and antagonist properties leading to variability of the intestinal microflora including eubiotics. Subsequently, OCPs get into the blood stream and lymph nodes (where immunoglobulins are formed) through the mucous intestine wall and damage lymph system (i.e., the immune system) and they then get into the liver by the portal vein disturbing its functions, including antitoxic function. In other cases, pesticides extracting with breast milk affect the level of antibodies in breast milk. On this basis, the state of the intestinal microflora (stool samples were collected for dysbacteriosis), liver function (liver tests were performed) and the levels of secretory immunoglobulins in breast milk have been studied. Concentrations of OCPs in breast milk were also measured.

Measurements of OCPs (hexachlorocyclohexane (HCH) and its isomers (α -HCH, γ -HCH, β -HCH and δ -HCH), 1,1,1-trichloro-2,2-di (n-chlorophenyl) ethane (DDT), 4,4-dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDD), aldrin and dieldrin, heptachlor) in breast milk were performed by thin-layer

gas-liquid chromatography using methodical instructions "Guidelines on the detection of trace amounts of pesticides in food stuffs, biological media, feed and the environment" [Part 17. Moscow, 1988, P. 389] and revised edition by M.A. Klisenko, A.A. Kalinina, D.B. Girenko et al. Pesticides test were carried out in the Laboratory of Toxicology, Radiology, Morphology and Ecology of the Institute of Medical Problems, South Branch of the Kyrgyz National Academy of Sciences (Osh) and Osh Province SES (Osh).

A total of 201 women living in urban and cotton-growing areas of the Osh Province of the Kyrgyz Republic were examined. Of them, 172 women with OCPs detected in breast milk were allocated into Group I. Group II consisted of 29 women with no traces of OCPs in breast milk. Examined women in Group I were allocated into 4 subgroups depending on the concentration levels of OCPs in breast milk. Subgroup I comprised 15 women with OCPs concentration level $> 0,1$ mg/l; Subgroup II – 66 women, OCPs concentration levels ranged 0,01–0,099 mg/l. Subgroup III consisted of 75 women with OCPs concentration levels 0,001–0,0099 mg/l and 4 women were allocated in Subgroup IV (OCPs concentration levels $< 0,001$ mg/l). All patients (201) were screened for secretory immunoglobulins – SIgA and SIgM (g/l) in breast milk. Stool samples were collected and tested for bacteriosis.

Levels of secretory immunoglobulins (SIgA and SIgM) in breast milk were measured by ELISA.

Microbiological studies aiming at identifying and detecting the level of dysbiotic disorders of the gastrointestinal tract of the examined women were performed according to the guidelines by R.V. Litvak and F.P. Vilshan-

skaya (1977) [1] supplemented by V.M. Bondarenko V.G. Likhoded (2007).

Liver tests were performed on 68 women. Of them, Group I consisted of 39 women with the detected OCPs in breast milk, Group II – 29 women (no traces of OCPs were detected in breast milk). Blood samples were taken from the ulnar vein (5 ml) in the morning on an empty stomach. Biochemical parameters in blood serum were measured by ELISA "Multisan", biochemical analyzer «BIO-Chemsa» 3/№ E117209, p. (Italy). ELISA was performed using the diagnostic test analyzer (ELISA) Stat Fax 4200 (USA). In order to avoid false positive results, ELISA positive serum samples were re-tested using confirmatory test systems.

Liver biochemical parameters were determined by the standard technique: total bilirubin – by Iendrashek – Grof method, ALT (alanine aminotransferase), AST (aspartat aminotransferase) – by Reitman – Frankel procedure, cholesterol – by Ilka method, total protein – by biuret test, the serum protein and thymol fractions – by turbidimetric method. Further details of the research and values detected are presented in Table 1.

Results of research and their discussion

Of the 201 women living in cotton-growing and urban areas and screened for OCPs, OCPs were detected in 172 (Group I), accounting for 85,6%. Group II consisted of 29 (14,4%), who showed no traces of OCPs in breast milk samples.

Data on OCPs concentrations in breast milk of women in Subgroups of Group I are presented in Table 2.

Table 1
Standards and techniques for the measurement of biochemical parameters

Test type	Method/Technique	Normal values
Total protein	Biuret test	65,0–85,0 g/l
Total bilirubin	Iendrashek – Grof	8,5–20,5 μ m/l
Thymol	Turbidimetric method	0–5 UI
Cholesterol	Fermentative method	2,9–5,2 μ m/l
ALT (alanine aminotransferase)	Reitman – Frankel	0,12–0,68 μ m/l hr
AST (aspartat aminotransferase)	Reitman – Frankel	0,12–0,68 μ m/l hr
Protein fraction	Turbidimetric method	
Albumin	–/–/–	55,0–60,0 %
α	–/–/–	15,0–16,0 %
β	–/–/–	9,0–12,0 %
γ	–/–/–	16,0–18,0 %

Table 2
Allocation of the surveyed women with detected OCPs in breast milk into Subgroups, depending on OCPs concentrations

Subgroups of Group I	OCPs concentrations mg/l	Number of women	%
Subgroup I	$> 0,1$	15	8,7
Subgroup II	0,01–0,099	66	38,4
Subgroup III	0,001–0,0099	75	43,6
Subgroup IV	0,0001–0,00099	16	9,3
Total		172	100

Table 3

Comparative data on the altered secretory immunoglobulins SIgA SIgM levels in breast milk depending on the concentration of OCPs

Group	SIgA, g/l		SIgM, g/l	
	M	P	M	P
I	7,85 ± 0,917	< 0,01	7,11 ± 1,35	< 0,01
II	11,5 ± 0,14	< 0,01	11,6 ± 0,15	< 0,01
Subgroups				
I	5,3 ± 1,2	< 0,05	4,55 ± 1,76	< 0,05
II	7,1 ± 0,93	< 0,01	6,3 ± 1,23	< 0,01
III	8,6 ± 0,81	< 0,01	7,8 ± 0,76	< 0,01
IV	9,85 ± 1,1	< 0,05	9,65 ± 1,79	< 0,05

Of the OCPs detected, HCH was found in 54,86%, DDE – in 53,5%, DDT and DDD – in 4,5 and 4,86%, respectively. Aldrin was detected in 1,7% and Hexachloride – in 0,34%. Dieldrin was not found.

The levels of secretory immunoglobulins in breast milk of nursing mothers depended on the concentration and type of OCPs in breast milk. The more detailed information is given in Table 3.

As shown in Table 3, in Group I, secretory immunoglobulins SIgA and SIgM levels in breast milk ranged 7,85 ± 0,917 and 7,11 ± 1,35 g/l vs. 11,5 ± 0,14 and 11,6 ± 0,15 g/l ($P < 0,01$) in Group II, i.e. secretory immunoglobulins SIgA SIgM levels in breast milk decrease 1,4 to 1,6 times in Group I with the detected OCPs in breast milk.

The lowest concentration of immunoglobulins SIgA SIgM was found in breast milk samples where OCPs concentration level in breast milk was > 0,1 mg/l: SIgA 5,3 ± 1,2 g/l, SIgM 4,55 ± 1,76 g/l ($P < 0,05$), i.e. the higher the concentration of OCPs in breast milk, the lower the concentration of secretory immunoglobulins SIgA SIgM. This may be due to the fact that OCPs inhibit the synthesis of immunoglobulins when they get into the lymph nodes.

Another equally important factor involved in protecting the body is the state of intestinal biocenosis; eubiotics in the intestinal tract not only possess antagonist properties against pathogenic and opportunistic pathogenic microorganisms, but also directly involved in the formation of secretory immunoglobulins in the digestive tract. OCPs interact with the intestinal flora, inhibit the colonization resistance of

the intestinal tract and increase the number of opportunistic microbes suppressing eubiotics, thereby reducing the formation of secretory immunoglobulins.

The effect of OCPs concentrations in breast milk on the state of intestinal biocenosis is shown in Table 4.

As shown in Table 4, the highest percentage of alterations was detected in Subgroup I, where alterations were revealed in almost all groups of intestinal microflora with the increased number of week-fermenting *E.coli* and decreased number of bifidoflora, i.e. bacteria involved in the development of secretory immunoglobulins. This may be due to the fact that OCPs affect the microflora, primarily eubiotics, inhibiting their growth and disrupting the function of the enzyme. Detection of pathogens in control group may be due to the greater sensitivity of pathogenic *E.coli* to OCPs, but this issue requires further detailed studies.

Some antibiotic-resistant, modified microbes – *E. coli* and other opportunistic microbes detected during bacteriological tests are of great interest.

The effect of OCPs concentrations in breast milk on liver biochemical parameters: in Group I, alterations of biochemical parameters of the liver were detected in 18 (46,15%) of the 39 examined women with the detected OCPs in breast milk; in Group II – in 6,9%. The more detailed data on the alterations of liver biochemical parameters in Groups I and II are shown in Table 5.

In Group I, liver function abnormalities were detected in 18 of the 39 women examined, accounting for 46,15%, in Group II, in 2 (6,9%) of the 29.

Table 4

Comparative data on the altered intestinal biocenosis depending on the concentration of OCPs in breast milk of nursing women (%)

Number	Alterations of intestinal biocenosis	Group									
		I		II		III		IV		V	
		n = 15	%	n = 66	%	n = 75	%	n = 16	%	n = 29	%
1	Detection of coliform bacteria. B N – 0 %	–	–	–	–	–	–	–	–	1	3,4
2	Reduction of the total number of coliform bacteria. B N – 300–400 МЛН/Г	13	86,6	31	46,9	7	9,33	2	15,3	2	6,9
3	Increase of the number of <i>E. coli</i> with weakly expressed enzymatic properties. B N – < 10 %	15	100	48	72,7	8	10,6	3	23,0	4	13,8
4	Increase of the number of lactose-negative enterobacteria. < B N – до 5 %	10	66,6	32	48,4	10	13,3	2	15,3	3	10,3
5	Detection of hemolytic <i>E. coli</i> . B N – 0 %	7	46,6	6	9,09	4	5,33	1	7,69	1	3,4
6	Increase of the number of coccal forms in a total amount of microbes. B N – < 25 %	9	60,0	30	45,4	12	16	1	7,69	1	3,4
7	Detection of hemolyzing <i>S. aureus</i> in relation to all coccal forms. B N – 0 %	8	53,0	11	16,6	6	8	3	23,0	1	3,4
8	Reduction of bifidobacteria. < 10 ⁷	14	93,3	30	45,4	15	20	2	15,3	3	10,3
9	Detection of <i>Candida</i> . B N – 0 %	12	80,0	15	22,7	10	13,3	2	15,3	1	3,4
10	Detection of <i>Proteus</i> species B N – 0 %	5	33,3	6	9,09	4	5,33	1	7,69	1	3,4

Table 5

Comparative data on the alterations of liver biochemical parameters in Groups I and II (%)

Group	Number of examined	Number of liver function alterations	%	Decreased serum cholesterol level		Increased thymol		Other values (ALT, AST and bilirubin)	
					%		%		%
I	39	18	46,15	12	30,76	4	10,5	17	43,6
II	29	2	6,9	0	0	0	0	2	6,9

In Group I, increased thymol was found in 4 (10,5%), sublimat – in 4 (10,5%), reduced cholesterol – in 12 (30,76%), increased ALT and AST – in 17 (43,6%), increased total bilirubin – in 4 (10,5%): direct bilirubin – in 2 (5,5%) and indirect bilirubin – in 2 (5,5%). Reduced albumin was detected in 5 (12,82%),

increased levels of gamma globulin – in 5 (12,8%). The ratio of albumin to globulin (A/G ratio) was within the range of 0,8–1,0. Changes in liver tests depended on the concentration and type of OCPs found in breast milk, but this issue requires a more detailed study on more samples.

In Group II, 2 of the 29 women had alterations of liver function, accounting for 9%. One patient showed a moderate increase in ALT and AST, the other one – a moderate increase in total bilirubin.

Thus, OCPs, when they get into the body through the gastrointestinal tract, primarily affect the microflora which participate in the formation of immunoglobulins disrupting its colonization resistance; when OCPs get into the liver, they disrupt protein-formation and neutralizing function of the liver; and eventually, excreting with breast milk, OCPs reduce secretory immunoglobulins SIgA and SIgM levels. The higher the concentration of OCPs in breast milk, the higher the occurrence of alterations of the colonization resistance of intestinal biocenosis, liver and the lower the levels of immunoglobulins in breast milk. It is therefore strongly recommended to examine breast milk of all lactating women living in cotton-growing and urban areas in the environment of the Osh Province for OCPs. It is also necessary to take appropriate measures to protect women from further penetration of OCPs and develop the ways of their elimination from the body.

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WHAT AIR FORCES HOLD THOUSANDS OF TONS OF WATER IN CLOUDS OR PHYSICS DEVELOPMENT SCENARIOS

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This article outlines basics of gas physics and at the same time includes description of microworld. The following is represented on the level of behaviour of certain molecules: atmospheric air pressure, moisture collection principle in clouds and atmospheric precipitation in the form of rain. Gravitation with regard to individual substance atom is explained. The article atmospheric air pressure formation mechanism is demonstrated in two comparative scenarios. The analysis has been performed and a more logical scenario has been selected. The reasons for lack of clear explanation of this natural process are specified. On the level of interaction of individual molecules and clusters their interaction is depicted along the border of below lying air masses and above molecular formations in the cloud. Forces and constructive features that have impact on moisture accumulation at certain height have been determined, including conditions that lead to atmospheric precipitation. Other matters that have contemporary solutions are revealed in course of research.

Keywords: molecular interaction, gas pressure, gas tension, gravitational forces, cluster formation

Comparison of two gas pressure formation scenarios

We all study physics at school. But how clearly is it outlined in textbooks? We need to answer the following questions.

How are clouds formed in the air where weight of water is thousands of tons? Why large amount of water flies over earth and does not fall until certain moment? Justified answers to these questions cannot be found in textbooks. They are not represented with regard to behaviour of individual atoms and molecules. There is also no description of formation of atmospheric air pressure on this level.

Gas formation in textbooks is represented predominantly based on molecular-kinetic theory. There are no other scenarios in textbooks.

In order to introduce other scenarios I propose to compare two scenarios of atmospheric air pressure formation and present explanation for reasons of moisture accumulation in clouds and many other matters.

Fig. 1 represents atmospheric air pressure formation based on molecular and kinetic theory. Wavy line below represents earth.

Small circles mean flying air atom (molecule) bodies and arrows represent direction in which they can transfer to. Gas pressure based on molecular and kinetic theory is formed through the energy of molecules heating surface. Participation of molecules that are on the surface that exceed average statistic distance between molecules in energy pressure may not be seen in this scenario.

Fig. 2 presents another possible scenario. Required basic data for explanation of this process is presented below – gas molecules are subject to gravitational forces and move away from each other. More detailed basic data for this sce-

nario will be presented below. It is worth noting that there is nothing unnatural in this scenario. Contemporary physics recognises gas molecule forces and acknowledges absolute ideal gas molecule movement as a result of these forces.

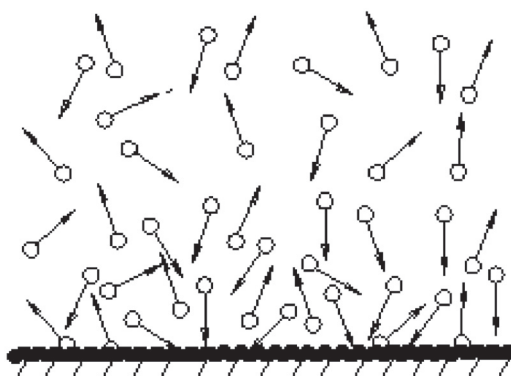


Fig. 1. Atmospheric air pressure based on molecular and kinetic theory

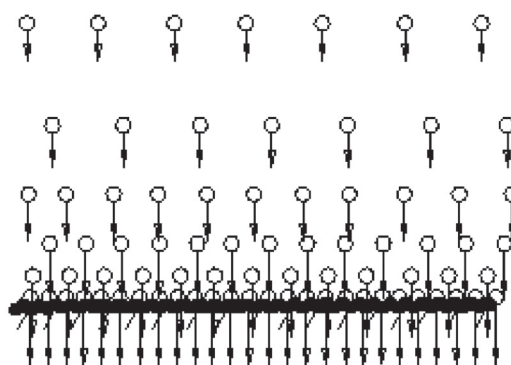


Fig. 2. Atmospheric air pressure passed on another scenario

Based on this scenario gas molecules above with their force fields on the force fields of lower gas molecules project total pressure on below molecules and all below surfaces. The arrows on this figure represent gravitational forces on each molecule. Gravitational forces weaken as a result of increase in distance between gas molecule (air) and earth. This factor is depicted as arrow length in this figure. Larger length represents larger force. The arrows demonstrate vividly that upper molecule pressure forces on below molecules decrease with height. As a result distance between air molecules away from earth surface increase. Based on the above total amount of air molecule forces above is added to increased forces with increased height.

Comparing these two atmospheric pressure formation scenarios we must state that gas pressure reasons and air depression with height are explained logically and vividly in the second scenario.

For more detailed comparison it is worth noting that based on molecular and kinetic theory gas molecules and atoms are chaotically moving in space even if gas is in equal conditions. It means that molecular and kinetic theory as a real model states that eternal flying particles that have certain weight are possible over earth without any energy in gravitational field! There is no explanation how this could take place and this is nonsense!

Any open vessel is filled with atmospheric air. By removing or adding gas into the vessel we may change its pressure on vessel walls in insulated vessel. If gas pressure is justified by forces, in these cases participation of distant molecules from the walls does not raise any concerns. However if gas pressure on vessel walls is a result of molecule strikes, it is vivid that direct participation of remote molecules cannot be traced. Their participation is only indirect. But indirect participation of physical factors is not reflected in the formulae! At the same time it is worth noting that in practical gas pressure computations kinetic energy of its molecules is never used. Empirical dependencies, that is, formulae that we use in real life, demonstrate that absolutely all atoms and molecules participate in gas pressure impact on vessel walls. I would like to stress that these formulae refer to any period of time. It means that they are true for each individual moment. Let's compare this concept with the following provision of molecular and kinetic theory: Movement of molecules in gases is chaotic: molecule speeds do not have any predominant direction and are distributed chaotically in all directions. Hence in accordance with this provision chaotic movement must be

in non-uniform molecule strikes on vessel walls. This should include both non-uniform gas pressure in time in one single plot and various plots at the same time. Such events have not been described anywhere.

Many others may state that true character of molecular and kinetic theory has been proven both from mathematical and practical points of view. Thesis [1] presents certain incorrect description of circumstances that is used in conclusion of main equation of molecular and kinetic theory. Adjustment of circumstances to achieve required results is evident. In addition to this, this thesis presents justification of reason for vertical thermal flows in gases and liquids based on level of atom and molecule behaviour that is convention formation process as a whole. Uniform distribution of thermal energy in any aggregate substance condition is presented in detail. That is, everything that is referred to entropy could be explained on the level of behaviour of certain atoms and molecules. There are multiple facts that state unreal character of molecular and kinetic theory in this thesis.

Practical proof of molecular and kinetic theory includes Stern test. This test uses oven, that is hot surface, that produces metal ions. This means that condition of balance is breached in this test. At the same time these test results are referred to permanent temperature conditions for some reason.

Second, metal ion speeds along straight surfaces are measured and they have no relation to chaotic movement of molecules based on molecular and kinetic theory.

Third, if cylinder sizes in this test were large enough, it would be discovered that ions under impact of gravitation were flying along the curve. However gas atoms and molecules also have certain weight. This means that without impact of certain forces from below and subject to gravitation they will fall on the ground in time.

Fourth, as metal ions coming out of hot metal were flying with the same speed, then their disintegration speed was measured in this test. It also must be stated that their flying is a result of potential energy forces, that is, disintegration forces.

Stern test summary

Based on explanation of this test in school textbooks and molecular and kinetic theory the following is true – if you through a stone, it will be flying eternally.

The reason for opposite conclusion is another important matter. In this case it is more important to understand that quality analysis of everything described in this articles and reference materials requires intelligent approach with fresh opinion.

Reference: According to F.S. Fitzgerald intelligent may be only that person who is able to keep two contradictory ideas in mind.

Introduction into basic data for proposed scenario

In order to explain moisture accumulation in clouds more detailed understanding of atmospheric air pressure formation theory is required.

It is not a secret that thermodynamics has been developed based on caloric theory. Caloric theory is mentioned rarely these days and often with full negation of the theory. It is believed that it has not supported Rumorf tests etc. I would like to state that all answers to questions as two why caloric has been argued have been found. However, the result is different from what is associated with this term. In short new thermal approach enabled to explain multiple physical processes, including those that contemporary physics still cannot explain nowadays.

For example, based on molecular and kinetic theory liquid molecules are in constant chaotic movement between each other. Their movement speed increases with increase in temperature. This leads to thought that molecules with increased speeds after strike fly at large distances. Based on this it is worth noting that this leads to increase of total amount of liquid. Such approach to explanation of liquid expansion specifies that expansion should be through increase of average distances between molecules. In other words – through increase of gaps between molecule bodies. But! The reference materials state that liquids changing their volume when heated maintain their ability for compression. This is not associated with increase in distances between molecules. In these cases maximum resistance will be built uniformly, and not through rapid change.

There are many examples when the process runs against molecular and kinetic theory. Many articles (for example [2]) present critics with regard to molecular and kinetic theory and simple solutions with regard to important matters for many processes, including, atom formation and their connections with others as well as optic events.

Basic data and essence of proposed theory

The proposed theory is called Thermal Energy Theory.

In Thermal Energy Theory everything is based on one basic assumption that there are thermal elements, that is, thermal energy elements that moving away from each other are attached to all the other elements. There are multiple elements. Therefore at this stage I will not assign them names and combine them under general name of material elements (mate-

rial elements or simply ME). The elements are very small and are included into particles that are currently referred to elementary. This means that the latter are not simply elementary. It also states that the elements are also included into all known atom elements (protons, electrons etc).

This presents all basic data used for explanation based on thermal energy theory.

We are all familiar with integration and disintegration forces in nature based on interaction of constant magnets. There is nothing unreal and unusual in basic assumptions of thermal energy theory.

And now the most important statement that transformed the vision that is associated with caloric term. During the period of selection of major model, that is when caloric theory was compared with molecular and kinetic theory based on their capabilities no one thought of a very important comparison. If operation of thermal elements is viewed not only in microworld, that is in interaction of atom elements between each other and interaction of atoms between each other, then one should remember that there is a large number of caloric elements under earth core. If there are forces between any two molecules (thermal energy to the element of the other) and disintegration forces, these forces must also be present between individual molecule on Earth surface and all those that are at depth.

This means that each molecule and each atom have both integration and disintegration forces with regard to Earth. Moreover, in this case thermal energy theory states that with changes in thermal energy elements in any substance (body) molecule integration forces toward Earth must change. And this is true! Reference materials [3, 4] and [5] present various tests in various countries that confirm changes in weight of materials with changes in temperature.

The above and materials [2] (that has not been yet translated into English) states that thermal energy force that plays a connecting role in atom and forms connections of atoms between each other, also has function that is currently executed by Hygs. Gravitation mechanism is clear in principle and many other questions that did not have answers also disappeared. For example, what conditions make electron to shift around atom core and what energy ensures atom links.

Multi-ton cloud formation reasons

Based on thermal energy theory atoms of various substances under uniform temperature have a varied number of thermal elements in their composition. This difference justifies formation of water layer in glass and lack of mercury wettability. That is, under uniform temperature both integration and disintegration forces

may form between atoms of various substances. If integration forces are present between various gas (air) atoms and other substances in gas, this forms a basis for cluster formation.

Air molecules have forces that they use to disintegrate from each other with regard to atmospheric pressure based on thermal energy theory. Let's take popular information that the whole Mendeleyev system is in the air surrounding us.

Let's imagine that air molecules may have various element composition and various forms. Disintegration forces of molecules that have various forms and composition (clusters) signifies that they have large TET/TE ratio. In other words, disintegration forces of TET of one molecule to TET of the other forms certain force. Molecule elements or clusters may have significant variations in values of the ratio specified above. That is they integrate and disintegrate as for some elements value of this ratio is high and for the others it is low.

In addition to this, transformation of gas into liquid and liquid into solid substance in cold condition is easily explained as decrease in a number of TET in their composition decreases value of TET/TE. As a result a small number of TET in composition starts functioning as a connective component.

Due to complex structure of material frame molecules and clusters have complex force fields. The lines that may be used to depict similarity of these fields will have different curve character in plane around the border of their frames.

As there are various elements with various composition and TET/TE ratio from different sides of molecules and clusters, disintegration of these lines from the surface of material frame will be different. In volumetric model these lines look like complex false surfaces. As the distance from the frame increases, they become flat, but the element of shape incorrectness still remains to certain degree.

Let's look at static process in order to explain moisture accumulation principle.

Let's imagine that air molecules and clusters in the clouds that contain certain amount of water molecules do not shift against each other. Let's see what happens on the border of contact between air molecules and cloud clusters.

The above states that due to complex form of force fields air molecules and cloud clusters with their disintegration forces, have fixed their location and participate in restriction of location of neighbouring molecules and clusters.

This means that in order to each molecule (cluster) to move lower all above-lying air

molecules need to be moved away. I would like to stress that all moisture molecules in clouds demonstrate this feature. As a result air compacts under clouds. And large degree of compaction requires more forces to move away molecules that have been fixed in relation to neighbouring molecules due to complexity of their energy fields. Many of us noticed during the flight that clouds look more flat from below, than above. I assume this factor is also due to levelling of air surface under clouds under average pressure.

This means that moisture molecule in the cloud cannot move away air molecules underneath. This is possible only when the force of a majority of molecules (clusters) creates significant pressure between gas molecules for disintegration. This leads to rain from the cloud when gravitational force exceeds force of lateral forces that compact air in this place. Remaining moisture is also absorbed by this gap. Therefore, we often observe how rain starts falling in cone-shaped form. As the wind moving the cloud compacts it, rain starts falling from this particular cloud.

This process is more complicated due to flows, but described moisture accumulation process must also function in dynamic mode.

Conclusion

As a result, this means that gravitational forces form conditions for delay in rain falling from the clouds.

Having analysed the above we also can understand why after having found a large number of substances that also included into atom composition, we still do not have spatial atom model.

Scientists believe that one non-conformance is enough for the theory to be acknowledged untrue, and that experience may not confirm existing theory, but it can reject it. Why do not we use these recommendations with regard to what we are so used to calling eternal ideas.

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INCREASING THE RELIABILITY OF POWER SUPPLY OF ELEVATORS

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Using storage batteries as a back-up source of lift's electric drive makes it possible to provide the elevator power in the event of an emergency in the main power system. When analyzing the effectiveness of these measures is taken into account the possibility of the battery to restore the nominal capacity instantly. It was shown that the capacity of the battery should be chosen from a condition that the maximum current does not exceed 2C discharge current. It is shown that excessive increase in capacity of batteries by their parallel connection reduces the reliable cooperation. This conclusion is based on the analysis of time to failure performed taking into account the failure of at least one of the batteries connected in parallel. Reduction of the total capacity is accompanied by an increase in the starting current. The number of battery charge-discharge cycles is reduced dramatically.

Keywords: elevator, reliability, electric power supply, redundancy, back-up power source, reliability, storage battery, parallel connection, multiple redundancy, emergency mode

Power supply of elevators is a complex process that is regulated by several laws and requires careful attention during the construction of any building with this hoist. Malfunction or failure of lifting equipment may lead to material damage and harm to human health. Features elevators power depends on several factors which justified the type of lift, its speed, carrying capacity, type and characteristics of the drive, and others. However, in any case, power supply of the object must meet the requirements of continuity.

Elevators are consumers first category of power supply reliability. In accordance with the requirements of the Rules for Electrical Installation it must be provided with electric power from reserving two mutually independent power sources. Break the power is permitted only at the time of its auto recovery. That is

for the use and storage of fuels and lubricants, which increases fire hazard.

Justification of the effectiveness of different ways of switching the battery [4] carried out by the example of the elevator ZIRCON «LM LIFTMATERIAL GmbH» company (Germany) with carrying capacity of 630 kg, the nominal drive power of $P = 4,5$ kW, rated current of $-12,3$ A, operating on AC current with a frequency of 50 Hz and a voltage of 380 V. Battery with a rated voltage of $U = 12$ V was considered as a backup power source.

We analyze the effect of using batteries as a backup power source to change the parameters of non-failure operation of the elevator drive power at different variants of the battery connection to the main chain. The most simple in terms of battery switching circuit is connected in series (Fig. 1).

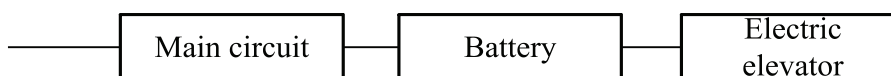


Fig. 1. The replacement scheme to assess the effectiveness of series connection in the battery circuit

why in [1–3], which were held earlier, urgent task to ensure the possibility of lifting equipment work for a certain period of time after the termination of the main power supply has been solved. For this purpose proposed to use a battery connected to the electric drive of the elevator and feed it in the event of failure of the main power supply. This version of a lift's power is more preferable because the content and maintenance of the diesel generator as a backup source is accompanied by the need

For example, according to the calculations in [1] the probability of operation the main circuit without reserve stands $p_{mc} = 0,999973$, and the probability of the slave battery operation $p_b = 0,9$. Then, according to the rule of determining the overall probability of the work with the series connection, the probability of the system, equipped with consistently included in the chain of supply battery is

$$p = p_{mc} \cdot p_b = 0,999973 \cdot 0,9 = 0,8999757.$$

This is 10 % lower than the initial probability. Thus, we can assume that in the absence of other backup power circuits, elevator reliability of power supply decreases. The probability of system performance will decline with derating. In addition it should be noted that in the case of series connection for circuit performance is necessary to ensure the operation of all components of the circuit elements. The battery is constantly included in the circuit, which implies a constant battery mode. This operating mode is unacceptable in view of the sharp loss of battery capacity due to its continuous charge.

Research carried out earlier [1–3] showed that when using the battery as a backup power source one of the possible ways of their connection is replacement of redundancy. In this case, the backup power source is connected in parallel with the main circuit power to the load through the switch, which is open during normal operation. It closes in the event of a mains, or when the voltage drops below a predetermined level (Fig. 2). The inclusion of redundant power supply can occur either automatically or by pressing a button inside the lift in the event of failure of the electricity grid.

hour. However, if due to high capacity, the battery can cause overcompensation of reactive power. This will lead to an increase in the reactive component and as a result to the growth of unproductive losses of electricity.

Thus on the one hand an increase in capacity of the battery to extend the backup power supply, on the other hand this may lead to an increase in reactive power circuit. This contradiction makes actual use as an additional electricity storage supercapacitor, which is connected in parallel with battery to the load. This will compensate for the jump of starting current and reduces the load on the battery. However, with the given parameters the power supply circuit from the supercapacitor is less than 4 seconds. So the study of the feasibility of sharing a super capacitor and battery have been conducted [2]. It was found that the combined use of the battery and supercapacitor ensures the growth of the likelihood of non-failure operation of the power supply with 85 % without the use of supercapacitor up to 95 % when sharing in the range of 0,5 minutes. Thus, making it easier to start-up conditions, the time of the elevator drive potential supply from the backup battery is extended.

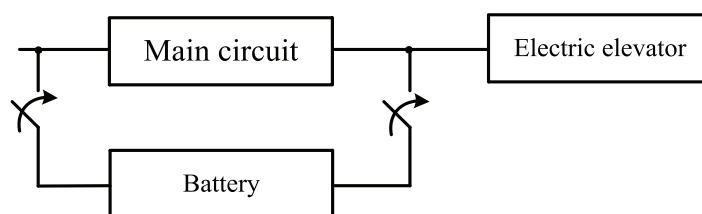


Fig. 2. The replacement scheme to assess the effectiveness of switching the battery to the circuit

For the given parameters of the elevator and connect the battery circuit, having a 55 ampere-hour capacity it is able to provide a guaranteed backup time for 4 minutes [1]. It should be noted that in addition to the temporary power supply function, the presence of the battery in the power supply circuit compensates the reactive power occurring in the system. For the chosen type of lift at the initial power factor $\cos\phi_1 = 0,566$ battery installation can increase this value to $\cos\phi_2 \approx 0,9$ [1]. Reactive power is not fully compensated for a given battery capacity. According to calculations the required capacity of the battery must be 75,6 ampere-

We estimate the probability of working parallel connection to the load battery considering that the failure rate of the backbone and reserve element are different [2]. By setting the parameters of the failure rate of primary and backup circuit, we use the formula [5]

$$p_{subst} = e^{-\lambda t} + \frac{\lambda}{\lambda_b - \lambda} (e^{-\lambda t} - e^{-\lambda_b t}),$$

where λ – failure rate of the system; t – mean time between failures; λ_b – failure rate of the battery.

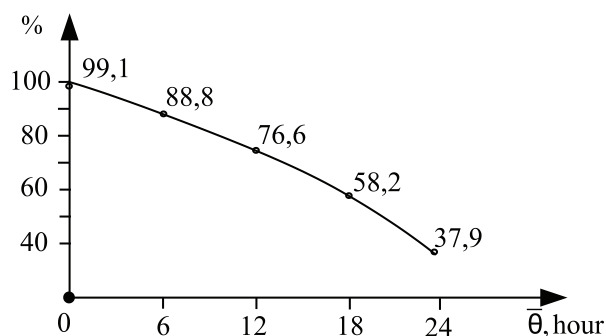


Fig. 3. Probability operate the lift with a different gap length of the main power supply

By calculating the change in the probability of failure of power supply operation of the elevator system using a backup source for different values of the length of failure of the main power supply, the data in Fig. 3. For different values of the duration of the failure of the main power supply calculate the change in the probability of failure of power supply operation of the elevator system using backup power. We got the data of Fig. 3.

On the issue of evaluating the likely time of power from the battery is important to take into account the battery charge recovery. The charge is not able to recover quickly, and the time of its recovery will depend on the completeness of the battery discharge. On the other hand, if we increase the capacity of the battery, its charge time when deep discharge is also increased, and therefore the recovery time longer. It shows that it's necessary to choose a rational choice of the battery capacity.

To determine the recovery time of redundant power supply system we evaluated the time required to charge the battery, depending on the depth of discharge [2]. As the prototype was used VAIPER battery, representing a starter battery 6ST-55 with a rated capacity of 55 A·h. It corresponds to the value calculated earlier. The battery has an inrush current of 420 A, and it was discharged DC 0,1 C. Reduced battery capacity was monitored by measuring the equilibrium open circuit voltage at the terminals of the battery at a temperature of 20°C: the voltage of 12,7 V corresponds to 100% of rated capacity; 12,55 V – 75%; 12,20 V – 50%; 11,95 V – 25% of rated capacity. Battery charge is carried out at a constant voltage of 14 V with ripple of the charging current does not exceed 2,5% of nominal voltage. Applied Charger ZU-120M-3 device for charging batteries with capacity from 50 to 120 A·h. The results of this experiment are shown in Fig. 4.

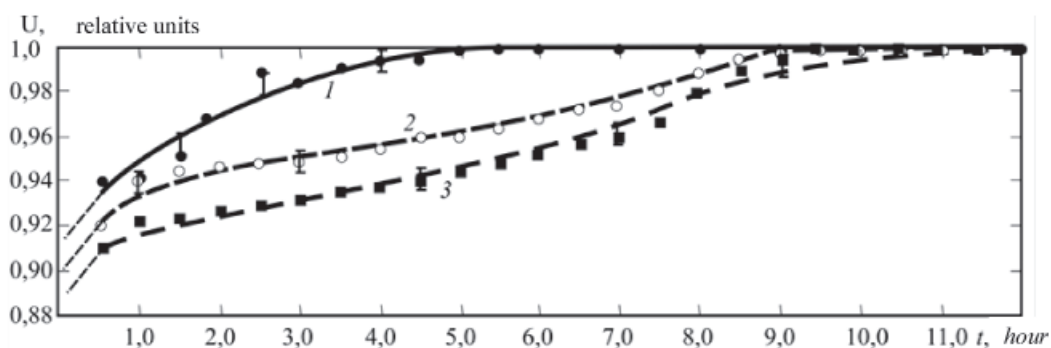


Рис. 4. The curves of the battery capacity at different discharge rate:
1 – the battery is discharged to 75% of the rated capacity; 2 – the battery is discharged to 70% of the rated capacity; 3 – the battery is discharged to 60% of the rated capacity

It is seen that the depth of discharge increases from 75 to 60 %, the recovery time (charge cycle time) increases from 5,5 to 12 hours. Assuming that the recovery time of the distribution function vary in truncated-normal distribution law, we have found that the maximum current allowed for the battery discharge is $2C$. Those. for the drive power of 4500 W, current, even without taking into account the losses in the inverter will be $4500 \text{ W} / 12 \text{ V} = 375 \text{ A}$. It is seen that the maximum current allowed for the discharge of the battery $2C = 375 \text{ A}$. Therefore, the battery should have a capacity $C = 187,5 \text{ A} \cdot \text{h}$. The calculation assumed that the battery capacity is $55 \text{ A} \cdot \text{h}$, therefore, it's need to use four batteries connected in parallel. It was revealed that an increase in the number of parallel connected battery time between failures decreases linearly. Take into account that the limited amount of time between failure of at least one battery.

For 4 parallel connected elements operating time is reduced from 18 to 1,4 months [2]. This makes it impractical to further increase battery capacity by increasing the number of partial batteries connected in parallel.

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MODEL OF INFORMATION SPREAD IN SOCIAL NETWORKS

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We propose evolution rules of the multiagent network and determine statistical patterns in life cycle of agents – information messages. The main discussed statistical pattern is connected with the number of likes and reposts for a message. This distribution corresponds to Weibull distribution according to modeling results. We examine proposed model using the data from Twitter, an online social networking service.

Keywords: social network, modeling, Weibull distribution, agent-based system, information spread

The flows of information have a strong influence on opinion formation and other processes in the society. Today social networks play a fundamental role as a medium for the information spread. These facts motivate to explore mechanisms of creation of information flows and influence on them. Dealing with this requires focusing attention on modeling and finding laws or patterns in the spread of information [1].

In this article we present an agent-based model of information spread. The agent in this model is an information message [2]. A message published in social network may cause different types of public reaction. This model involves types of reaction such as positive or negative comments, respect or protest (we will call it *like/dislike*); message may be shared or copied (*repost*); also one message may have a link to another one (*link*). The evolution of the agent is controlled by mentioned above types of reaction. The main attribute of the agent is “energy” (E); that is representation of current relevance of the message or a degree of interest to the topic of the message by people. Naturally, a positive reaction or appearance of link to the message cause increase of energy. In opposite way, energy decreases when the message gets negative feedback. Anyway, energy tends to decrease because information eventually becomes outdated.

The agent specification

More precisely the rules of agent evolution are as follows. Each agent appears with the initial energy (E_0) and dies when its energy becomes 0. The energy varies during the agent's life cycle depending on the types of reaction. Let us list them all and their impact on the energy:

- like: energy is incremented;
- dislike: energy is decremented;
- repost: energy is increased by 2;
- reference: energy is incremented.

In addition the energy is decremented at every time step (we consider the evolution in discrete time).

On the other hand, the more relevance of the message, the more likely people respond and express their opinion about information in this message. It is assumed the probability to get some response depends on current energy of agent. We introduce the probability of getting certain reaction for the agent with energy E as follows

$$p_{like}^{(E)} = p_{l_0} \varphi(E);$$

$$p_{dislike}^{(E)} = p_{d_0} \varphi(E);$$

$$p_{repost}^{(E)} = p_{r_0} \varphi(E).$$

We denote by p_{l_0} , p_{d_0} , p_{r_0} initial parameters of the model, and by φ some monotone nondecreasing function from \mathbb{R} to $[0, 1]$.

The simulation of information spread

Earlier we introduced the evolution rules for the agent. The information flow consists of the set of such agents. We simulate the dynamics of the whole information flow as follows. At the initial time only one agent exists. New agents may appear in two ways. Firstly there is a probability of spontaneous generation (p_s). It means that new agent may appear with probability p_s at every time step. Such appearance corresponds to the publishing new information by somebody. Secondly a copy of existing agent may be created (*repost*).

Here we describe the life cycle of one agent in terms of variation of its energy. Let ε_t denote the value of energy at time t . Suppose δ_t is the random variable such that

$$P(\delta_t = 2 | \varepsilon_t = E) = p_{like}^{(E)} p_{repost}^{(E)};$$

$$P(\delta_t = 1 | \varepsilon_t = E) = (1 - p_{like}^{(E)}) p_{repost}^{(E)};$$

$$P(\delta_t = 0 | \varepsilon_t = E) = p_{like}^{(E)} (1 - p_{repost}^{(E)});$$

$$P(\delta_t = -1 | \varepsilon_t = E) = (1 - p_{like}^{(E)}) (1 - p_{repost}^{(E)}).$$

Let us denote $P_{\Delta}^{(E)} = P(\delta = \Delta | \varepsilon = E)$. Then we have

$$\varepsilon_{t+1} = \varepsilon_t + \delta_t.$$

It follows that we can consider a change of energy as the random walk on $\{0, 1, 2, \dots, E_0, \dots\}$ with transition probabilities

$$p_{ij} = \begin{cases} P_{j-i}^{(i)}, & (j-i) \in \{-1, 0, 1, 2\} \cap i > 0, \\ 1, & i = j = 0, \\ 0, & \text{otherwise} \end{cases}$$

In other words the stochastic sequence $(\varepsilon_0, \varepsilon_1, \dots, \varepsilon_t, \dots)$ is a Markov chain with transition probabilities p_{ij} . A state diagram for this Markov chain is shown on Fig. 1, using a directed graph to picture the state transitions.

The random walk of energy is useful approach to analysis of properties of the model.

Model results

Now let us consider the statistical distribution of likes and reposts for messages in the information flow. Note that we can find the probability to get n likes for one agent according to the above theoretical approach.

Suppose an agent gets like at time t ; then $\delta_t \in \{0, 2\}$, otherwise $\delta_t \in \{-1, 1\}$. Denote by $(\Delta'_1, \dots, \Delta'_{t_{\max}})$ any vector such that $\Delta'_t \in \{0, 2\}$, if $t = t_1, \dots, t_n$ and $\Delta'_t \in \{-1, 1\}$ otherwise for $0 < t_1 < \dots < t_n < T_{\max}$. It is easily proved that

$$P\{\text{agent get } n \text{ likes}\} = \sum_{t_1 < \dots < t_n} \sum_{(\Delta'_1, \dots, \Delta'_{t_{\max}})} \prod_{i=1}^{t_{\max}} P_{\Delta'_i}^{(E_0 + \sum_{j=1}^{i-1} \Delta'_j)}.$$

Data generated by the model is illustrated in Fig. 2.

The frequency distribution of likes (blue line with dots) increases at first, and then decreases. It looks like a density function of the Weibull distribution [4]

$$f(x) = \begin{cases} \frac{k}{\lambda} \left(\frac{x}{\lambda}\right)^{k-1} e^{-\left(\frac{x}{\lambda}\right)^k}, & x \geq 0; \\ 0, & x < 0. \end{cases}$$

In Fig. 2 a density function of the Weibull distribution with the shape parameter $k = 2,1$ and the scale parameter $\lambda = 7,4$ is shown (red line). We get this density function as an approximation for the frequency distribution of likes using the method of least squares.

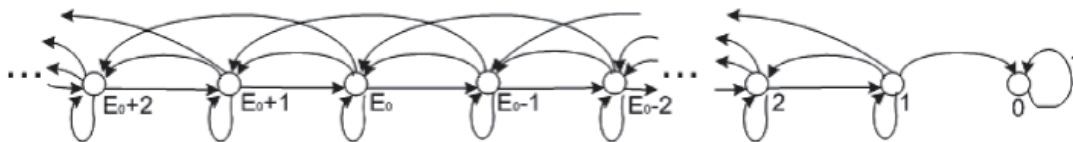


Fig. 1. A state diagram for Markov chain. States represent energy of an agent

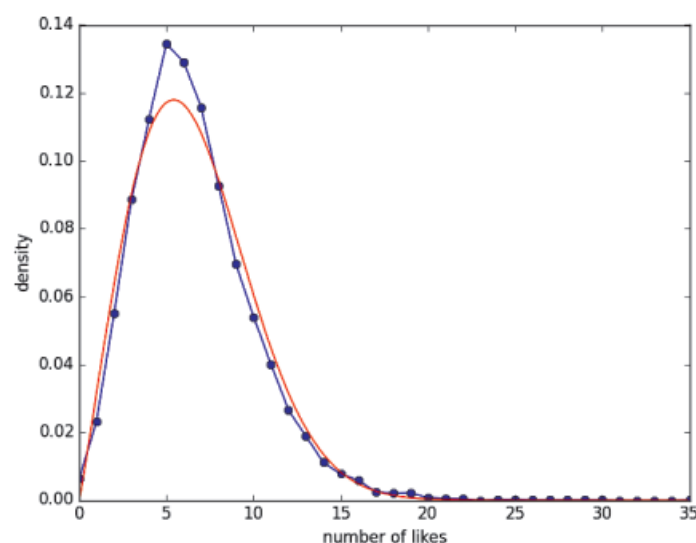


Fig. 2. Distribution of likes generated by model

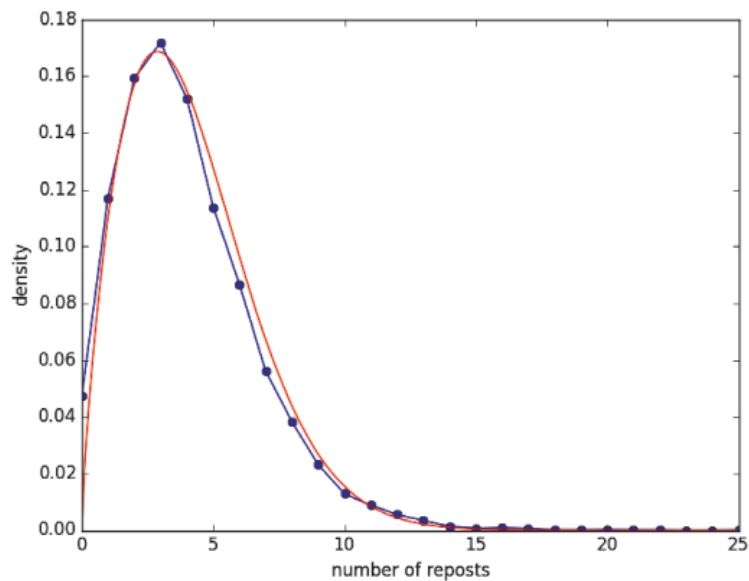


Fig. 3. Distribution of reposts generated by model

The frequency distribution of reposts and its approximation are shown in Fig. 3. Here a density function of the Weibull distribution has the shape parameter $k = 1,7$ and the scale parameter $\lambda = 4,6$.

Information flows in social networks

We study life cycles of news publications in Twitter and compare results with output produced by the model. Data about increase of

likes and retweets for special information messages were collected [3]. We found that distributions of likes and retweets from a real social network fit Weibull distribution similarly to the model (Fig. 4 and 5). The shape parameter coincides with good accuracy in both situations.

We developed a computer program using *R* programming language for analyzing statistical data. Processing was carried out in three following steps.

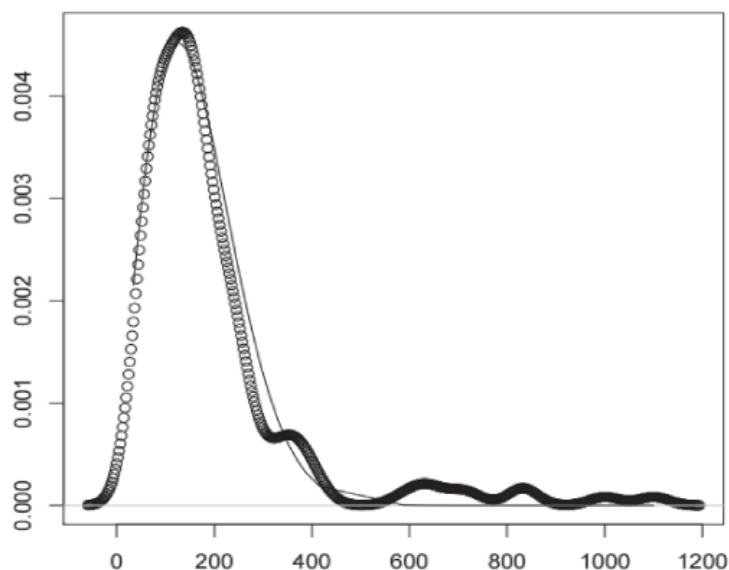


Fig. 4. Distribution of likes from Twitter

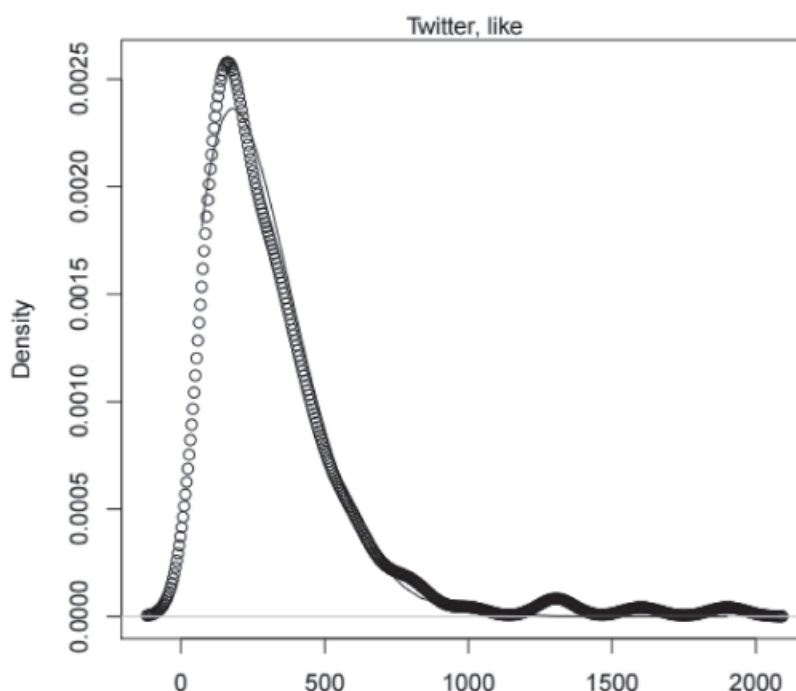


Fig. 5. Distribution of retweets from Twitter

At first step the program detected increases in number of retweets for one user in online mode. For example, messages of New York Times newspaper were scanned every 15 minutes.

At second step the program treated data accumulated at the first step. We applied Weibull distribution for data approximation, so the scale parameter and the shape parameter were calculated. In addition, we estimated the rate of increase for number of retweets.

At third step all gathered data were stored in the external data base for future analysis.

To summarize, we collected texts of each message, timestamps for messages, scale and shape parameters, and numerous graphs. These graphs represent number of likes and retweets, the rate of growth for number of likes and retweets, and approximation for number of likes and retweets with Weibull distribution.

Conclusion

We constructed agent-based model of message life cycle in social networks.

The statistical pattern for number of likes and reposts for information messages was

found. Distribution of likes and reposts satisfy Weibull distribution according to modeling results. Model output is quite similar to the results from the real social network. It follows that the statistical pattern exists in real social networks and the model captures this pattern.

Findings described in this article can be useful for future studying of information spread in social networks. Also the presented results can be applied to detecting anomalies in a life cycle of information messages.

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INSTALLATION FOR PREPARING GALVANIZED STEEL SCRAP FOR USING AS CHARGE MATERIAL IN INDUCTION MELTING FACILITIES

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Proposed is construction of installation for removing zinc from galvanized steel scrap in order to prepare it for using as charge material in induction melting facilities. The dimensions of the installation working capacity for processing steel scrap over one work cycle of the installation have been calculated. The installation is designed for removing zinc from galvanized steel scrap by chemical refining. This method consists in chemical drawing of zinc from steel base at the expense of the effect of hydrochloric acid aqueous solution (initial concentration of hydrochloric acid 9% by weight) on scrap during a set period of time. For protecting steel base from dissolving in acidic medium hexamethylenetetramine (urotropin) in the amount 2,5% by weight is used as short stopping agent.

Keywords: construction, installation, galvanized steel scrap, zinc coated steel scrap, zinc drawing, chemical refining, induction melting, hydrochloric acid, hexamethylenetetramine

Secondary material resources can reduce the need for constantly rising in price primary materials necessary for the operation of machine-building companies. This is especially true for the foundry sector. A modern approach to the organization of production systems involves recycling (reuse) of recycled materials and products after their operation period for manufacturing useful products according to the scheme: “material – product – secondary materials – secondary products” [1]. So returning galvanized steel scrap generated in large quantities in the automotive industry to its own production chain can significantly improve the production efficiency of the foundry sector of machine building enterprises by reducing the cost of raw materials.

In the modern production of automobile and machine-building industry galvanized steel sheet with zinc coating thicknesses of 20–60 microns is widely used as a basic material. As a result, large amounts of waste galvanized steel sheet (Fig. 1) accumulate, the use of which for iron smelting is difficult in case the melting areas of machine-building enterprises are equipped with induction melting furnaces.

In induction melting facilities remelting of galvanized steel scraps is hindered by a number of factors:

- deleterious effect of emitted during melting fume containing harmful substances on furnace operators as well as the need in expensive refining equipment;
- heavy fume emission restricts visibility in a melting section which may cause factory accidents;
- possibility of weakening of the lining of melting furnace and increased risk of melt leakage connected with the consequences of active physico-chemical interaction of zinc with refractories;

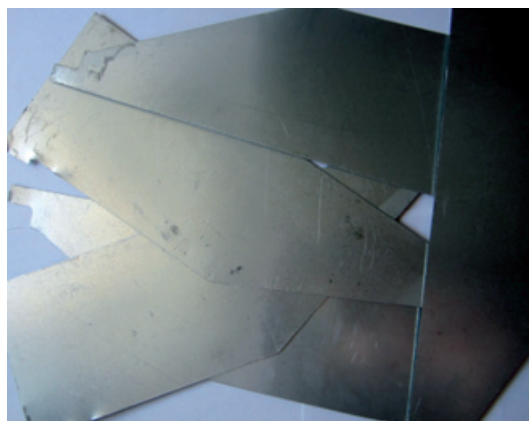


Fig. 1. Galvanized steel scrap

– increased risk of liquid melt discharge from the furnace resulting from boiling which takes place at the contact of galvanized scraps with liquid melt;

– decline in the quality of the obtained alloy due to deterioration of the mechanical properties of the material of castings (hardness, percentage elongation).

Remelting galvanized steel scraps at specialized iron and steel enterprises is also connected with large financial costs primarily of logistics, thus there arises the need for recycling galvanized steel scrap, namely removing zinc from a steel coated base in their own production conditions.

Removing zinc coating from steel scraps

The following methods for processing galvanized steel scraps are used in international practice: [2]

- Remelting in an electric arc furnace;
- Chlorination of galvanized scrap;

- MRI-technology;
- Vacuum evaporation of zinc;
- Electrochemical separation of zinc;
- Chemical separation of zinc.

One of the promising methods of removing zinc from galvanized steel scraps appears to be a chemical method of refining waste in a hydrochloric acid aqueous solution, scheme of which is shown in Fig. 2.

cessing cycle. The required amount of water at a water temperature of 10–30°C is added. Then hexamethylenetetramine at a rate 2,5 g/liter is added to the water with scraps. Next, technical hydrochloric acid in the amount of 250 g/liter is poured into the water. The amount of processed waste is calculated in such a way that the processing cycle at an average temperature of 20°C does not exceed 30 minutes. During

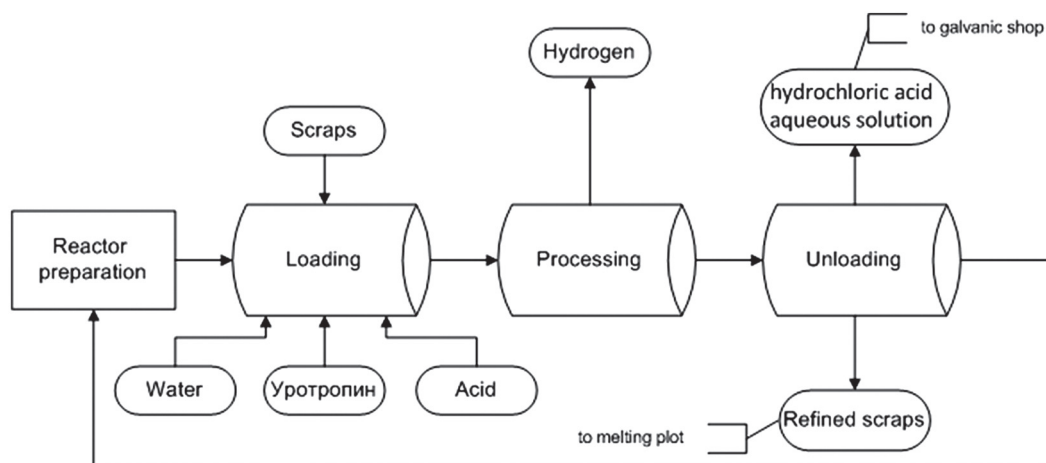


Fig. 2. Diagram of refining of galvanized steel scraps

The method is based on a chemical reaction between zinc and a hydrochloric acid aqueous solution. As a result of a chemical reaction of zinc and hydrochloric acid interaction steel scraps are completely cleaned from the zinc coating and can then be used as charge material for iron smelting in induction furnaces. For the refining process technical hydrochloric acid [3] and technical hexamethylenetetramine [4] are used.

For protecting steel base from dissolving in the interaction of acid and iron a small amount of technical hexamethylenetetramine (urotropin) is added to the solution as short stopping agent. The following original data have been established experimentally: initial concentration of hydrochloric acid 9% (250 g/l of technical acid), the concentration of hexamethylenetetramine – 2,5% (2,5 g/l). Temperature of the solution is 20°C. The ratio of acid to water is 1:3, which allows to exclude the effect of “vapouring acid” and to ensure the removal of the zinc coating from the steel base with an initial velocity of 5–10 microns per minute.

The technology is implemented as follows. Galvanized steel scraps are placed in a tank with the capacity corresponding to one pro-

cessing waste it is necessary to provide for the withdrawal of evolved gases (hydrogen). For this purpose alloys-absorbents of hydrogen based on TiFe and titanium or Zr(Fe, Mn, Cr, Fe, V, Ni)₂ can be used. Also to remove hydrogen from the reaction zone a production hood can be used [5]. After a specified time the solution is drained and sent for further recycling, and steel scraps can be used as charge material for iron smelting in induction furnaces in foundries of machine-building enterprises.

Installation for removing zinc coating

It is proposed to use the refining installation of following construction (Fig. 3). The installation represents a container of the drum type consisting of stationary part 2 fixed on base 1 and the movable part of mesh 3, which is driven in rotation by an electric motor through a reducer (not shown). For the purpose of protection from aggressive acidic solution, the reactor is made of corrosion-resistant alloy, for example KHN65MV or H70MF [6]. The dimensions of the movable and stationary parts are calculated based on the volume of waste to be processed in one cycle of operation. The

percentage of filling the installation with waste and the reaction solution seems appropriate to be 70–80 % of the total installation for a more complete reaction between the zinc coating and the acidic solution. The distance between the inner surface of the stationary part and the outer surface of the movable part should be minimal. It is advisable to take it equal to 50 mm. On the basis of the average density of the loaded waste 3000 kg/m^3 and the amount of waste that is processed per cycle 100 kg with filling the working cavity at 80 %, overall dimensions can be taken as follows: the inside diameter of the stationary part $D = 900 \text{ mm}$, external diameter of the movable part of the $d = 800 \text{ mm}$, the length of the working container $l = 800 \text{ mm}$.

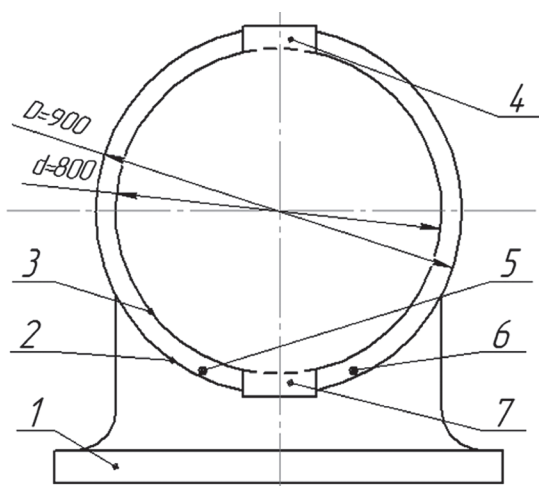


Fig. 3. Installation for removing the zinc coating from galvanized steel scraps

The process of refining steel scraps is as follows: through the loading hatch 4 in the movable part of the installation 3, made of steel mesh, galvanized steel scraps are loaded. Then with the help of the pump 5 and the system a hydrochloric acid aqueous solution with hexamethylenetetramine is supplied, after which the movable part is driven in rotation. After finishing the refining process with the help of the drain pump 6 of the working chamber of the installation the processed solution is removed, then the cleaned steel scraps

are discharged through the discharge hatch 7. After drying, they can be used as charge material for iron smelting in induction furnaces. The aqueous solution of zinc salt as the result of the reaction can be used as electrolyte in zincification, i.e. returned to the productive chain of the enterprise, if its structure has electroplating shops or sent for recycling to other options.

Conclusions

Analysis of the results obtained from laboratory experiments shows that processing 1 tonne of galvanized steel scraps requires about 70 liters of hydrochloric acid and 0,8 kg of technical hexamine (dry substance). With the cost of technical hydrochloric acid up to 90,000 rubles per 1 tonne (approximately 10 rubles per 1 liter) and the cost of hexamine up to 60,000 rubles per 1 tonne, the estimated cost of materials for processing 1 tonne of steel scraps will amount to 750 rubles [7]. Based on the value of secondary materials for cast iron smelting (from 12000 rubles per 1 tonne), the costs of materials for processing galvanized steel scraps and the costs of producing and maintaining the installation it can be concluded that using the proposed installation for withdrawal of the zinc coating from galvanized steel scraps at the amount of at least 20 tonnes per month is economically feasible.

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GEOGRAPHIC INFORMATION SYSTEMS AND CONFIDENTIALITY OF INFORMATION

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In the beginning of XXI century began to develop very quickly the science of Geoinformatics, in particular, geographic information systems. Geographic information systems allow to process large amounts of information, to combine data from different sources, combine different images of the earth surface and to obtain the result is ultra-precise maps. But here we are faced with certain problems of confidentiality. There is a problem of information protection in geoinformation systems. Particularly acute issue of security of the functioning of GIS on the Internet. The paper discusses possible solutions to the problem of security of web servers, geographic information systems, and directions for further research on the subject.

Keywords: geoinformatics, geoinformation system, space images, unauthorized use of data, web server

In the beginning of XXI century began to develop very quickly science Geoinformatics ([2, 3]), in particular, geographic information systems (GIS) ([4, 5]). This was due to the fact that computing technology has reached a level where the solution to a specific computing task is not limited to the capacity of computers (particularly computers), and information transfer is conducted through the wide channels, that is, almost overcome the threshold of transferring large amounts of information needed for practical purposes.

In addition, there is a large amount of media, which are, on the one hand, capacious, on the other – have low access time and a sufficiently large reliability.

Summing it all up, we have the possibility of development of various information, in particular geographic information and technology.

We got the opportunity to explore satellite images of the earth's surface [9], water and underground facilities. It is important here and space technology development, the emergence of new technologies of photography, scan objects with great precision.

Geographic information systems allow to process large amounts of information, to combine data from different sources, combine different images of the earth surface and to obtain the result is ultra-precise maps.

For a specific user of the GIS can be indicated by its location on a map and can also be offered the best route to reach a certain waypoint.

But these opportunities are geographic information systems are not exhausted.

We can make requests of various nature, and get answers to specific questions. For example, we can find out where you need to put the point to get the highest profit. Or which area you need to build a hospital or school to meet the demand for the services of these institutions.

But here we are faced with certain problems of confidentiality of information [1]. As a geographic information system available via the Internet, information from them may be known to an unlimited number of individuals. That is, there is access to high precision maps can be located of any object, be it a building, person or vehicle, it may be used to harm a certain group of persons. there is a problem of information protection in geoinformation systems.

Particularly acute issue of security of the functioning of GIS on the Internet.

Internet GIS is a system that performs basic manipulation with spatial data on a dedicated web-map server and providing this data to users via the Internet Protocol compatible with HTTP [1].

Consider the possible threats the Internet GIS.

First, it is an attack via the Internet to unauthorized access, modification or retention of information.

Secondly – unauthorized use of data obtained through legal use of a GIS.

Thus, it is possible to select the following areas of protection:

1) maximum protection the Internet server from unauthorized access, changes and data hold;

2) giving users only the data, reuse of which in commercial products is eliminated [11].

Strategy to protect Internet servers is the responsibility of the security administrator of the Internet server. Additionally, you can use cryptographic encryption to protect the map data.

Security Internet GIS depends largely on the security of the web server on which it is based. Consider the General protection of web servers. Highlight the following key issues protection [1].

1. Software upgrade web-server.

2. The use of specialized servers.

3. Removal of unnecessary applications.
4. External Firewall.
5. The danger of remote administration.
6. Use routers with packet filtering.
7. Training of the personnel.
8. Separation of privileges.
9. Hardware solutions.
10. The intrusion detection system.

At the same time, with all the ease of use of the specialized map of the Internet servers identified a number of shortcomings that hinder their use as servers, Internet GIS for the publication of public information. For example, the use of standard Internet servers is only possible if the company has its own web server and can afford the licensing fees for the use of the map server. There are problems of high cost of product license and compatibility issues of different platforms.

In this case, it makes sense creating your own map server. It is possible to allocate two directions of implementation of the online map server:

- using standard GIS;
- self realization of the elements of the GIS Internet server.

You can suggest the following ways to protect information.

First, it must be authorized entrance in the geographic information system has great potential in the Internet.

Second, information in a GIS must be transmitted over protected channels.

Thirdly, the secret items should not appear on the maps provided to persons having the right of access to classified information.

Finally, the restricted information may be stored and transmitted in encrypted form.

Using these precautions, we can reduce the probability of intercept GIS information, and to prevent the harm from its dissemination.

Thus, we considered possible solutions to security problems of the web-server, geographic information systems, and directions for further research on the subject.

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SYSTEM ANALYSIS OF THE DESIGN OF EFFICIENT MULTI-SLIDE STAMPING PROCESS

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The article describes method of efficient multi-slide stamping process through of technological and structural factors. System analysis of the design of efficient multi-slide stamping process should include a number of subsystems concerning stable technology, optimum conditions of the machine, and minimum costs. Application of the system analysis at the design stage of the production process is allows to get the most efficient combination of production processes at the selected criteria.

Keywords: multi-slide sheet-stamping machines, technological transitions, mathematical combinatorics, the number of positions, efficient process

Manufacturing quality parts by multi-slide stamping at automatic multi-slide sheet-stamping machines (AMSM) during their optimized operation is based on one complex problem solution – collaborative control of machine actuator operation conditions and production process.

According to the analysis of part stamping on machines by traditional technologies [1–5, 8], in some cases there are scratches along the generator, metal tears and breaks mostly in places of transition of the cylindrical part of the items into the bottom and the flange, that indicates unstable nature of the process.

System analysis of the design of efficient multi-slide stamping process should include a number of subsystems concerning stable technology, optimum conditions of the machine, and minimum costs.

Application of the system analysis at the design stage of the production process is intended to provide the most efficient combination of production processes at the selected criteria. The criterion for the subsystem efficiency – stable technology – is the indicator: horizontal displacement of the tool in the working area of stamping, which allows you to determine the error of the stamped part during completeness of the required condition.

$$\delta_{\max} \leq Z. \quad (1)$$

System analysis is carried out in several stages [1]: technical information is collected, according to the part drawing the process requirements and its main and auxiliary functions are revealed. Under the main function of the process it is understood its general purpose, while support functions provide interim needs associated with the implementation of the main function.

For example, the main functions in relation to the unit process [1, 5–7] of drawing parts

with extrusion are the following: making the part blank cylindrical, calibrating the flange, making the final transition. Technological transitions are taken as auxiliary functions. At the final stage of system analysis people are engaged in the search for new technological solutions, taking into account all possible ways of functioning.

The implementation of various options of the function activities can be achieved by combining or dismemberment of technological transitions of the initial process, by changing their sequence, as well as by changing in placement of technological transitions on the positions of the machine and in time. The number of possible options of the production process can be found by mathematical combinatorics. The number of options is given by the formula of combinations:

$$N = \sum_n^m \gamma_n C_m^n = \sum_n^m \gamma_n \frac{m!}{n!(m-n)!}, \quad (2)$$

where γ_n – number of possible changes of technological transition sequence in the process where the number of simultaneous transitions is equal to n ; m – number of machine positions; C_m^n – number of combinations out of m to n elements.

Formula (2) is applied for multi-slide sheet-stamping machines with any number of positions. As a rule, sheet-stamping machines have six to thirteen positions.

Thus, for the eight-slide machine when $n = 6$, the number of possible changes of transition sequence is $\gamma_6 = 3$; when $n = 7$ $\gamma_7 = 2$, when $n = 8$, if you use drawing in four transitions, calibration in a separate position and final transition in two positions $\gamma_8 = 1$.

By varying the placement of the operations according to the positions of the machine, you can find the total number of possible process implementations.

If the number of transitions $n = 6$ we have

$$N = \sum_{n=6}^{m=8} \gamma_n C_m^n = \sum_{n=6}^{m=8} \gamma_n \frac{m!}{n!(m-n)!} = 3 \frac{8!}{2!6!} + 2 \frac{8!}{7!1!} + 1 \frac{8!}{8!0!} = 91. \quad (3)$$

For the following numbers of transitions the number of possible implementations of the defined process is given below.

When the number of transitions $n = 7$

$$N = \sum_{n=7}^{m=8} \gamma_7 C_8^7 = 2 \frac{8!}{7!4!} + 1 \frac{8!}{8!0!} = 17.$$

When the number of transitions $n = 8$

$$N = \sum_{n=8}^{m=8} \gamma_8 C_8^8 = 1.$$

For the ten-slide machine when the number of transitions $n = 6$

$$N = \sum_{n=6}^{m=10} \gamma_8 C_{10}^6 = 1686.$$

If the number of transitions $n = 7$, the number of possible implementations of the process is $N = 635$, when $n = 8$, $N = 155$, when $n = 9$, $N = 21$, and when the number of transitions $n = 10$, the number of possible process implementations $N = 1$.

For the twelve- and thirteen-slide machines the number of possible implementations of the considered process is when $n = 6$ and $n = 7$, several thousand, therefore one-flow stamping becomes unsustainable and we need to implement the process of stamping parts in two flows.

Once the number of possible implementations of the process is determined its required to find the optimum process according to the adopted criteria (inequation 1) when the tool displacement will be less than the one-sided gap at any technological transition.

This problem is solved with a help of ECM according to the developed algorithm of the efficient production process design.

However, in order to simplify the solution of this problem you can be restricted to finding right or left minimum torques from the applied forces on the machine positions relatively to geometrical center of the slider completing the condition:

$$z \geq \delta_{\max} \rightarrow M = P \cdot e \rightarrow \min,$$

where P – resultant force; e – application force's arm; $\delta_{\max} \leq Z$ – optimality criterion.

In addition to finding the optimum production process for a sample part the technologists at production sites have to estimate the rational production process varying the drawings in different ways: drawing with wall thinning, combined drawing and drawing with extrusion.

In the practice of the design of rational multi-slide stamping processes with a significant amount of draw transitions, there is no need to analyze all the possible variants. Data calculations and analysis of force distribution on positions, evaluation of imbalances and tool displacements, deflection and rotation angles show that the rational ones will be the production processes designed with a displaced (in the direction of a slider) application of loads using drawing with extrusion.

Analysis of the design of production variants of multi-slide stamping processes shows that their number may reach several tens to several hundreds.

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ON THE NEW NON-HAMILTONIAN QUATERNIONS OF HALF-ROTATION AND THEIR APPLICATION TO PROBLEMS OF ORIENTATION

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The application new (non-traditional) groups, algebras of the half-rotation solid body and their application in the orientation tasks for the strapdown inertial navigation system and orientation systems. Non-Hamiltonian quaternions of the half-rotation can be zero in contrast to the classical Hamiltonian normalized quaternions of the full-rotation with the parameters of the Euler (Rodrigues – Hamilton), their rates are not constant and depend on the Euler angles of final rotation.

Keywords: non-Hamiltonian quaternion of rotation, half-rotation, groups and algebras of quaternions, strapdown inertial systems, guidance, navigation, control

In strapdown inertial navigation system (SINS) [1] and orientation systems (SIOS) [9] of the aerospace aerial vehicle the classical “Hamiltonian” quaternions of solid body rotation with the parameters of the Euler (Rodrigues – Hamilton) [1], [9] are now (from the beginning of the 70s of the last century) widely used. These quaternions are normalized (with unit norm) and they cannot be zero [1–10].

The possibility of using an unnormalized quaternion for SINS with no single the norms, depending on the angle of the final Euler rotation of solid body first is shown in [5 (2000), 10 (1999)]. Such quaternions are obtained by multiplying the normalized Hamiltonian quaternions of rotation (as unit vectors of the real four-dimensional space) by an arbitrary function of the angle of Euler rotation. They belong to the sets of *non-Hamiltonian quaternions* of the solid body “full” rotation.

The paper examines the new (previously published in [6]) unnormalized quaternions of rotation forming a set of *non-Hamiltonian quaternions* of the solid body “half-rotation”.

Non-Hamiltonian unnormalized quaternions of half-rotation are exceptional by virtue of their properties, in particular, the heterogeneity of systems of four kinematic linear differential equations corresponding to these quaternions.

Non-Hamiltonian quaternions of the half-rotation

We are considering two types of non-Hamiltonian, quaternions of the half-rotation of solid body:

$$U = u_0 + \bar{\lambda}; \quad V = v_0 + \bar{\lambda},$$

where $u_0 = 1 - \lambda_0$; $v_0 = 1 + \lambda_0$; $\lambda_0 = \cos(\varphi/2)$; $\bar{\lambda} = \lambda \bar{k}$; $\lambda = \sin(\varphi/2)$; \bar{k} is the unit vector of Euler’s axis of finite rotation (turn) of the solid

body in three-dimensional Euclidean vector space [1; 3; 9]; φ is the Euler final rotation angle.

Parameter λ_0 and coordinates λ_n ($n = 1, 2, 3$) of three dimensional vector $\bar{\lambda}$ (coordinate orthonormal basis with unit vectors related to a solid body) are Euler (Rodrigues – Hamilton as a function of the angle φ) real parameters [1; 3; 9; 10]. They define the classic Hamiltonian quaternion of “full” rotation [1; 3]:

$$\Lambda = \lambda_0 + \bar{\lambda}$$

with unit norm

$$\|\Lambda\| = \lambda_0^2 + \lambda^2 = 1; \quad \lambda^2 = \lambda_1^2 + \lambda_2^2 + \lambda_3^2.$$

Quaternions U, V are considered here as *non-Hamiltonian quaternions of half-rotation* of solid body and turn out as a result of multiplication of non-traditional new *normalized quaternion of half-rotation*

$$P = m + \bar{p}; \quad M = p + \bar{m}; \quad m = \sin(\varphi/4);$$

$$\bar{p} = \cos(\varphi/4) \bar{k}; \quad \bar{p} = \cos(\varphi/4);$$

$$\bar{m} = \sin(\varphi/4) \bar{k}$$

respectively on the modules

$$|U| = 2m; \quad |V| = 2p,$$

(i.e. $U = |U|P$, $V = |V|M$). This normalized “Hamiltonian” quaternions of half-rotation P, M are regarded as vectors in the real four-dimensional vector space.

The different sets of the half-rotation quaternions determined by the *generalized non-Hamiltonian quaternions of the half-rotation* $U_c = c_U U$; $V_c = c_V V$, where c_U, c_V are arbitrary constant coefficients. When $c_U = c_V = 1$ viewed quaternions U, V are obtained.

Unlike quaternions Λ , unnormalized quaternions U, V can be zero (at $\varphi = 0$ and $\varphi = 2\pi$

respectively) and their modules depend on angle φ . Therefore, they are of special practical interest in solving two major problems: inertial sensing and inertial attitude control of the solid body provided that the shortest turns (at angles $\varphi < \pi$ and $\varphi > \pi$) are ensured.

Quaternions U, V are exceptional (from the set of possible non-Hamiltonian unnormalized quaternions of rotation [1; 5; 6; 10]) as those quaternions and their corresponding kinematic differential equations and groups, group quaternions algebras of rotation have a number of special or unique properties.

By the way for example, quaternions U, V in addition to going to zero, have a common vector $\bar{\lambda}$, and their norms are equal to doubled scalar parts:

$$\begin{aligned}\|U\| &= 2u_0 = U \circ \tilde{U} = u_0^2 + \lambda^2; \\ \|V\| &= 2v_0 = V \circ \tilde{V} = v_0^2 + \lambda^2,\end{aligned}\quad (1)$$

where $\tilde{U} = (u_0 - \bar{\lambda})$; $\tilde{V} = (v_0 - \bar{\lambda})$ are conjugate quaternions.

In addition, the following equalities hold: $u_0 v_0 = \lambda^2 = (\bar{\lambda} \cdot \bar{\lambda})$, and $U + \tilde{U} = U \circ \tilde{U}$, $V + \tilde{V} = V \circ \tilde{V}$, unlike inequality $\Lambda + \tilde{\Lambda} \neq \Lambda \circ \tilde{\Lambda}$, where (\circ) is the sign algebraic operations “Hamiltonian” quaternion multiplication [1; 3].

Quaternion differential kinematic equations

Quaternion kinematic differential equations for “proper” quaternions [1; 9, p. 109] U, V , are linear, but not homogeneous. Those equations are obtained from the known [1] linear kinematic equations $2\dot{\Lambda} = \Lambda$ for quaternion Λ by substitution of variable λ_0 with variables u_0, v_0 and are as follows:

$$2\dot{U} = \Omega - \Omega \circ U; \quad 2\dot{V} = -\Omega + V \circ \Omega, \quad (2)$$

where $\Omega = (0 + \bar{\omega})$ is the angular velocity quaternion; $\bar{\omega}$ is the vector of absolute rotational velocity of the solid body; $\dot{\Lambda}, \dot{U}, \dot{V}$ is the relative derivatives of quaternions in time.

The equations (2) have a joint first integral $u_0 + v_0 = 2$.

These equations because of their inhomogeneity are of special interest for the solution of tasks of synthesis of high-precision conical precession computer algorithms of SIOS (the sixth or tenth order of accuracy) using Taylor’s rows [9].

The formulas for the multiplication of quaternions of the half-rotation

The multiplication formulas (rules, laws) [9, p. 109] of proper non-Hamiltonian quaternions U, V , are obtained from the classic (group) [1; 3] multiplication formulas of normalized own quaternions Λ by substitution of quaternion Λ with quaternions U, V , according to the following formulas

$$\Lambda = E_4 - \tilde{U} = V + E_4,$$

where $E_4 = (1 + \bar{0})$ is a scalar unit quaternion; $\bar{0}$ zero vector.

For two sequential finite rotations (turns) of the solid body, the group multiplication formulas of normalized quaternions Λ and non-Hamiltonian quaternions U, V are written in symbolic form as:

$$\Lambda = \Lambda_1 \circ \Lambda_2; \quad U = U_1 \otimes U_2;$$

$$V = V_1 \otimes V_2,$$

as well as:

$$U = U_1 + U_2 - U_2 \circ U_1;$$

$$V = 2E_4 - V_1 - V_2 + V_1 \circ V_2, \quad (3)$$

where Λ, U, V are the resulting rotation quaternions, Λ_1, U_1, V_1 are the first rotation quaternions, Λ_2, U_2, V_2 are the second rotation quaternions; (\otimes) is a conventional sign of the group (non-Hamiltonian) multiplication [6; 10] of any non-normalized quaternions; (\circ) is a sign of the algebraic operation of Hamiltonian multiplication.

The formula (3) includes the operation of addition of quaternions, in contrast of the multiplication formulas of the classical Hamiltonian quaternions with the parameters of the Euler [1; 3; 4].

The group of non-Hamiltonian quaternions of the half-rotation

The quaternion sets Λ, U, V , form a four-dimensional quaternions representations of three-dimensional rotations classical groups [3; 4; 6] – a groups of non-Hamiltonian quaternions of three-dimensional rotations and half-rotation of the solid body or of quaternion groups of three-dimensional rotations and half-rotation with the above group multiplication formulas (3).

Multiplication formulas (3) quaternions U, V determines their name “non-Hamiltonian quaternions of the half-rotation”.

The following equalities follow from the above formulas:

$$\begin{aligned} U \otimes \tilde{U} &= \tilde{U} \otimes U = 0; \\ V \otimes \tilde{V} &= \tilde{V} \otimes V = 2E_4, \end{aligned} \quad (4)$$

where $0=0+\bar{0}$ are zero quaternion; $\bar{0}$ is a zero vector.

These equalities show that unit elements in groups of quaternions of U , V are respectively the zero quaternion and the doubled single quaternion $2E_4$, and reverse quaternions U^{-1} , V^{-1} are equal to the conjugate \tilde{U} , \tilde{V} .

Non-Hamiltonian quaternion algebra of the half-rotation

Unnormalized quaternions space U , V , together with their multiplication formulas (3) (the algebraic operations), determined the actual new, associative, non-commutative and unnormalized group [11, p. 259] of quaternions algebras of half-rotation with single-valued division and without zero divisors [11; 12] (since these group algebras and group there is no zero divisors).

Multiplicity of the quaternions U , V forms a linear four-dimensional Euclidean vector space, while the Hamiltonian quaternions rotation Λ not form a vector space, since haven't zero quaternions.

By analogy with the algebra of Hamiltonian quaternions Λ of rotation the exceptional quaternions algebras U , V of half-rotation are further endowed [4, p. 103–104] the structures of:

- 1) the commutative group under addition;
 - 2) the non-commutative, associative four-dimensional algebra of division over the real.
- Thus the operations of addition and multiplication group (3) are distributive [3, p. 32].

Application of non-Hamiltonian quaternions of the half-rotation in the problems of the control orientation

Parameters of quaternions of U , V are used for the solution of tasks of control of orientation of the spacecraft (SC), as solid body, in positive definite quaternion functions f_u and f_v Lyapunov of a square look [5; 10]:

$$\begin{aligned} f_u &= \alpha_u u_0^2 + \beta_u (\bar{\lambda} \cdot A_u \bar{\lambda}) + \gamma_u (\bar{\omega} \cdot \bar{g}); \\ f_v &= \alpha_v v_0^2 + \beta_v (\bar{\lambda} \cdot A_v \bar{\lambda}) + \gamma_v (\bar{\omega} \cdot \bar{g}), \end{aligned} \quad (5)$$

where $\alpha_u, \beta_u, \gamma_u > 0$ and $\alpha_v, \beta_v, \gamma_v > 0$; A_u, A_v are definitely positive symmetric constant operators; is the momentum kinematics vector of the spacecraft; J is the operator (tensor) of inertia of the spacecraft; $\bar{\omega}$ is the angular velocity vector of the spacecraft.

To ensure control shortest reversals spacecraft function is used f_u when $u_0 < 1$, $v_0 > 1$ ($0 < \varphi < \pi$), or function f_v when $u_0 > 0$, $v_0 < 0$ ($\pi < \varphi < 2\varphi$).

With an appropriate choice of formulas determine the vector of control points (as described, for example, in [10]) a negative definition of the derivative of Lyapunov functions in time provides. The result is the asymptotic stability of the processes controlling the orientation of the spacecraft and its shortest spreads throughout the range of variation of the angle from 0° to 360° .

Application of non-Hamiltonian quaternions of the half-rotation in the algorithms of the orientation determine

Parameters – the coordinates of exceptional quaternions U , V used in control algorithms by orientation of spacecraft are calculated on computer algorithms of SIOS with are similar known algorithm for computing the classical quaternions rotation Euler (Rodrigues – Hamilton) parameters [1; 2; 7–9; 14–18]. This calculation algorithms parameters quaternions U , V easily obtained from the many known algorithms for calculating parameters of Euler (Rodrigues – Hamilton) by simply replacing the scalar parameter λ_0 on the parameters u_0 and v_0 , respectively.

Based quaternion U , V may also be prepared by new biquaternions SINS algorithms [1].

The one-step algorithms of the third and fourth orders of accuracy in the “scaled” [9, p. 78, 79] quaternion type 0,5 U used in the “HARTRON” Corp. (Kharkov, Ukraine), in the task of determining the orientation of the spacecraft [13].

Of particular practical interest now becomes a four-step algorithm of the fourth – sixth order accuracy [1; 2; 9; 14; 15; 17; 18], it is possible recurrence computing quaternion U , V with a time step $H = 4h$ (h – a constant and minimum possible sample rate in the computer SINS of signals gyroscopes in time).

The article [7; 8] shows that the four-step algorithms are more effective for use in SINS than the one-step, two-step and three-step algorithms. These algorithms are used intermediate orientation parameters [9, p. 144] – the coordinates $\varphi_{N+4,k}$ ($k = 1, 2, 3$) small vector $\bar{\varphi}_{N+4}$ characterizing finite Euler rotation of the object to a small angle for a time equal to step H . The algorithms for computing these parameters may be represented by a generalized four-step algorithm of the form [9, p. 172]

$$\varphi_{N+4} = q_{N+4} + a_1 Q_{-1} q_1 + a_2 Q_{-2} q_2 + a_3 (Q_{-2} q_1 + Q_{-1} q_2) + a_4 (Q_{-2} q_{-1} + Q_{-1} q_2), \quad (6)$$

where $q_{N+4} = q_{-2} + q_{-1} + q_1 + q_2$; q_{-2}, q_{-1}, q_1, q_2 are column matrix, composed of angular increments corresponding quasi-coordinates (gyro signal) q_α ($\alpha = -2, -1, 1, 2$) generated in the on-board computer SIOS or SINS on four successive “small” steps h poll gyroscopes; Q_{-2}, Q_{-1}, Q_1, Q_2 are the corresponding skew-symmetric matrix.

The values of the constant coefficients a_v ($v = 1 \dots 4$) to (6), that determine the specific form of the case considered algorithms fourth order of accuracy [9, p. 173], are presented in Table 1 in the form of fractions. Algorithms 1, 2, 3, 5 are given in [9, p. 169; 153; 173; 157], the algorithm 4 – article [14] (“smoothing” algorithm of the fourth order obtained on the basis of Chebyshev polynomials).

Algorithm 3 was first published in 1986 [7] and was also considered in the paper [8] (1987). The monograph [9, p. 158] in the algorithm (3) under the number (3.3.45) contains a typo (instead of the coefficient $a_4 = 32/45$ printed $a_4 = 32/55$).

Table 2 shows for comparison the values of constant speed calculation drift of the algorithms (with conical vibrations of SIOS gyroscopes block [14] with conditions: nutation angle – 1 deg, the frequency of vibrations of tapered – 10 Hz, step with computing – 0,01 s) obtained in computer simulations by the method of the parallel accounts [9, p. 218]. As can be seen from Table 2, algorithm 3 is significantly superior in accuracy and other algorithms are substantially so-called *conical algorithm* [15] (the actual sixth-order of accuracy). Further

analysis showed the benefits of the algorithm 3 and also in operation performance [8; 9].

The algorithm 3 (as the main part of the calculation algorithm parameters Rodrigues-Hamilton) has been implemented [2, p. 316] in the laser system “SINS-85” in serial production [16; 19; 20] since 2002 and is designed for use on aircraft Il-96-300, Tu-204, Tu-334. Modification of “SINS-85” (“SINS-77”, “SIMS-T”, “SINS SP-1”, “SINS SP-2”) are used on the aircraft An-70, Tu-95, Tu-160, Tu-214, Su-35, T-50, Yak-130 [21].

Of particular interest is the possibility of using adaptive conical algorithms [18] for the calculation of the parameters non-Hamiltonian quaternions of half-rotation in SINS. There is the only one optimal among the four-step algorithms the best in terms of accuracy and operation performance adaptive algorithm conical (algorithm 6 of the 6th order from Tables 1, 2). It is obtained based on the algorithm (6) with coefficients insist on a conical motion. This configuration by choosing values of the coefficient b_{23} in the formulas (3.3.107) of [9, p. 173]. This algorithm is performed complete (ideal) compensation conical error due coefficients k_{05}, k_{14}, k_{23} in square terms of the asymptotic estimates (4.3.31) constant speed computing drift-order terms $O(h^6)$ when $\vartheta \rightarrow 0$ (ϑ – nutation angle) [9, p. 215]. The accuracy of the algorithm, as shown by computer simulation exceeds the accuracy of the algorithm 3 a decimal ($2,2 \cdot 10^{-5}$ deg/h) under the conditions of calculation, the relevant Table 2.

Table 1

The constant coefficients of four-step algorithms

Factors	Number of algorithm					
	1	2	3	4	5	6
a_1	0	0	22/45	184/315	-74/45	534/945
a_2	16/9	0	22/45	112/315	-9/2	486/945
a_3	0	4/3	22/45	212/315	86/45	414/945
a_4	0	0	32/45	52/105	0	696/945

Table 2

The constant velocity of the drift computing of four-step algorithms

Option	Number of algorithm					
	1	2	3	4	5	6
The actual order of accuracy	4	4	6	6	6	6
The drift velocity, deg/h	2,5	1,4	$3,9 \cdot 10^{-4}$	$9,6 \cdot 10^{-2}$	$1,1 \cdot 10^{-2}$	$2,2 \cdot 10^{-5}$

Optimum conical algorithm 6 exceeds the accuracy even of the four-step algorithm American company Litton [15] providing for filtering signals of laser gyroscopes [21; 22]. The computational complexity of optimal algorithm 6 equal to the computational complexity of the algorithm 4 and the algorithm of the company Litton.

There is also the only one among the five-step algorithms the optimal conical algorithm of 6th order with the ideal correction of the conical error. A method for constructing such an algorithm and computer study of its accuracy and operation performance based on asymptotic estimates of similar cases four-step algorithm [9, p. 218, p. 249–255].

Conclusion

The possibility of using non-Hamiltonian quaternions of half-rotation in strapdown inertial guidance and control is shown. In contrast to the classical Hamiltonian normalized quaternions of rotations the considered non-Hamiltonian half-rotation quaternions can be zero and their modules and norms depend on the corner of the end Euler rotation.

The parameters of the non-Hamiltonian quaternions of half-rotation are appropriate to use in advanced SIOS and SINS of aerospace aircrafts, along with the classic parameters of Euler (Rodrigues–Hamilton), or instead of them.

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REGIONAL PECULARITIES OF THE DEVELOPMENT OF A PROCESSING CLUSTER AGRO-INDUSTRIAL COMPLEX

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Economic development of the Republic of Dagestan in modern conditions is characterized by lack of attention to the formation and development of a processing cluster agro-industrial complex. The need for change in this issue is due to a historical characteristic of Dagestan related to the fact that in tsarist and Soviet periods, when the majority of the population was engaged in agriculture. For detailed recommendations for the effective development of a processing cluster, you must install the APK modern structure – LLC "Aquarius", LLC "Dagagroholding", LLC "Daginter" LLC, "Deneb", LLC "Plant of mineral water 'Mever'", "company" mineral water Plant "Rychal-su", etc. the Development of agriculture of the Republic of Dagestan has such trends, as the increase in the share of agricultural enterprises of small and medium business, etc. Offer – to improve the production structure for the development of deep processing of raw materials and increase the volumes of products with high added value; to increase the share of small enterprises in the production deficit for the Republic agricultural products, etc.

Keywords: cluster, Economics, processing, region, budgets, management, regulation

The state of economic development in the modernization highlights the lack of attention to the formation and development of a processing cluster in the agricultural sector. This has led to the exacerbation of tensions in many regions of Dagestan. While the Republic is the serious challenges relating to enhancing the development of a processing cluster to the main of which is the economic condition of the Republic, dependent on financial support from the center.

Gained significant experience in the regulation of the development of a processing cluster in agriculture in different regions of Russia, CIS countries and in the developed capitalist countries can be applied in our country.

Attention to the development of a processing cluster in agriculture due to historical characteristic of Dagestan related to the fact that in tsarist and Soviet periods, the majority of the population was engaged in agriculture. Unfortunately, at present a modest investment in agriculture affect the level of socio-economic development of Dagestan. As a result, he is one of the last places among the subjects of the Russian Federation. The significant of this has its geopolitical and geo-economic position. Because of Dagestan is located on the southern outskirts of the Russian Federation and borders with the world powers and regional centers, the importance of its progressive development. The greatest importance is the fact that it shares borders with neighbouring countries as Azerbaijan, Georgia, Kazakhstan, Turkmenistan and has a long coastline with the Caspian sea. It becomes increasingly growing importance as a force of natural resources, and as an alternative means of transport of the Russian Federation with Iran and other coastal States. In addition through its territory major

routes of strategic importance in the development of a processing cluster agriculture. That is why Dagestan important using their territorial and resource advantages, and being in the field of view of various States in the region, to develop their processing cluster in the agricultural sector.

In recent years there have been positive changes in the management of the development of a processing cluster in the agro – industrial complex of Dagestan is interested investors in the agricultural sector, modernization of related objects of economy of the Republic as a transport and logistics center, development of land resources for optimal and effective use, etc., However, these aspects are not strict system concept of regional economic development in General and agriculture in particular. This represents a balanced mix of state and market methods and tools for the management and creation of conditions for the development of a processing cluster agriculture in the economy, taking into account all stakeholders from producers to consumers. The necessary improvement of existing mechanisms for managing the development of a processing cluster in the agricultural sector, as well as constant monitoring of the modernization of the process based on the experience of other regions of the Russian Federation and abroad. The solution of this important economic tasks are devoted to dissertation research.

As can be seen from the statistics there has been a steady, though small, increase of production volumes of agricultural enterprises of all types that is related to traditional agricultural orientation of the economy of Dagestan and in high demand among the population of local products (Table 1) [2].

Table 1

The production structure of agriculture by categories of farms
(in actual prices; percentage of total)

	2005	2008	2009	2010	2011	2012	2013
Farms of all types	100	100	100	100	100	100	100
including:							
agriculture organization of the	9,5	9,2	9,9	10,2	11,1	12,5	14,3
households	82,5	81,0	80,8	79,3	78,1	73,4	71,5
peasant (farmer) economy ¹⁾	8,0	9,8	9,3	10,5	10,8	14,1	14,2

Notes: ¹⁾ Including individual entrepreneurs.

Table 2

Park main types of machines in agricultural organizations¹⁾ (year-end; pieces)

	2005	2008	2009	2010	2011	2012	2013
Tractors ²⁾	4344	3329	2470	2060	1724	1658	1375
Plows	1481	1086	848	824	666	658	544
Cultivators	486	416	355	347	304	308	269
Drill	899	657	474	444	346	335	260
Harvesters:							
combine	984	733	506	476	393	372	285
corn	57	53	40	39	30	32	23
forage	134	120	95	90	76	74	63
Mower	526	429	335	338	256	238	210
Balers	818	570	425	403	334	320	278
Reaper rolls	137	108	83	84	64	54	45
Sprinkler and irrigation machinery and equipment	83	65	50	57	41	39	23
Spreaders of solid mineral fertilizers	182	145	114	106	84	86	58
Machines for soil application of organic fertilizers:							
Solid	73	69	51	58	45	48	43
Liquid	15	12	11	7	5	10	7
Sprayers and dusters tractor	650	540	457	431	390	376	334
Milking machines and units	42	52	49	46	52	64	70

Notes:

¹⁾ Since 2008, excluding microenterprises.

²⁾ Without tractors are mounted on excavation, reclamation and other machines.

The development of a processing cluster in agriculture is impossible without the availability of technical means (Table 2) [2].

For full recommendations for the effective development of a processing cluster, you must install the APK modern structure. It includes such processing plants, such as:

- LLC “Azamat”, producing dried meat, the skin is dried, smoked tail, goat milk, goat cheese;
- LLC “Asercanserv” producing fruit juices;
- LLC “Aquarius” Botlikh district, producing soft drink, pickles, urbech and jam;
- LLC “Amir”, products of milk processing;
- KFH “Kabulkap”, producing fruit juices;

- LLC “Gergebelsky canning factory”, producing fruit juices, canned vegetables, beef stew;
- KFH “Dido”, producing a whole grain flour (corn, wheat, barley, linseed, pumpkin seed, black cumin seeds, oatmeal, wheat malt, enzyme – rye malt, whole FAM. white flax, bran with black caraway seeds, bran with black caraway seeds), honey Caucasian, urbech (paste) in the range, tea and other drinks – barley and oat drinks;
- LLC “Dagagroholding” engaged in the processing of plant products;
- OOO “Daginter” producing confectionery products (biscuits, wafers, etc.);
- LLC “Deneb” producing juices, lemonades and ice teas in the range;
- LLC “Eurokond” engaged in the production of confectionery products;
- LLC “Plant of mineral water ‘Mever’”, which produces mineral water;
- LLC “Plant of mineral water ‘Rychal-su’”, which produces mineral water;
- LLC “Izberbash of the milk plant” that manufactures the products of milk processing;
- LLC “Kizilyurt dairy plant ‘Kolos’”, producing milk and products of its processing;
- LLC “Kizlyar Agrocomplex” producing dairy and meat products and products of their processing in the range;
- LLC “Kizlyar cannery engaged” in the production of fruit and vegetable preserves;
- LLC “Kikuninski cannery”, processing agricultural products;
- LLC “KUMC”, which produces canned meat, sausage and sausages, canned cereals, etc.
- LLC “Makhachkala winery” that produces cognacs in the range;
- LLC “Makhachkala milk factory”, engaged in the manufacture of dairy products;

- LLC “Makhachkala meat-packing” plant, products of meat processing in the range;
- LLC “Mountainous Dagestan”, producing fruits and vegetables, canned meat, semi-finished products;
- KFH “Nur” producing dairy and meat products in the range;
- LLC “Tahirkettle canning factory” that produces fruit and vegetable juices;
- CJSC “Hassok” engaged in the production of juices.

Unfortunately, the production of these enterprises is not high, given the potential for crop and livestock production in Dagestan. In addition, some manufacturers of juices used for the production of the crop in our region, and are ready to concentrate.

Republican authorities offer their own measures to improve the situation in the manufacturing cluster agriculture, through the departmental target program of the Ministry of agriculture of the Republic of Dagestan of the development of the canning industry, the development of processing the crop sector, the development processing of the livestock industry, etc.

They provide analysis, recommendations, forecasts and expected sources of funding. Here are some of them.

For the development of processed products in the crop sector in the Republic of Dagestan for 2013–2015 the proposed financing structure (Table 3) [3].

The development of the canning industry of Dagestan needs in accordance with the target program (Table 4) [4] in such sources of funding as:

For effective development of the processing of livestock products in the target program RD is proposed (Table 5) [5].

Table 3

The structure of funding

The direction of financing activities	The amount of financial security, just	Including at the expense of	
		the Republican budget of Dagestan (forecast)	extrabudgetary funds (projected)
Technical re-equipment, reconstruction and modernization of production, mln rubles, including:	1615,3	107,1	1508,2
Production of canned fruit	1130,86	75,12	1055,74
Manufacture of grain mill products	484,44	31,98	452,46

Table 4

The total amount of cash needs and sources of program costs

Number	The name of the event	The period of performance, years	Funding – total, millions of rubles	Including at the expense of	
				the Republican budget of Dagestan	extrabudgetary sources (forecast)
1.	Construction, reconstruction and modernization of production facilities canneries	2014–2016	3178	–	3178
		2014	2542,4	–	2542,4
		2015	635,6	–	635,6
		2016	–	–	–
2.	The acquisition of technological equipment for processing fruit and vegetable raw materials	2014–2016	1060,8	–	1060,8
		2014	318,2	–	318,2
		2015	530,4	–	530,4
		2016	212,2	–	212,2
3.	Subsidies for reimbursement of expenses for the purchase of technological equipment for processing fruit and vegetable raw materials	2014–2016	530,4	530,4	–
		2014	159,1	159,1	–
		2015	265,2	265,2	–
		2016	106,1	106,1	–
4.	The acquisition of containers and packaging for the production of canned vegetables and fruit	2014–2016	353,1	–	353,1
		2014	70,6	–	70,6
		2015	106,0	–	106
		2016	176,5	–	176,5
5.	Subsidies for reimbursement of the value of packaging, for the production of canned vegetables and fruit	2014–2016	70,6	70,6	–
		2014	14,1	14,1	–
		2015	21,2	21,2	–
		2016	35,1	35,1	–
6.	The cost of acquisition of the main and auxiliary raw materials	2014–2016	2183,4	–	2183,4
		2014	436,7	–	436,7
		2015	655,0	–	655,0
		2016	1091,7	–	1091,7
7.	Subsidies for reimbursement of expenses for the purchase of the main and auxiliary raw materials	2014–2016	873,4	873,4	
		2014	174,7	174,7	–
		2015	262,0	262,0	–
		2016	436,7	436,7	–
	Total	2014–2016	8249,7	1474,4	6775,3
		2014	3715,8	347,9	3367,9
		2015	2475,4	548,4	1927,0
		2016	2058,5	578,1	1480,4

Table 5

The structure of the financing activities of the departmental target program

The direction of financing activities	The amount of financial security, just	Including at the expense of	
		the Republican budget of Dagestan (forecast)	extrabudgetary funds (projected)
Technical re-equipment, reconstruction and modernization, mln rubles, including:	1069,8	64,3	1005,5
processing of meat	577,8	35,4	542,5
processing of milk	472,8	28,9	443,8
The development of small processing plants, research, creation and promotion of brands of food and training in the field of processing of meat and milk	19,2	–	19,2

Analyzing possible ways of forming the financing of a processing cluster offered by the authorities of Dagestan, one can establish that a large proportion of extra-budgetary sources. Unfortunately, the practice of previous years of development showed that the investment attractiveness of the cluster is not high. We found that, without a comprehensive solution to this issue in General with the development of the acreage, herd development, reclamation activities it is impossible to achieve a clear understanding about the concept of agricultural development.

Based on the foregoing, we believe it is necessary to note that the concept of state regulation should distinguish between three groups of methods of influence on the development of a processing cluster in the agro-industrial complex of the Republic of Dagestan:

- methods Interdistrict regulation of relationships;
- methods (Republican) regulation and promotion of territorial development;
- methods of state regulation of development of a processing cluster agriculture at the level of local authorities.

Grant to the Republic:

- to reduce the expense of local budgets limit the prices and tariffs on basic food products and services, and change the range of goods and services, as defined by regulation;
- to adjust the size limits of trade margins to free selling (wholesale) prices for agricultural products in accordance with the cost of

their transportation and sale prices on glass containers.

Management development processing cluster in the agro-industrial complex of the Republic of Dagestan will be more successful when applying our proposed methods and mechanisms that will lead to improved competitiveness.

We believe that the broad lines of demopolization are:

- privatization of processing of agricultural enterprises in various industries in accordance with the established legal norms;
- the disaggregation of agricultural enterprises-monopolists with the release of their composition of several independent enterprises with legal entity status (where practicable and economically feasible);
- encourage the development of different forms of small business in the agricultural sector, primarily in the production of consumer goods and services, housing, and also in the sphere of innovative activity;
- the diversification of the agricultural products produced by large enterprises and associations.

A necessary condition for the effectiveness of measures for de-monopolization of agricultural and economic structure in General is strict compliance with the antitrust laws.

The development of agriculture of the Republic of Dagestan has the following development trends:

- the increase in the share of agricultural enterprises of small and medium business;

- the strengthening of integration processes in the context of a global recession;
- the increasing involvement of the state in attracting investors to the processing cluster of agriculture;
- the increase in agricultural production in agriculture;
- the prospects for the development selkhoztekhnika clusters.

However, we found that there are negative effects in the development of the agricultural sector [1], such as:

- the poor development of this important structure of agriculture as a processing cluster;
- insufficient use of the possibilities of application of the mechanism of direct and indirect interregional relations;
- weak use of indirect methods of state regulation;
- high depreciation of the basic production assets of the majority of agricultural enterprises and low capital productivity, which is reflected in the volume of production and its competitiveness.

The resolution of these problems, the removal of constraints on the dynamic development of the agricultural sector [1], can serve the following factors:

- a sufficient amount of natural resources that allows you to increase production with all environmental requirements;
- labor-surplus region, which, however, could encourage the use of labour resources and qualified professionals with the expansion of production;
- available in sufficient volume capacity to process natural resources and production of competitive products;
- the presence of effective demand for manufactured products for the country in other regions of Russia and abroad.

Given these factors, we offer:

- to create a reliable system of social cooperation between the state and the public;
- preserve and maintain existing jobs and create new ones;
- accessibility of General education and vocational training, health services in rural areas;
- to improve the production structure for the development of deep processing of raw materials and to increase the volumes of products with high added value;
- to increase the share of small enterprises in the production deficit for the Republic agricultural products;
- to optimize your process and cooperative communication, which would enable a complete technological cycle of production and marketing of agricultural products in one structure; to reduce the costs per unit of production by expanding the scale of production and competitiveness of agricultural products; to create a rational structure of interaction within companies, the introduction of modern principles of strategic planning, budgeting, regulatory planning methods, cost control, etc.

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EVALUATION OF THE EFFICIENCY OF THE INTERNAL CONTROL SYSTEM OF THE EXTENSIVE REPAIR FUND

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We have studied the internal control system as one of the main tools to ensure control over the targeted use of funds for capital repairs of apartment houses. The methods of evaluating the effectiveness of the internal control system on the example of Russian experience. Defined and systematized the key risks affecting the effectiveness of financial – economic activity. The procedures of monitoring and diagnostic system of internal controls designed to assess the ability of the internal control system to eliminate or minimize the risks of ineffective control measures.

Keywords: internal control system, apartment houses, financial risks, evaluation of the efficiency

Currently, the housing stock of Russia is dominated by the buildings older than 30 years according to the data of the end of 2012 that is more than 60% of the housing stock. Two-thirds of apartment houses have a deterioration level of more than 30%¹. The absence of the system of regular extensive repair, in accordance with the regulatory repair periods may make a significant part of apartment houses (hereinafter AH) inappropriate for habitation in only 10–15 years.

In world management practice there has been implemented for a long time a special tool of constant control i.e. the internal control system (hereinafter ICS). ICS is a tool ensuring the activity objectives of an organization, based on a continuous process of risk assessment, control of the efficiency of financial and economic activity, statutory compliance, completeness and accuracy of reporting, safety of information.

In Russia, they also start implementing widely internal control. Internal control units used to be created only in organizations of a particular industry such as credit institutions, professional stock market participants and private pension funds. However, after passing amendments to the Federal Law “On Accounting”² in 2012, now all the economic entities are required to carry out internal control of the facts of economic life, introduction of business accounting and reporting.

The purpose of the internal control system of the extensive repair fund of a managing company is the implementation of the extensive repair program in apartment houses and resettlement of emergency housing and at the same time ensuring control in several ways:

- Ensure the execution of functions of forming extensive repair funds, ensure the reli-

ability of contributions accounting of owners of premises in the AH; control statutory compliance and compliance with the rights and legitimate interests of owners of premises in AH for extensive repair of common property in an apartment house.

- Ensure control of liquidity and financial stability of extensive repair fund; monitor the effectiveness of financial and operational planning, the execution of cost estimates; monitor the timeliness, completeness and statutory compliance of accounting and financial reporting.

- Monitor the intended use and efficiency of using funds; ensure compliance with legislative requirements in selection of contractors for the provision of services and execution of works on extensive repair; exercise control over the timing and quality of work upon extensive repair.

- Monitor the use of funds obtained as support measures from the federal or regional budgets.

What is an internal control system?

The first point is that it is an organizational structure that is a structural unit or individual experts of the extensive repair fund ensuring in terms of the implementation of control activities a certain order of interaction with other departments or employees of the organization.

The second point is that it is a special corporate culture in which all employees without exception are involved in some extent in the work on risks minimization. They know how to and seek to define situations that affect critically on the interests of the organization; they transmit promptly information about emerging risks and take statutory measures to prevent negative consequences.

The third point is that it is a set of measures aimed to eliminate or minimize risks; it is also a set of control activities and procedures aimed at detecting and preventing risks.

¹ According to the data of Federal State Statistics Service.

² Federal Law “On Accounting” of 06.12.2011 № 402-FL (ed. of 04.11.2014).

Nowadays management recognizes several important principles on which an effective internal control system is to be built that is certainly applicable to the extensive repair fund [1].

- Continuity of internal control.
- Involvement of every employee in the processes of risk management and internal control.
- Integration of ICS in all business processes.
- Realization of internal control at all levels: strategic, tactical, operational control.
- Selection of priority areas of control.

The purpose of internal control is to identify and prevent risks that are probability events that can lead to negative consequences.

Usually they stand out the risks associated with natural disasters and other force-majeure circumstances; market risks and so on. According to the proposed classification there are good reasons to allocate internal and external risks [3].

However, the most significant seems to be the division of risks on the basis of the main functional areas of the activity of a managing company that is formation and management of the extensive repair fund; and risks associated with the function of a technical customer.

We should also highlight the division of risks by types of negative effects:

- financial risks;
- risks associated with the failure of the regional program of extension repair of common property in the AH;
- reputational risks.

We should pay a special attention to the function of internal control on the monitoring of the use of money by extensive repair fund as the capital of extensive repair fund and as the own capital allocated for administrative and economic needs, as well as the capital received as a support measure from the federal and regional budgets.

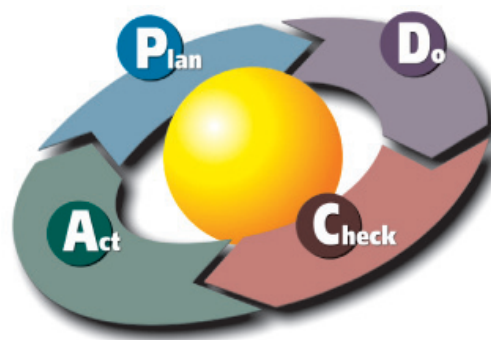
For ensuring effective control of the targeted use of funds and of the appropriateness and effectiveness of the cost of a managing company it is necessary to develop a detailed regulation of financial planning and to implement control procedures for the execution of such plans.

The current control of the use of funds is realized through the inclusion of a series of operations on the payment documents authorization into the process of execution of payments [5]. In particular, it is necessary to check the presence of payment in terms of costs and payment schedule, the compliance of primary documents that are the basis of payment and so on.

The approach to the organization of cash flow control is built on the conventional Shewhart-Deming cycle management («Plan-Do-Check-Act») [6].

Management cycle:

PDCA Methodology is the simplest algorithm of actions of process control and the achievement of its objectives. Management cycle begins with planning.



Planning

Setting goals and processes necessary to achieve the objectives, work planning process to achieve goals and customer satisfaction, planning, allocation and distribution of the necessary resources.

Performance

The execution of the planned works.

Inspection

Data collection and monitoring results on the basis of key performance indicators (KPI), resulting in the implementation process, the identification and analysis of deviations, the establishment of the causes of deviations.

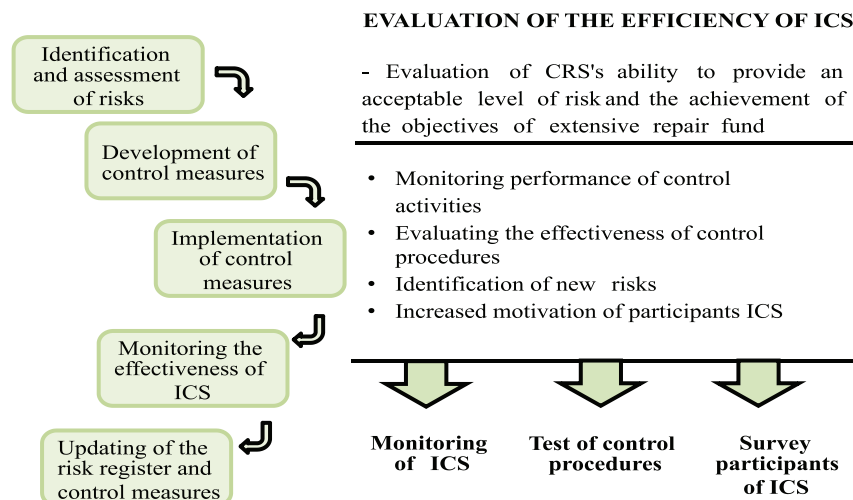
Impact (control, adjustment)

The adoption of measures to address the causes of deviations from the planned result, changes in the planning and allocation of resources.

ICS monitoring represents a specially conducted control activities aimed at assessing the level of effectiveness. That is the assessment of the ability of ICS to eliminate or minimize the risks of the organization, to ensure the realization of the objectives of the extensive repair fund [2].

In particular, the ICS monitoring is to be held for the timely achievement of the planned control procedures and in accordance with the approved procedures and method statements.

Then they assess the effectiveness of these control procedures. That is that they check whether the measures taken help to eliminate the risks of treatment or reduce the associated risks to the planned level [4].



Monitoring the effectiveness of ICS

Moreover, participation of employees in a regular assessment of the effectiveness of ICS increases their motivation and level of responsibility associated with the execution of the tasks of internal control.

We recommend holding monitoring of the effectiveness of ICS in three forms.

- Monitoring of the state of ICS, within which they verify the completeness and timeliness of control procedures, they hold the assessing of the correctness of documenting of control activities.

- Control procedures testing that is the study of the incidents that had place and the search for imperfection of control procedures which had to identify and eliminate the possibility of such incidents, but they found or didn't exclude them.

- Inquiry of the participants of ICS in the form of mail out with questionnaires to employees who were involved in the process of internal control to gather subjective assessments of the effectiveness of the control procedures and suggestions for its improvement.

Summarizing, we may emphasize that the internal control system is an important and necessary tool for the management of a managing company.

A tool that can help the administration of a managing company to deal with the obligations to ensure the extensive repair of apartment houses in proper time and with proper quality.

A tool that can give the owners of premises in apartment houses confidence that

money of their extensive repair funds will not be lost or spent inefficiently; will not be the subject of abuse or corruption schemes.

The proposed monitoring will contribute to the examination and early detection of potential financial abuse, fraud and corruption schemes in economic and financial operations of the management company. The offered evaluation of internal controls efficiency will timely identify and minimize the risks of the organization. When implemented, the offered approaches to monitoring and control of financial and economic activities of management companies will enable to create a highly effective tool to manage the process of the housing stock major repairs.

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E-BUSINESS AND ITS DEVELOPMENT IN KAZAKHSTAN

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The article is devoted to the issue of e-business development in Kazakhstan. The article provides an analysis and prognosis of electronic business development in Kazakhstan. The implementation of a possible solution to a distributed system is briefly described, based on java-technologies. Brief description of e-business types is given in the main part, also the concept of a distributed system, types of distributed software systems, distributed systems of architecture analysis, logical software layers of distributed systems. The main part of the article reflects the development of a distributed e-business systems example – the online shop on the basis of JAVA-technology, describing the implementation of a distributed system, the software and hardware parts of a distributed system, and also logical architecture for the Internet-shop, and operation of the system.

Keywords: e-business, business process, online shop, technology development of distributed systems, logical architecture, software and hardware, JAVA – technology

In recent years, the world has changed significantly due to the development of information technology. One of the most striking signs of the times became the development of e-business. This segment of business has proved its viability and effectiveness, so virtually any enterprise both production and non-production sphere builds its business processes with the use of e-business elements.

Using of e-business capabilities allows traditional companies to solve marketing and management challenges significantly faster and less expensive. The development and wide distribution of global telecommunication networks was the formation of a fundamentally new type of enterprise, which does not have the traditional tangible expression – digital product presented exclusively in digital form, such as software, e-books, audio and video works and so on [6, 7, 8].

Predictions made by Askar Zhumagaliyev in 2011 are used as a basis for any settlement in the area of e-commerce growth prospects in Kazakhstan. According to him, in 2014 the market will grow to 1,2 billion US dollars. “Our expectations for 2014 are that the volume of e-commerce market will reach about \$ 1,2 billion, while Internet advertising will grow almost twice”, – said Zhumagaliyev at the international conference of Digital Communications in Kazakhstan. At the time of the interview, according to the assessment of Zhumagaliyev, e-commerce turns over in Kazakhstan amounted to about 300 million US dollars, the volume of online advertising – about 6 million US dollars. Almost it is about the growth of approximately 4 times in 2–3 years.

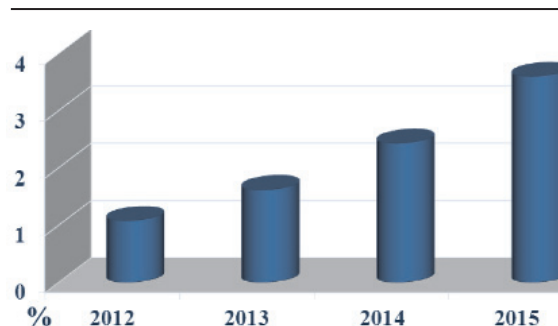
At the same time, Konstantin Gorozhankin, the head of CEO Processing.kz, gives more optimistic prognosis. According to him, by 2015, e-commerce market in Kazakhstan will

increase by nine times. He said that at the moment the market of e-commerce in Kazakhstan is about 0,45 percent of the total market. Assessments of the growth are as followings: in 2013 the share of e-commerce will account for 1,8 per cent, in 2014 – 2,7%, and in 2015 will reach four per cent by the time the market of e-commerce will amount to 3,6 billion US dollars. There are generally accepted estimates which are statistically adjusted, and so, they say that the threshold for the Internet audience composes 20%. From this figure begins the growing demand for online services. Kazakhstan has already reached this figure, and in big cities dramatically exceeds this mark. The boom of the e-commerce Konstantin expects in 2012–2013 [1]. We are now just in this time interval, and some data suggest that the prognosis is becoming reality.

Less optimistic is Vice-Minister of Transport and Communications of Kazakhstan Saken Sarsenov. In particular, in early October of this year at a public audition of the program “Information Kazakhstan-2020”, he noted that according to his estimates e-commerce market in Kazakhstan will reach 4 billion dollars only in 2020. I do not exclude that in his estimation taking into account the risks that are hovering over the world economy as a danger of “second coming” of the crisis that threatens to eclipse in scope last.

At the same time, there are other, more modest evaluations of existing realities. In particular, according to a survey conducted by analytical research center «Chocolife.me», the entire e-commerce market in Kazakhstan in 2011 amounted to over 133 million dollars. Basically, it creates «Air Astana» and other companies for that sale air and rail/train tickets, it was said in the company. Regarding payment methods, in this case 78,36%

of buyers are calculated by bank cards, 18,31 % and 3,33 % in a cash to pay for the services via terminals. Leading position in terms of revenue took the following online retailers: «Disti» – 5,7 million, «Sulpak» – 3,7 million dollars, «Alser» – 3,6 million US dollars. Analysis and prognosis of electronic business development in Kazakhstan is presented in the Figure.



Analysis and prognosis of electronic business development in Kazakhstan

E-business – is the result of a traditional business, which has led to the emergence of electronic commerce form. E-business is based on Internet technologies that allow you to streamline business processes, increase their productivity and efficiency [2]. Online commerce (e-commerce) – is just one of the possibilities that offered. Due to accessibility and broad coverage of the Internet e-business offers companies easy ability to communicate with customers, partners, suppliers and employees.

Business models of project organizational structure are built depending on the client. Business classification from this point of view has identified number of business models:

1. B2B (business-to-business) – business for business.
2. B2C (business-to-consumer) – a business that focuses on the physical end-consumer.
3. C2C (consumer-to-consumer) – a business that provides interaction between a large number of physical users.
4. C2B (consumer-to-business) – price ticket system, in which consumers would like to buy products and services.
5. B2A (business-to-administration) – business operating transactions between private companies and government organizations (administration).
6. C2A (consumer-to-administration) – a business built on relationships organization of individuals and public services.

In addition, there are a number of exotic models, associated with types of business, built on a business-to-government interactions

(B2G), government to citizens (G2C), government-to-government (G2G), and so on.

The main types of e-business:

1. Internet shops. Online stores are the embodiment of e-commerce in its classical sense (buying and selling goods and services on the Internet). Online store is a company which trades on the Internet using the Web-site. Online store website contains catalogs of goods with their descriptions, photos and prices. A special form of online-ordering allows customers to select, order and pay for products they are interested in, to calculate in advance the cost of the entire order, including delivery. As a rule, the customer is able to track the online store, at what stage is the execution of his order. Online stores often place in special sections or in descriptions of specific products customer reviews and other useful information for customers. The assortment online store of goods can range from a few to many tens of thousands of names. Depending on the selected conditions, the customer pays for the order on delivery or prepayment commits one of the traditional methods or by using specialized systems of Internet payments.

2. Corporate websites. The main function of the corporate website is the support for existing real business. This support can be expressed as follows:

- 1) Promotion of goods and services on the Internet;
- 2) Expansion of the customer base;
- 3) Formation of the dealer network, attracting franchisees organizations (Upgrade Binaries companies interested in promoting their products in the regional markets);
- 4) Catalogues, ratings, searching system;
- 5) Content projects;
- 6) Information business network;
- 7) Financial Services;
- 8) Advertising Business;
- 9) Communication services, means of communication;
- 10) Trading places.

The idea of an online market place looks very attractive. Its essence is as following: to create a website interface that allows sellers to put up for sale its products and customers to choose the best deals and make purchases. The initial audience of buyers and sellers is formed by advertising media and personal contacts. The process of making deals begins. It is understood that all financial transactions are done via the Internet, and in the usual way. With non-existence of geographical barriers, participation in trade at this site may take us all over the world. Sellers and buyers are both legal and

natural persons. Trading online platform can be organized in three main ways: exchange, auction or catalog.

3. Distance learning and online-consultation [5].

4. Gambling network.

Methodology of e-business based on Java-technologies

On the basis of e-business, you can consider the development of online store for the sale and promotion of products. In the first place in the construction of online store, it is necessary to develop the architecture of an online store.

System architecture

Commerce framework should ensure the following basic principles: centralized approach of information processing; avoid duplication of data entry and increasing its reliability by identifying a previously entered information; a mechanism of differentiation of user access rights should be in the system; providing conflict-free functions, conflict-free expansion of the users working with the store [3].

On the physical level online store consists of two parts:

1. The software part: Databases on SQL Server database platform; The set of software modules; The set of software modules that provide the ability to upload and download external reporting data.

2. Hardware: Hardware-software complex for the database server; The hardware-software system to accommodate the application server; The logical architecture of the Internet shop is divided into 3 levels (The data source level – provides storage and access to data systems, transaction management; The level of application logic – provides data transfer between the presentation layer and the data source, perform the operation on the basis of the data entered by

the user; The presentation layer (user) – provides interfaces for displaying and entering information, processes the user's commands and then convert them into operation at the level of application logic.

The structure and operation of the system

The following modules (subsystems) have been allocated on the basis of architectural solutions: Module "Frontend"; Module "Backend"; Module "Data Storage".

Module "Frontend" is intended to provide a single entry point to the Internet shop for its users. The module must be a site and should provide all interested persons with information about the sale of goods. Registered user Module should provide an opportunity to work in a private office and perform the following functions: Authorization Online, Editing of personal data, Order Product, Movement of goods into the basket, View order status.

Module "Backend" for feedback with users module represents administrative section, which provides the following functions: Creating and populating the sections/subsections of the site menu, Adding product info, Adding product to checkout.

Module "Data Storage" provides storage of information on the Internet to create a partition store. By the logic of the application users and site administrators contact point in the module with the request. The main role and function are shown below.

Business processes used in the system. The main task of an online store is ordering of the goods and their processing. Based on these data basic business processes have been developed and used in the system.

1) Registration in the online store:

To register in the store the user must complete the registration process by following sequences: In the registration window click on

Roles and functions in the system

Roles	Functions
A guest	Browse the product catalog Registration on the site
Registered user	Log on website Edit personal data Ordering goods Moving goods into the basket View Order Status
Moderator of store	Creating and filling sections / subsections of the site menu Adding information about the product Adding product to cart and checkout Change order status

the button “Register”; To specify registration information, e-mail address, which will be tied to a user account in the future; Confirmation of registration must come to the email address of the user, which he pointed at registration; The letter must go through a registration confirmation and the user is automatically added to the account in the system.

2) Order of the product:

To order from the online store you must first login, and perform the following steps: Select the desired item; Add selected items; Order product, which is in the basket, Confirm the order by receiving a notification e-mail.

3) Fill the content of the online store:

The content of the online store is filled with system administrators. To do this, the administrator must select the relevant sections and add information on the goods.

4) The application process to order the goods:

After ordering goods, application is processed by the administrator. The administrator checks the goods associated with the users. For administrator realized workstation for processing orders for goods.

Technologies used during system development

Java has become an indispensable tool for developers: writing software on one platform and run on virtually any platform; the creation of programs that run in a web browser and have access to Web services; the development of applications on the server side for forums on the Internet, stores, polls, HTML forms processing and many others; union applications or services using the Java language to create highly specialized applications or services; the creation of multi-functional and efficient applications for mobile phones, remote processors, microcontrollers, wireless modules, sensors, gateways, consumer products, and practically any other categories of electronic devices [9].

Java Technologies for the development of e-business systems: Java Foundation Classes (Swing) (JFC), Java Help, Due to Java Native Interface (JNI), Java Platform Debugger Architecture (JPDA), The structure of Java 2D API, Technology Java Web Start, Certification Path API, Java Database Connectivity (JDBC), Java Advanced Imaging (JAI), Java Authentication and Authorization Service (JAAS), Java Cryptography Extension (JCE), Java Data Objects (JDO), Package Java Management Extensions (JMX), Java Media Framework (JMF), Java Naming and Directory Interface (JNDI), Java

Secure Socket Extensions (JSSE), Java Speech API (JSAPI), Java 3D [10].

In the conclusion, analysis and forecast of development of electronic business in Kazakhstan showed that e-business in Kazakhstan will develop. Today, e-business is used in the vast majority of information systems with distributed structure. The realization of distributed e-business systems based on JAVA-technology is one way of e-business development in Kazakhstan.

The article analyzes the state of e-business in Kazakhstan, prospects of electronic business development in Kazakhstan; describes a distributed system and the types of distributed systems, logical software layers and architecture of distributed systems, technology for building distributed systems, describes the technology implementation of an online store as a distributed system based on JAVA-technologies [4].

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THE INDUSTRIAL COMPLEX FUNCTIONING STATE MANAGEMENT SPECIFICITY

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The research presents a view on the participation factor of state power in the industrial production development. The research author underlines that it is necessary for the state to regulate the industrial system in terms of market instability and production modernization problems. The research author concludes that effective budget financial policy is to be elaborated on the federal and regional levels in order to provide production comprehensive transformation according to the contemporary economic requirements.

Keywords: interference, state management, industry, human capital

State interference is the active influence on all human life spheres, which is especially important in terms of a socio-economic crisis. In particular, such interference is of great importance for the industrial policy of a state. This is determined by the rapid increase of requirements to domestic and foreign markets' competitiveness.

The above-mentioned reasons affect the implementation of state power functions, which are in turn essential for maintaining the market economy balance. There are the so-called "market failures", which is a free supply-and-demand balance, unable to satisfy the society's demands along with the aggravating social environment, what is caused by the lack of in-demand industrial production or a rapid increase of goods prices. In such a situation, the interference of state power may imply regulating the production activity by extending the industrial control functions or by developing the politico-economic collaboration with private business owners. It is possible to define several industrial control functions, depending on the management influence goal. The first function is providing the development of the labour potential and protecting the people, living close to industrial enterprises, from adverse external economic impact by protecting the environment and providing the improved ecological security. We can draw the figures, showing the costs of developing human capital in Southern Federal District in 2012 (expenses in billions of rubles and in percent to the Domestic Regional Product respectively): Rostov Oblast – 42,6 billion rubles and 7,66%; Krasnodar Krai – 58,5 billion rubles and 6,79%; Volgograd Oblast – 27,2 billion rubles and 7,19%; Astrakhan Oblast 11,7 billion rubles and 8,7%; the Republic of Adygea – 4,9 billion rubles and 24,61%; the Republic of Kalmykia – 3,7 billion rubles and 15,37% [3]. The issues of ensuring ecological security by regional authorities determine the expenses on

environmental protection. At the beginning of 2012 in Southern federal District these expenses amounted up to (in billions of rubles and in percent to the Domestic Regional Product respectively): Rostov Oblast – 2,88 billion rubles and 0,52%; Krasnodar Krai – 4,72 billion rubles and 0,55%; Volgograd Oblast – 3,02 billion rubles and 0,8%; Astrakhan Oblast – 1,44 billion rubles and 1,07%; the Republic of Adygea – 0,43 billion rubles and 1,04%; the Republic of Kalmykia – 0,04 billion rubles and 0,17 [3]. The afore-mentioned figures prove that Krasnodar Krai takes the lead by state regional expenses, while Astrakhan Oblast, the Republic of Adygea and the Republic of Kalmykia lack effective municipal improvement. Speaking about the contemporary Russian Federation industry, it is also worth mentioning volume of Domestic Regional Product per capita (in thousands of rubles per capita): Krasnodar Krai – 193 thousand rubles; Rostov Oblast – 148 thousand rubles; Volgograd Oblast – 167 thousand rubles; Astrakhan Oblast – 144 thousand rubles; the Republic of Adygea – 105 thousand rubles; the Republic of Kalmykia – 84 thousand rubles.

The volume of Domestic Regional Product (in billions of rubles): Krasnodar Krai – 1008,2 billion rubles; Rostov Oblast – 632,2 billion rubles; Volgograd Oblast – 437,4 billion rubles; Astrakhan Oblast 145,4 billion rubles; the Republic of Adygea – 46,1 billion rubles; the Republic of Kalmykia – 24,3 billion rubles.

The volume of investments into the main small businesses' capital (in millions of rubles): Krasnodar Krai – 27445,1 million rubles; Rostov Oblast – 11630 million rubles; the Republic of Adygea – 1450,5 million rubles; Volgograd Oblast – 4831,7 million rubles; Astrakhan Oblast – 1133,6; the Republic of Kalmykia – 207 million rubles.

The turnover of small businesses per capita in thousands of rubles per capita): Krasnodar Krai – 85,1 thousand rubles, Rostov

Oblast – 78,6 thousand rubles; the Republic of Adygea – 52,7 thousand rubles; Volgograd Oblast – 38,7 thousand rubles; Astrakhan Oblast – 34,4 thousand rubles; the Republic of Kalmykia – 11,4 thousand rubles [7, p. 19]. We can state that there are necessary socio-economic conditions for satisfying social needs and for providing social stability (in particular by the volume of Domestic Regional product and investments into the small businesses' main capital).

Secondly, the regulation of production in industries with high risk of formation of monopolies (e.g. in the field of electricity, transport and communications, and so on.).

Thirdly, the adjustment of the adverse social effects of the market economy, which is connected with the growing social inequality in living standards decreasing opportunities to get the necessary goods at set prices [6, p. 33].

These functions can change with the development of social relations, which is associated with the emergence of elements of the so-called post-industrial society. There are two basic models of correlation between the state influence and the economic and production system in a post-industrial society:

1) the continental model, which is closely associated with the principle of a certain dependence of the economy from the government (this model is typical for France, Germany, Italy, etc.);

2) Anglo-Saxon model with the recognition of the principle of non-intervention in the economy (its elements are implemented in the US and UK).

The basis of effective state economic policy is the financial system, which consists of budgets of different levels within federalism (in Russia – a federal budget and budgets of subjects of the Russian Federation) and decentralized financial resources at the disposal of state-owned industrial enterprises and organizations. The process of these funds' use state regulation is one of the most important instruments of industrial policy in a situation of maintaining the principle of economic processes based on public-political influence.

Increasing the level of public investments is determined by various situation factors on the state's territory and foreign affairs situation. These factors include the military (raising the level of military production), economic-economical (the presence of relatively uniform development of the set of economic sectors and different types of production depending on market demand) and social (orientation on the situation in the society, with the production

of consumer goods and high-quality products food) [6, p. 34].

Public financial expenses in industrial policy system divided into two categories:

1) the cost of the armed forces, law enforcement with the necessary increase in production of modern weapons and technology (in this case, there is improvement of the structure of the military-industrial complex, with its methods of regulation);

2) expenses for the satisfaction of social needs in the form of increased production of socially popular products with the development of agriculture and peaceful destination products. The priority of the second species is closely related to the strengthening of the foundations of an economic system of post-industrial society, as is the social orientation of the expansion and progress of industrial activity.

State function of stabilization of the market economy can be effectively carried out with the help of fiscal policy basic elements (often regarded as constituent elements of industrial strategy of the state, although it is one of the most important conditions for successful industrial control). These elements include a certain course of the budget regulation (to ensure a balance of financial income and expenses) and monetary regulation (lower inflation, regulation of the internal volume of currency). The use of such tools is necessary to overcome the production slowdown and falls in unstable market processes.

Considering foreign experience of government interference in industry, we can view Taiwan's economic strategy – economic stimulus plan of 2005 intended for attracting the investments in infrastructure projects through collaboration between the government and private manufacturers and for providing favorable conditions for small business lending.

At the same time modern economic “locomotives” are created (for Taiwan it was industrial production of semiconductors and liquid crystal displays) [5, p. 90], that will be in demand on the basis of maintaining production high quality. The implementation of output is closely linked to effective advertising brands on the market.

The expansion of modern industrial building in areas related to the strengthening of innovation and scientific potential of vocational and higher education institutions. It is aimed at training highly skilled workers and engineers as the necessary human resources base. It is claimed to increase the number of “points of technological innovation” as separate companies with their subsequent association with

the purpose of expansion of technological modernization on the basis of technology parks, centers of technological innovation and regional research centers.

Strengthening linkages between industry, educational institutions and research institutions provides for the establishment of joint projects in applied research. These surveys should be directed to the development of modern technologies of work organization and the use of existing equipment in the workplace [1, p. 103].

It is possible to note a number of strategic guidelines to the construction of modern industry while ensuring the social orientation of the economy and the strengthening of economic relations between producers and consumers:

1) expansion of the cluster approach in the implementation of the industrial policy to strengthen inter-sectoral linkages;

2) identification of promising industries that could become drivers of growth of the economy with the development of targeted programs for their development;

3) creation of the necessary institutional environment and infrastructure for the modernization of production;

4) establishment of the most popular products on the market;

5) regulation of the nature of the territorial concentration of the productive forces in accordance with the environmental capacity of a given area.

It demanded the transition from a functional to a territorial approach in the formation of an integrated system of public research institutions and public groups of experts for a comprehensive evaluation of innovative projects in terms of the feasibility of their implementation. This contributes to increasing the mobility of skilled manpower in the field of industrial innovation with continuous additional maintenance personnel. Active development of specialized mechanisms for financing innovation and combining them with the existing elements of the market infrastructure. Implementation of effective mutual arrangement of communication between industrial complexes based on a combination of different modes of transport.

Achieving these goals will provide relatively balanced development of areas with a combination of social development, construction and modernization of engineering and social infrastructure to improve competitiveness and innovation activity of enterprises [4, p. 73].

As part of an effective industrial policy is necessary to develop concrete measures to stabilize the financial and economic state of the industrial complex. Such measures should include:

1) providing technological and technical re-equipment of enterprises;

2) the development of production in the direction of expanding the range of finished products and improve its quality through the use of modern types of raw materials [2, p. 94];

3) expanding cooperation with various investment partners in domestic and foreign markets.

The implementation of the mentioned measures should be fulfilled on the basis of well-grounded business plans and perspective investment projects. In turn, this is closely connected with implementing effective budget, fiscal, monetary and investment policy on the federal and Russian regions level. Fulfilling the task of state interference into the industry's functioning will enable stabilizing its financial and economic condition.

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INDICATORS AND CRITERIA FOR EVALUATING THE EFFICIENCY OF ECONOMIC GROWTH

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The article is devoted to problems of economic and social development of the Novgorod region. Consider the economic and social indicators of the region's development in the dynamics of the Novgorod region is determined by the position in the national performance and indicators the North-West Federal District, presents the main socio-economic indicators of living standards in the area.

Keyword: socio-economic indicators and indicators, average per capita income, nominal and real income, consumer price indices and industrial production, economic growth

Economic growth in Russia, its past, present and future are one of the most important topics in the discussions of politicians and scientists. This is a problem because the intense economic growth is the basis for improving the welfare of the population and the condition for reducing the income differentiation. The economic potential of the country is growing at the expense of increasing the number of inputs, improve quality and improve methods for their production. In this case we are not talking about copying already passed developed economies stages of economic growth, but the speedy elimination of the gap in terms of living standards, economic efficiency and other indicators of the quality of society. Besides, the growth process in nature is not stationary, and catch-up growth should take into account the change in time of the situation. Strategic objectives embedded in the global economy, the return position in the intellectual sectors of the market, reducing the gap in the living standards of the population also suggest high rates of economic growth and stability.

In modern world, economic growth is not the only indicator of economic development of a country or a particular region, but is a consequence of sustainable human and social development. Therefore, a comprehensive analysis of the economic growth to identify the factors most influencing on it, identification of opportunities to increase economic growth. Analysis of economic growth, its factors and indicators that contribute to the development of effective social and economic policies.

The problem of economic growth is one of the most important for the Novgorod region. Table 1 presents some of the data that characterize the proportion of the Novgorod Region in the national key socio-economic indicators.

Analysis of the dynamics and factors GRP Novgorod region for 1998–2013 years has shown the role and place of the Novgorod region in the formation of Russia's gross domestic product. For the main economic indicators in the

occupied area of 2003 8th place in the ranking of the North-West Federal District. These statistics on the Novgorod region has shown sustained economic growth: Increase in GRP with 9,4223 billion rubles in 1998 to 39,066 billion rubles in 2003, GRP growth rate has averaged 34%. This is in no small measure contributed to the favorable investment climate, strengthening of industrial capacity, administrative support for the agricultural sector and small businesses [3].

According Novgorodstat, the gross regional product in 2011 at basic prices amounted to 149 billion rubles and increased by 3,7 percent compared with the previous year. Index – the deflator of gross regional product in 2011 in relation to the prices of 2010 amounted to 112,8 percent. The share of gross regional Novgorod Oblast in the Russian Federation's GDP and GRP products Northwestern Federal District in 2011 compared with 2010 remained unchanged at 0,3 and 3,2% respectively.

The per capita income in 2011 accounted for 236,000 rubles of GRP, which is higher than 2010 by 35,7 thousand, or 17,8%, lower than the average Russian indicator by 80,6 thousand or 25,5%. Among the North-West Federal District region on this indicator ranked eighth, ahead of the Republic of Karelia and Pskov region.

The share of the leading basic economic activities (agriculture, mining, manufacturing, power generation and distribution, gas and water, construction, transport, retail) in 2011 accounted for 70% of gross value added (in 2010 – 68,5%).

In 2011 compared to 2010 gross value added increased in such significant (by share in GRP) types of economic activities such as agriculture, hunting and forestry (115,9%), wholesale and retail trade; repair of motor vehicles, motorcycles, household goods and personal items (114,5%), manufacturing (105,9%). In addition, a significant increase in gross value added in 2011 was observed in mining (74,9%), education (37,2%), health and social services (15,8%), financial activities (14,7%) [1].

Table 1

Specific gravity of the Novgorod region in the national key socio-economic indicators [7, p. 14]

Index	Per cents
The area of the land	0,32
Population	0,44
Average population of employed in the economy	0,5
Total regional product	0,3
Fixed assets in the economy (the full account value at the end of the year)	0,29
The volume of shipped products (works, services):	
mining	0,01
manufacturing	0,52
production and distribution of electricity, gas and water	0,28
Production:	
nitrogen, mineral or chemical fertilizers	7,0
urea-formaldehyde resins in primary forms	15,4
construction and assembly parts made of reinforced concrete	0,7
lumber	3,4
plywood, consisting only of sheets of wood	4,7
Agriculture products	0,6
The volume of work performed by the activity "Construction"	0,4
Commissioning of the total area of residential buildings	0,4
Retail trade turnover	0,36
The volume of paid services to the population	0,41
Investments in fixed assets	0,4

Currently Novgorod region ranks 7th in the Northwest Federal District on the fertility rate, 9th place – at a rate of mortality, 3rd place – on the growth rate of real money incomes of the population, 5th place – on the growth rate of real gross wages and salaries, 4th place – Commissioning residen-

tial buildings in the 1000 population, 3rd place – density automotive expensive public paved, place 2 – the index of investment in fixed assets [8].

The place occupied by the Novgorod region in the national socio-economic indicators are presented in Table 2.

Table 2

The place occupied by the Novgorod region in the national socio-economic indicators [7, p. 15–16]

Index	Place
Birthrate	58
mortality ratio	81
The employment rate	14
Unemployment rate	9
Average per capita money income (per month)	34
Consumer spending in average per capita	36
The minimum subsistence level of the entire population	47
Total regional product per capita	30
Mining	66
Manufacturing	42
Production and distribution of electricity, gas and water	67
Agriculture products	56
Investments in fixed capital per capita	35
Commissioning of apartment houses on 1000 population	25
The density of public roads with hard surface	34
The volume of communication services rendered to population, per capita	59
Retail trade turnover per capita	40

The main economic and social indicators of the RF subjects, according to the methodology of Rosstat, include the following indicators: industrial production index, consumer price index, the average monthly wage, per capita cash income. Also on the subjects of the RF analyzes operational data on the volume of shipped goods of own production by economic activity, the production of major products, livestock production, livestock, commissioning of the housing, the volume of retail trade turnover; information on consumer price indices, average prices for goods and services included in a social set list of financial performance of large and mid-sized organizations, investment performance, per capita income, the average monthly wages and wage arrears.

In January – March 2014 compared to January – March 2013, the index of industrial production in the Novgorod region amounted to 108,6%, the consumer price index in March 2014 to December 2013 – 102,4%.

Cash income per head of population in January – February 2014 amounted to 19835,1 rubles, which is higher than in January – February 2013 by 13,5%.

Real disposable per capita cash income (income after deduction of compulsory payments, corrected by consumer price index) in January – increased by 6,6% February 2013 – February 2014 compared to January.

In January – February 2014 monetary incomes of population in the region amounted to 24,7 billion rubles and increased compared to January – February 2013 by 12,9%, expenditures – 25,4 billion rubles and increased by 11,2%. The excess of income over expenditure amounted to 715,7 billion rubles (in January – February 2013 – 963,8 billion rubles).

Real disposable income in January – February 2014 compared to January – February

2013 increased by 6,1 % compared with January 2014 – by 24,9%.

Average salary in the January – February 2014 in the economy of the region amounted to 22908,1 rubles and increased compared to January – February 2013 by 9,2 % in real terms – by 2,7 %. In January – February 2014 the level of average gross wages and salaries of workers of education has made to its level in the manufacturing sector 77 % (in January – February 2013 – 66,7%), health care workers and social services – 79,1 % (74,1 %).

In the analysis of socio-economic indicators of living standards of the population of the Novgorod region (Table 3) it is clear that for the period under review saw an increase in the nominal income of the population.

In 2005 compared with 2000 per capita cash income per month increased more than three times. Growth in real disposable per capita income for the same period amounted to only 10,1 percent. The maximum performance of real income growth recorded in 2006 and 2008, the minimum – in 2011.

During the entire period of growth of nominal income grew faster than real, and in general for 12 years, the nominal per capita income of the population of the Novgorod region grew by almost 11 times, and real – in 2,2 times. Average monthly wages increased in the analyzed period by 12 times, while real wages – in 2 times. And even in 2009 it was observed a decrease in comparison with 2008.

One of the most important indicators of the above appears to the consumer price index, a main gauge of inflation, has a direct impact on economic growth, and especially relevant in today's conditions [2]. Increased inflation in 2015 as compared to the year 2014 and noted in the whole of the Russian Federation (108,5% vs. 104,8) and the North-West Federal District (hereinafter – Northwestern Federal District) 108,6% versus 105,3% [9].

Table 3

Main socio-economic indicators of the standard of living of the population of the Novgorod region

Year	Per capita income per month, rubles	Real disposable average per capita income, as a percentage of the previous year	Average monthly salary, rubles	Real wages as a percentage of the previous year
2000	1807,5	106,8	1742,5	114,1
2005	5475,6	110,1	6940,8	111,6
2006	7205,9	119,4	8907,5	116,2
2007	8614,1	108,5	11004,9	113,4
2008	11653,3	117,0	13685,2	108,8
2009	13388,8	104,2	14794,5	96,8
2010	15598,9	109,9	16750,8	105,9
2011	16980,9	100,2	18636,5	103,4
2012	19649,2	109,7	21297,4	109,1

Table 4

Consumer price indices in 2015 in Russia and the subjects of the North-West Federal District (in %, June to December of the previous year)

	2014	2015
Russian Federation	104,8	108,5
North-West federal district	105,3	108,6
The Republic of Karelia	105,2	108,2
The Republic of Komi	105,0	108,6
Arhangelck Oblast	104,3	107,5
Vologda Oblast	104,4	107,1
Kaliningrad Oblast	105,9	106,5
Leningrad Oblast	104,9	108,7
Murmansk Oblast	104,8	108,8
Novgorod Oblast	104,9	108,4
Pskov Oblast	105,3	109,4
Saint-Petersburg	105,8	109,1

The cost of a conditional (minimum) set of food products, as is known, the difference reflects the consumer price levels of staple foods in the region.

According Novgorodstata, in the Novgorod region in 2015. The value of the contingent (minimum) has developed a set lower than in the North-West Federal District and its subjects.

Nominal gross wages in January – May 2015 amounted to an average of 25367,6 rubles a month, which is higher than in January – May 2014 by 4,8%, its real size, adjusted for the consumer price index decreased by 9,7%. The lowest level of average wages was seen in workers in organizations of textile and clothing industry (15,9 thousand. Rubles, or 62,7% of the average in the region), fishing, fish farming and agriculture, hunting and forestry (16,5 thousand. rubles, or 65% and 65,1%, respectively), retail trade (17,7 thousand. rubles, or 69,9%), hotels and restaurants (17,8 thousand. rubles, or 70,3%).

The subsistence minimum per capita, approved by order of the Government of the Novgorod region № 225-p of 07.13.2015, at the II quarter of 2015 averaged 9,788 rubles for able-bodied population – 10 626, for pensioners – 8130, for children – 9677 rubles.

Table 5

Conditional cost (minimum) set of food products in the Russian Federation and the subjects of the North-West Federal District in June 2015

	Set price, rubles	The % by December 2014
Russian Federation	3792,68	114,3
North-West federal district	4357,35	115,2
The Republic of Karelia	4338,39	117,3
The Republic of Komi	4491,20	116,1
Arhangelsk Oblast	4500,20	110,3
Vologda Oblast	4136,28	114,1
Kaliningrad Oblast	4316,66	120,1
Leningrad Oblast	4384,56	118,5
Murmansk Oblast	4559,48	114,1
Pskov Oblast	4194,87	117,3
Saint-Petersburg	4503,35	115,7
Novgorod Oblast	3890,14	118,3
Velikiy Novgorod	4027,35	118,0
Borovichi	3651,12	118,8
Staraya Russa	3662,81	118,4
Valday	3791,28	119,5

In January – May 2015 average per capita income of the population of the Novgorod region, according Novgorodstata amounted to 23 107,7 rubles, which is higher than the corresponding period of 2014 by 12,8%. Real disposable per capita cash income for the period decreased by 3,3 %.

According Novgorodstat [9], as compared to the year 2014 in the Novgorod region saw an increase in the volume of production of industrial and agricultural products, construction works and housing construction, wholesale trade turnover. However, the decreased turnover of road transport and passenger public transport, the retail trade turnover, catering, paid services to the population, reduced real wages of workers. Raised levels of unemployment and crime.

Table 6

Main indicators, characterizing the results of economic activity in the Novgorod region in 2015

Index	2015	2015 in % by 2014	2014 in % by 2013
Index of industrial production	X	102,5	112,9
The volume of shipped goods of own production, works and services by own forces, million rubles:			
mining	3334,2	191,9	131,7
manufacturing	182538,2	124,2	115,6
production and distribution of electricity, gas and water	16096,3	109,8	114,7
Manufacture of agricultural products, million rubles	27444,2	114,8	111,3
Volume of works performed by kind of economic activity "Construction", million rubles	55591,7	143,0	122,4
Commissioning of residential houses at the expense of all financing sources, thous. m ² of total area	359,0	101,4	109,5
Cargo turnover of motor transport organizations of all kinds of economic activities, a million ton-km	710,8	99,1	97,1
Passenger public transport, one million passenger-km	526,9	99,0	96,4
Retail trade turnover, million rubles	107010,0	95,2	105,2
The turnover of catering, million rubles	4941,3	96,2	100,8
The volume of paid services to the population, million rubles	32158,0	97,9	101,0
Per capita income, rubles	24500,4	108,8	111,3
Average monthly wage per employee, rubles	25776,2	104,3	107,2

The industrial production index in the Novgorod region amounted to 102,5% in 2015 relative to 2014, which is lower than the previous year. By December 2012 the industrial production index was 102,9 percent.

Production of products of the agricultural economy Index of all farmers (agricultural organization, peasant (farmer) farms and individual entrepreneurs, private households) amounted in 2014 to 114,8% in 2015, higher than the previous year.

Significant growth was achieved in construction: scope of works performed by kind of economic activity "Construction", amounted to 55,6 billion rubles, an increase by 2014 to 43% in 2015.

According Novgorodstat, prices for consumer market increased by 12,6% in 2015, food prices grew by 14,9%, non-food products – by 13,5%, paid services – by 7,1%.

The cost of a conditional (minimum) set of food per person per month for the region has

increased since the beginning of the year by 12,1% and amounted at the end of December 2015 3685,43 rubles.

Increasing the level of prices would not affect the change in the standard of living. In January – November 2015 average per capita income amounted to 24500,4 rubles, which is higher than the corresponding period of 2014 by 8,8%.

The subsistence minimum per capita, approved by order of the Government of the Novgorod region from 01.10.2016, № 9-ps, for the IV quarter of 2015 amounted to an average of 9221 rubles for able-bodied population – 10 028, for pensioners – 7658, for children – 9053 rubles.

Nominal gross wages in January – November 2015 amounted to an average of 25776,2 rubles a month, which is higher than in January – November 2014 to 4,3%, its real size, adjusted for the consumer price index decreased by 9,5%. The lowest level of average

wages was seen in workers in organizations of textile and clothing industry (15,3 thousand. Rubles, or 59,3 % of the average in the region), fishing, fish farming (15,6 thousand. Rubles, or 60,5 %), agriculture, hunting and forestry (17,2 thousand. rubles, or 66,9 %).

The standard of living changes occur due to negative labor market trends. According to the Department of Labor and Social Protection of Population of the Novgorod region at the end of December 2015, the state employment service institutions were registered 4,7 thousand. People not employed activity, which is 23,1 % more than at the end of December, 2014. The number of officially registered unemployed amounted to 4,3 thousand people (at the end of December 2014 – 3,4 thousand people.), or 1,3 % of the economically active population (1 %) [10].

Employers need for workers, stated in public employment services at the end of December 2015 compared to December 2014 decreased by 2,3 times and amounted to 2,9 thousand. man. The load is not employed population work in the 100 declared vacancies amounted to 161 people (at the end of December 2014 – 57 people).

The difficult situation on the labor market of the Novgorod region is caused by the above indicators of reduction of production volumes in a number of industries. Negative trends are compounded by unfavorable demographic situation.

Thus, economic and social indicators of development of the Novgorod region show the need for an active social and economic policies aimed at increasing economic growth and improving its sustainability.

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INNOVATIVE METHODS AND MECHANISMS FOR INCREASING THE QUALITY OF EDUCATION AND TECHNOLOGY-BASED TEACHING AND LEARNING

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In this article the experience of JSC "Astana Medical University" on development and use of the interactive multimedia electronic books in English called "Professional English in Medicine" and "Progressive medical English" is described. The e-books are intended for training of students of medical specialties in reading and understanding of professionally focused texts and exercises and constructing on their basis of own statements. Interactive e-books are considered in this article, consisting of 2 parts (textbook and CD-disc) and they are developed taking into account the mental mechanisms and processes, taking place during the reading and understanding of the text, the system of pretext exercises is aimed at the development of abilities of professionally focused oral speech and pronunciation. Authors pay attention to these e-books, which are devoted for medical specialties as "Public Health", "General medicine", "Stomatology", "Nursing" and "Pharmacy" departments.

Keywords: e-books, innovative, reading, understanding, technology, interactive multimedia, structuring, compression, system of exercises, oral speech

Nowadays there are a large number of the computer courses and programs intended for training in English of students of non linguistic higher education institutions. Today, schools and universities are being pressured more and more to improve the technology they use and teach in the classrooms. Innovative computer technology, E-books and English language in education are very important subjects in our country. Teachers of foreign languages of these higher education institutions created a number of training computer programs. Because innovative methods and mechanisms may enhance the learning and may help most students in achieving their academic objectives. However specificity of branch higher education institution does not always allow to use the training computer programs developed in other higher education institutions, in particular for each specialty the lexical filling has to be provided, the professionally focused texts are offered. Respectively, chairs and teachers of foreign languages continue to develop the new training of the computer programs intended for specific conditions of training and specialties of students. The combination of computer technology and appropriate English language teaching/learning methods may increase the academic knowledge.

In this article it will be a question of the interactive multimedia electronic books in English "Professional English in Medicine" for the first year students and "Progressive Medical English" for the second year students, as shown below, developed and tested on the basis of Foreign Languages chair of JSC "Astana Medical University". The e-books are intended

for training of students of medical specialties in reading and understanding of professionally focused texts and exercises and constructing on their basis of own statements. We adopted technology-based Teaching/Learning in education for our students. If technology is adopted in education, it will make better future. Also high productivity, beneficial education and long-term advantages are expected [3; 4].



Fig. 1. Professional English in Medicine

The purpose of research is to identify the main studied themes, the main theoretical reference frameworks used as research support, and to characterize the research methodologies.



Fig. 2. Progressive Medical English

1. Main theme: images, audiovisuals, information technologies, teaching and learning, teacher's training, others.

2. Purpose: analysis, intervention, conception and development, others.

3. Object of study: pupils, students, teachers, materials, teaching and learning process, teacher's training, others.

4. Context: school (educational level), university, professional, others.

5. Theoretical references: behaviorist perspectives, communicational and multimedia perspectives, systemic perspectives, cognitive and constructivist perspectives, hypermedia approach and cognitive flexibility, others.

Tasks of the research:

1. To reveal the basis of technology-based teaching/learning use in the educational process.

2. To analyze the degree of research problem and scientific approaches.

3. To determine the existing tendencies of realization.

4. To develop experimental diagnostical instruments which allows to estimate the efficiency in educational process.

5. To develop the program and methodical recommendations of introduction these innovative technologies to the educational process.

Methods of investigation:

1. Methods of semantic differentiation which allows to differentiate the understanding by separate groups and to analyze the semantic object in different fields.

2. Methods of interactive learning.

3. Methods of problem based learning and methods of program learning are also deserved to use.

4. Methods of modern concepts of innovative technologies and E-books.

5. Empirical methods (observation, testing, discussions and etc.).

6. Experimental work, math methods of statistic data processing.

Development of an interactive multimedia e-books were preceded by the preparatory work including:

1) definition of texts' themes of an electronic books;

2) marking of texts taking into account mental mechanisms of understanding;

3) definition of work stages with each text;

4) drawing up questions, exercises and tasks to each text.

On the basis of the analysis of curriculum programs for the course "Foreign languages", eight themes were chosen for the "Professional English in Medicine": "Spinal column", "Human Brain", "Human Heart", "Human Teeth", "Digestive system", and so on. And twelve themes were chosen for the "Progressive Medical English": "Human skeleton", "Bone", "Human shoulder", "Female Urinary system", "Male Urinary system", "Human eye", and so on. On each of these themes professionally focused texts and exercises were selected [1; 6].

When determining ways of a marking of each of texts we relied on E.M. Vereshchagin and V.G. Kostomarov's work "Language and culture" in which the analysis of the text is carried out from the point of view of lingvo-regional geography. We believe that some conceptual regulations developed by the specified authors can be postponed for training in reading and understanding of professionally focused texts. Considering mental mechanisms of understanding of the text, authors allocate three mental processes:

1) text structuring by the reader;

2) compression, semantic compression of the text;

3) staking (giving the meaning to compressive structural units) [10].

Use of computer technologies when training in reading and understanding of the foreign language text gives the chance not only to include previously developed exercises directed on training in structuring professionally focused text and its compression in electronic book but also to type the text so that to facilitate its perception by students.

Visual representation of structure of the text, division of the text into semantic parts and placement of words into boxes, the opportunity to listen to every text and exercise, and all components of e-book are in colours, are represented to us very valuable advantage of computer technologies when training in reading and understanding of professionally focused foreign-language texts. Reading programs use drill-and-practice techniques to help with reinforcing young students' reading skills. This advantage allows to make active various mental mechanisms of understanding of the text that leads to increase of efficiency of educational process of a foreign language.

The first and the most complicated problem which people face with, it is to learn as many new words as it is possible, we mean, to enrich the vocabulary and put into words all your feelings and thoughts. During preparation for development of the electronic books we defined the following stages of work with the text:

1) introductory text reading having a pre-text task (including the task directed on identification of structure of the text, for example to define its semantic parts, to make the plan of the text etc.);

2) division of the text into semantic parts;

3) work on each part of the text for the purpose of full understanding of the content;

4) presentation of new vocabulary in the program which is available in each part of the text and presenting difficulty to memorize;

5) removal of the found difficulties, an explanation of the difficult language phenomena;

6) direct reading of the text;

7) performance of pretext tasks and exercises aimed at the analysis of the language phenomena, development of lexical and grammatical skills;

8) implementation of the test for an operating control of the studied material;

9) conducting exercises by students aimed at the development of abilities of oral speech, their involvement in a professional discourse.

Pretext tasks and exercises were developed in a special way that students consciously considered the mental mechanisms taking place at understanding and memorizing of information containing in the text: structuring of the text, text compression, staking (attributing meaning to structural units of semantic parts). Such exercises are aimed at the development of abilities:

1) understanding of the main contents of the text (definition and allocation of the main information, separation of supreme information from minor one, establishment of logical or chronological communication of events and facts);

2) understanding of details, detection of the confirming or specifying information, establishment of interrelation, the comparative analysis of new and already known information;

3) information transfer with use of synonyms.

The complex of pretext tasks and exercises includes tasks for formation and improvement of skills and abilities of students in different types of speech activity, and also expansion of their wide range of interests, increase of level of the general culture and awareness in different areas of knowledge. For example: discussion of information containing in the read text, its interpretation, commenting, an assessment of the separate facts or events about which there is a speech.

The purpose of electronic book is – acquaintance of students with a professional discourse. The term “discourse” in various researches received various interpretation. We agree with A. I. Ivanchenko's statement that in practice of training in a foreign language in higher education institution the discourse should be considered as realization of communicative intentions in various situations of communication, in our case – as the oral statement, the message on professionally focused subject in a certain situation of communication [2; 9].

In this regard we will especially stop on the text tasks and exercises directed on formation of abilities to perceive and produce oral and speech messages in the various situations of communication with the use of actual and speech material of the texts included in the e-book. It is necessary to pay attention of students that the choice of speech means in preparation of their statement by them has to depend on a situation and partners of communication. We will give some text tasks developed for involvement of students in professionally focused discourse.

It is necessary to highlight that by means of computer technologies it is possible to form evident idea of ways of simplification of a language form of the statement. Therefore we included the block and logical diagrams of texts, visual support helping students to keep a large volume of text material in memory in the electronic book. Therefore,

we consider that the use of unique opportunities of the computer in the teaching field of reading and writing on foreign language is an important task now. The use of computer is necessary for more effective formation of reading ability in the process of teaching reading [5].

Computer can simulate, motivate, and optimize self-education. Computer at the same time will perform the following functions: to be a controlling device, determining the correct understanding; to be learning device, regulating the degree of student's self-sufficiency in the process of text understanding; to provide individualization of text understanding; to give the opportunity to perform a differentiated approach in the selection of texts and types of exercises for each student; to serve as a means of forming of self-control skills in the process of reading; to be a trainer-simulator, allowing you to work out quickly a particular speech action, necessary for the success of the activities in general [8].

Using a computer can be effective in the training of skills variety in reading: to teach correctly intone of the text, to help mastering necessary skills of reading techniques, to expand the perception field during reading, to increase the individual rate of students' reading, to form the ability how to use dictionary and reference books, to teach students overcome a variety of language difficulties themselves, to divide the received information from the text into the primary and secondary, etc. Series of tasks of independent training to overcome difficulties in the process of reading are given as an example of computer using for learning to read. We marked out series of tasks for the teaching of students' reading in English language. The purpose of these series of tasks is to form students' skills to overcome with language difficulties of text understanding [7].

At an assessment of level of students' abilities formation of oral speech we used the following criteria: adequacy of language means towards the character of a communicative task; logicity and sequence of a statement; statement volume; correctness of the speech.

In 2014 on Foreign Languages chair skilled training for the purpose of efficiency checking of the developed electronic book was conducted. 160 second-year students (ten educational groups) in total took part in skilled training. This training has been recognized successful, as students:

1) mastered the program themes included into the electronic book: "Spinal column", "Brain", "Heart", "Teeth", "Digestion", "Urinary system" and so on;

2) gained ability to understand the main contents of texts on the specified themes (paying attention to details, confirming, specifying or comparing new information with already known);

3) gained a number of skills and abilities in different types of speech activity (to discuss information containing in the read text to interpret it, to comment, to estimate the separate facts and events);

4) learned to choose speech means by preparation of the statement depending on a situation and features of partners;

5) improved common-language skills and abilities.

Nowadays the students of the first and second years of all specialties of JSC "Astana Medical University" as well as postgraduate students are engaged into the process of studying the e-books "Professional English in Medicine" and "Progressive medical English".

Themes that we covered during our research: theoretical and methodological frameworks; analytical studies; computer innovative learning technologies, E-books and requirements; psychological aspects of use of modern information technologies (positive and negative aspects); educational opportunities of technology-based teaching/learning; features of cognitive and intellectual activity of students during their study; experimental diagnostics of research and dynamics of motivation; methodology of E-books use in the educational process; criteria of evaluation efficiency of learning.

In conclusion of this article it would be desirable to hope that the experience of creation of the electronic books described by us will give help to teachers of non linguistic higher education institutions of medical specialties in development of modern educational literature of foreign languages. The innovative methods of teaching form analytic skills and give the opportunity to have an accessible and qualitative education. The aim of innovative methods is to create such methods and modes which raise the efficiency and productivity of teaching process. E-books can raise the level of efficiency in teaching, attract student's attention and develop such qualities as creative thinking, logic and easily enrich the vocabulary with interest. Using technology

refers to the use of computers and computer technology as tools and aids to help teachers teach and students learn, because some of the most widely used tools are found in the English Language classes. The innovative methods, technology-based teaching/learning may keep more students interested in the subject matter for a longer amount of time, and may contribute to the acquisition of more profound knowledge. Test results were higher. Thus, we can assume that given system of training is effective and recommend it to use in Universities with the necessary equipment.

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EUROCONTROL DOCUMENTATION AND METHODOLOGICAL ELEMENTS, RELATING TO PROFESSIONAL COMMUNICATIVE COMPETENCE DEVELOPMENT

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This article describes Eurocontrol methodology of professional communicative competence development. The four main professional training documents, such as syllabus, training plan, training event plan and assessment plan are defined. The 5 main methodological blocks of training tools were covered too. The first block – training events – consists of 9 types of training events and the-four parameters, which are necessary for their proper choice, the second one-training methods – covers 23 training methods, used during different professional training stages, the third block – describes 10 training media, the fourth – 3 learning rates and the last block – 2 modes of delivery.

Keywords: professional communicative competence, syllabus, training plan, training event plan, assessment plan, training documents, training events, training methods, training media, learning rate, mode of delivery

Eurocontrol is an intergovernmental organization which includes 41 member-States and created to build, together with other partners, a Single European Sky, providing the air traffic management functioning, required for the twenty-first century demands and beyond [5].

The forming and development of air traffic controllers professional competence is the key element of solving the general problem of civil aviation (especially air traffic management) – flights safety. As for professional competence itself – it is a complex element, which contains a lot of characteristics, which air traffic controller has to possess in order to be a professional. One of these characteristics is professional communicative competence, which defines the quality of aviation radiotelephony.

Air traffic controllers professional (foreign language) communicative competence – is a complex of professional foreign language knowledge, skills and habits and the ability of their proper usage for the working interaction during radiotelephony with the crews of aircraft, which fly on international routes, in any conditions of professional interaction and activity.

In order to make professional training as effective as it possible, especially relating to professional (foreign language) communicative competence development, Eurocontrol proposes to use the following set of professional training documents and methodological tools, which have to be OBLIGATORY implemented in all member-States (in our case – in Ukraine). We'll describe them in this article.

Professional training documentation

Syllabus

A syllabus is a list of training objectives classified by subjects, topics and sub-topics

showing the training necessary to fill the training gap and achieve the course aim.

The syllabus does not indicate times, training techniques or the order in which the training objective should be achieved.

Within the EUROCONTROL documentation structure, a syllabus may be presented as a EUROCONTROL Specification, EUROCONTROL [2; 3].

Training Plan

A training plan is a syllabus with additional information. The training plan details for each subject, topic and objective the training requirements (type of training event, educational material needed, method and mode of delivery).

It also includes the order of delivery of the training events and the time scale for achievement of the stated plan.

A training plan details the performance objectives and/or assessments required at predetermined intervals during the course [1; 2].

Training Event Plan

The training event plan is the document used by the instructor when preparing and delivering training events. It contains the following information:

- objectives to be covered;
- a timeline;
- training method/s to be used;
- the types of materials and/or equipment needed;
- the knowledge and skills prerequisites (if any);
- whether the delivery of the event is to a group or individuals [2].

Assessment Plan

An assessment plan identifies for each subject, topic and objective how the assessment will be performed. In order to make the process more efficient, sets of objectives are linked to

a performance objective. The assessment is then based on this performance objective.

The form of the assessment (oral, written, practical exam, continuous assessment) could also be repeated in the training event plan [2; 4].

Methodological tools

Training events

Training objectives indicate what is expected from the learner. How to train a learner to achieve the objectives is indicated in the training plans through the choice of training events.

A **training event** is the delivery of training to achieve an objective or objectives that have been grouped together to form a pedagogically cohesive unit. Each training event has a main type assigned to it. The training event is more accurately described by reference to the training method/s, media, learning rate and mode of delivery [2].

The following are definitions of nine training events, used in the training plans:

Case (Case)

Training event based on the case study or group work methods in which a real or fictional situation or series of events are presented to learners for their analysis and may include proposal of possible solutions. Most of the time it is a group session with the support of texts, visual aids and multimedia computer; sometimes it may be delivered as individualized training [2].

Computer/Web-based Training (CWBT)

The provision of knowledge and skills that makes use of a computer and/or Internet technology. CWBT includes methods like interactive training, exercises, lessons, multimedia or virtual classrooms which may be delivered separately or combined ("blended"). Instructor guidance may be part of CWBT [2].

Lecture (Lec)

A straight talk or exposition without group participation other than questions, usually at the conclusion.

Lesson (Les)

Interactive talk or exposition which includes the participation of learners during the event. The instructor is able to ascertain whether material is being assimilated.

Skill Practice (Pract)

Practical training that combines the learned theory with the skills or part thereof, that are necessary for the operation tasks.

There are four methods of Skill Practice: Skill Acquisition (SA), Part-Task Practice (PTP), Hands On (HO) and Supervised Practices (Sup Pract) [2].

Simulation (Sim)

Practical training that combines knowledge, skills and attitudes by means of repre-

sentation of air traffic responding to any learner action as real air traffic. It always includes briefing, tutoring and debriefing.

There are three methods of Simulation: Individual Simulation (ISim), Team Simulation (TSim) and Group Simulation (GSim).

Briefing (Brief)

The introduction to, or review and discussion of the outcome of, the practical training.

There are four methods of briefing: Briefing, Debriefing, Structured Briefing and Structured Debriefing [1].

Visit (Vis)

A visit to a professional environment (typically operational environment). The visit may include the assignment of observational tasks, discussions and/or practical activities.

Self study (Slfs)

Period/s of time that are built-in to a course that will allow learners to acquire specific knowledge through their own efforts [2].

The Four Parameters of the Training Events

The methodology to design the training strategy is based on the answers following four questions:

- What is the method used by the instructor to teach? (**training method**).
- Which media is used to carry the training message? (**media**).
- Is the learning rate free or restricted or real? (**learning rate**).
- Is the training individual or in a group? (**mode of delivery**) [2].

Training methods

The training method characterizes the correlation between the matter, the learner and the instructor [1].

The following are the definitions of the 23 training methods used in the Common Core Content training plans:

Lecture (Lec)

A straight talk or exposition without group participation other than questions, usually at the conclusion [1].

Lesson/Demonstration (Les)

Interactive talk or exposition, which includes the participation of learners during the event.

Case Study (Case)

A real or fictional situation or series of events are presented to learners for their analysis and consideration of possible solutions or problems identified. Their findings in a real situation can be compared with what actually occurred.

Computer-based Practical Exercise (CBPE)

The exercise is presented by an instructor using visual aids and deciding, from learners' answers when and how to move on [2].

Exercise (Ex)

The provision and consolidation of knowledge and skills through the performance of defined task(s).

Facilitation (Facil)

Methods/techniques used in an interactive teaching environment to help learners achieve a desired result.

Group Work (GrW)

Discussion within the group of learners to find the solutions for a given problem with no or minimal support by instructor [2].

Hands On (HO)

Training on real equipment that is not in operation. Emulation on multimedia computer is sometimes sufficient. Text is used as additional data (instructions, operating manual, questionnaire, etc.).

Interactive Training (Inter)

The provision of knowledge and skill by means of a computer with numerous interactions, learner response analysis and allowing, when appropriate, free individual rhythm of learning (self-paced manner) [2].

Supervised Practices (Sup Pract)

Manipulation of equipment where the instructor provides the necessary feedback.

Part-Task Practice (PTP)

Practical training which allows restricted or real-time practice of a part of the skills that are necessary for the operational task in a realistic environment (PTT or Sim) [2].

Individual Simulation (ISim)

Real-time full-task simulation involving one single learner.

Team Simulation (TSim)

Real-time full-task simulation involving an individualised cell made of several learners. A team consists of two or more learners who are required to work together on related or interacting tasks.

Group Simulation (GSim)

Real-time full-task simulation involving several individual or team simulations simultaneously.

Briefing (Brief)

An introduction to a practical training exercise where the objectives and any relevant issues are communicated to the learner [2].

Debriefing (Debrief)

A review and discussion of the outcome of practical training based on a formative and/or summative assessment.

Debriefing should include the observed strengths and weaknesses of the learner and should be based upon the aims of the session and the notes recorded by the instructor.

Structured Briefing (StBf)

A planned group introduction for a simulation (or a series of simulations) stating the objectives of the exercise, the simulated operational procedures, the operation of the simulator, the expected role of each team member, including the instructor, and possibly demonstrations of simulation exercises [1].

Structured Debriefing (StDbf)

A planned group review and discussion of the outcome of a simulation (or a series of simulations). The discussion is centred on the "lessons learnt" [2].

Virtual Classroom (VC)

Distance training of a group of persons connected in synchronous mode and facilitated or lectured by an instructor.

Role-Play (Role)

Learners act out a working model of some real-world human situation in interacting group. They are provided with background data and roles to play together with constraints which may change as the play proceeds [2].

Skill Acquisition (SA)

Practical training, which allows self-paced, restricted or real-time practice of a part of the skills necessary for the operational task in a possibly non-realistic environment (e.g. 2D aerodrome).

Self study (SlfS)

Learners acquire specific knowledge through their own efforts.

Self Test (SlfT)

Formative Self-Assessments used to strengthen memory recall by practice, to correct misconceptions and to promote confidence in learner's knowledge [2].

Training media

The training media are the physical means by which an instructor communicates a message. One type of media can include different supporting materials. The examples of support material given in the descriptions below, are specific to the AT CO training environment, nonetheless the examples provided should not be considered as exhaustive [2].

Real Equipment (RE)

Equipment such as CWP, NAVAIDs, avionics or documents such as charts or maps, either used in operational conditions (On-the-Job Training) or in non operational conditions (shadowing or demonstration).

High-Fidelity Simulator (Hi Fi Sim)

A full-size replica of Controller Working Position (CWP) including all equipment and applications necessary to represent full tasks of the different Air Traffic Services functions

and their environment. In the case of an aerodrome control simulator it includes an out-of-the-tower view [2].

Simulator (Sim)

A device that presents to the learner the important features of the real situation and reproduces the operational conditions under which the learner can practice real-time tasks directly.

Part-Task Trainer (PTT)

A device to provide training for specific and selected operational tasks without requiring the learner to practice all of the tasks which are normally associated in a fully operational environment.

Multimedia Computer (MMC)

A (networked or stand-alone) multimedia computer or workstation dedicated to one learner or to a team.

Video (Vid)

Aids such as camera, camcorder, recorder, player, TV, monitor, projector and screen used for the generation, storage and reproduction of visual animated images and associated sounds (video, films, DVD and other). In particular, it enables to record learners' performance and to replay it [2].

Visual Aids (Vsl)

Aids such as projectors, monitors or screens used to display presentations, animations, slides, mock-up, models and video clips, possibly associated to loud speakers or headset for the sound [2].

Audio Aids (Aud)

Aids to communication such as microphones, loudspeakers or headsets used to listen, record and playback audio clips.

Text (Txt)

Written training material in either printed or electronic format [2].

Multimedia or sound Laboratory (Lab)

A set of individual learner positions for the use of part task, language or radiotelephony training which support self-paced learning as well as interactive instructor support and monitoring.

Learning rate

Self-paced Learning (Self)

Learning directed by the individual in order to meet learning objectives. In self-paced learning the learner controls the pace of the learning process [2].

Time-restricted Learning (Rstd)

A learning/teaching system whereby the course developer or instructor controls the pace at which the learner has to work.

Real Time (Real)

A learning/teaching system whereby the pace at which the learner has to work is the same as in real operation.

Mode of delivery

Individualised Training (I)

Features of the individualised training are the provision of possibly different stimuli to each learner, the separated analysis of their response and the provision of consequent new stimuli independent of the answers of other learners [2].

Group Training (G)

All the participants are presented the same learning material under the same conditions.

As a conclusion we would like to mention that air traffic controllers professional training is not limited by only this set of elements, professionally specialized. Eurocontrol demands that all new elements have to be in harmony with all mentioned above.

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IMPLEMENTATION OF QR-TECHNOLOGY IN ACADEMIC PROCESS OF MANAGEMENT-EDUCATION

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The article is devoted to the essential and substantial aspects of the implementation of QR-technology in modern management-education. The authors disclose the features of the implementation of QR-technology as an interactive educational technology in the classroom work, which provides activation and intensification of the academic process in the conditions of Russian education modernization. Highlights of the organization of educational QR-quest and final evaluation system of its passage are described. The authors conclude that the use of QR-quests as a new form of educational process organization should be seen as a key condition for improving the quality of management-education, reducing the load of students, more effective use of learning time.

Keywords: QR-technology, quest, management-education, academic process

Education is very important in solving nationwide problems. One of the main priorities in the implementation of educational standards of higher education within the competence approach is to develop students' general-cultural, general- professional and professional competencies, such as:

- ability to abstract thinking, analysis, synthesis;
- willingness to act in unusual situations;
- willingness to self-development, self-realization, the use of creative potential;
- willingness to manage a team in their professional activities, tolerant to perceive social, ethnic, religious and cultural differences;
- ability to develop training programs and methodical maintenance of management disciplines, as well as the use of modern methods and techniques in the process of teaching, etc. [3, 7].

In the current conditions of Russian education modernization, when the emphasis shifted from «acquisition of knowledge» on the formation of «competencies», takes place a re-orientation to a humanistic approach in learning and introduction of innovative educational technologies, providing accounting and the development of the individual characteristics of students [3]. Traditional educational technologies, when reproductive methods of teaching are predominant, do not give the results that planned in the theory of Russian education modernization.

One of the requirements of modern management-education is the widespread use of active learning methods. Thus, the implementation of bachelor programs not less than 30 % of classroom teaching should be conducted in the interactive form, and the implementation of Master programs – not less than 50 % [8, 27]. Under these conditions, in the uni-

versity should be provided for the use of innovative educational technologies, developing teamwork skills, interpersonal communication, decision making, leadership qualities.

The use of innovative educational technologies orients of teacher to create such forms of organization of learning activities in which the emphasis is on learning and cognitive activity of student, on the formation of systemic thinking and the ability to generate ideas for solving creative problems [6, 44]. Increasing the diversity of educational technology becomes an essential requirement and at the same time the result of the implementation of the formation of a competent professional.

In the information society the teacher ceases to be the sole bearer of knowledge. Therefore, the choice of forms and methods of training in academic process of management-education must be focused on competence-based approach [4, 29]. This approach involves a more extensive use of interactive teaching methods, which provide a high degree of involvement of students in the learning process and are today one of the criteria of quality educational programs.

Interactive teaching methods involve co-learning – collective learning in collaboration. The teacher plays the role of the organizer of the learning process, the creator of conditions for the initiative of students [7, 87]. Also, interactive learning is based on the direct interaction of students, which have their experiences (joint development of solutions, work towards a common goal, discuss the results, mutual consultation and evaluation, etc.) [5]. On the basis of this experience, new knowledge and skills are formed.

For complex formation and development of competences, which are provided by the goals and objectives of a particular discipline,

it is appropriate to organize the work of students in subgroups (teams) as a way to increase the level of classroom teaching's interactivity [2, 71]. In this context, the QR-technology is a relatively new interactive teaching method, which is used in modern management-education programs. For the implementation this technology a special organization of the collective work of students, which activates their cognitive and creative activities in solving the problems, is required.

QR-technology is based on the application in the educational process of QR-quest – a form of introduction in management-education augmented reality, which is an interactive game. In this quest clues and riddles are encoded in QR-codes.

QR-code (quick response) – a matrix code (two-dimensional barcode), which was designed by the Japanese company «Denso-Wave» in 1994. Besides trading, manufacturing, logistics, tourism and other fields, is now the QR code is used in education. Interactivity of QR-technology manifests itself in a constant interaction between students and teacher by direct and feedback connections, free exchange of opinions on ways of solving the problem, which is put in an educational QR-quest.

Educational QR-quest can be online and offline. In the online QR-quest, students must move along Internet sites in search of QR codes. In the offline QR-quest students must physically move in the building of the university in search of QR-codes. The outcome of the educational QR-quest can be:

- the answer to the question;
- a final destination, that was encrypted;
- a subject, that was hidden.

As a rule, educational QR-quest is based on the type of linear quest, in which teams must be under time limit to pass as many stations and to answer the questions that are encrypted in QR-codes. For the passage of educational QR-quest learning group is divided into subgroups (teams) depending of the total number of students (optimal subgroup consists of 4-8 students).

Formation of commands can be performed:

- on request of the participants of the quest (depending on the personal qualities of students, as well as group phenomena, such as friendship, enmity, competition, etc.);
- by the discretion of the teacher;
- random way (for example, by drawing lots).

It should be noted that the formation of the teams with the help of the latter two methods is the most desirable, because participants need

to “work together” – it brings learning environment to real life situations.

For the educational QR-quest required:

1. Tablet computer (notebook, netbook, mobile phone) with installed software decoder and presentation for marks in the form of photos.

2. Map with stations – the name of the station may simply be an ordinal number, or may reflect the lecture topic or subject area, if educational QR-quest is intersubject.

3. Assignments stations (QR-codes).

4. Worksheet for recording the responses.

First, it is necessary to instruct of students – to explain the rules of the educational QR-quest, rules of the work with decoder and webcam, rules of photographing, and to carry out trial decoding and photographing.

Teams should not disturb each other during the passage of the route. So the first station, which begins an educational QR-quest, different for all the teams, and then the teams pass point-station in order.

Time of educational QR-quests are usually limited to 2 academic hours, during which the teams have to perform as many tasks as possible (to pass as much points of stations as possible). At each station the team should be read QR-code, answer the question and record the answer in the worksheet, as well as take a photo of the group on the background of the station and to place it on the corresponding slide of presentation.

In simplified form evaluation system can be represented as follows:

- for each station traveled team gets 1 point (subject to availability of the team photo on the background of the station);
- for the correct answer – from 1 to 2 points;
- for a wrong answer – 0 points;
- for the lack of response (assuming completion of this station) – 1 penalty point;
- for being late at the finish – 1 penalty point for every 5 minutes late.

Experience in organizing of QR-quests in the educational process of the Chair «Management» (Volgograd State University) shows that students gain skills of distribution functions for the implementation of common objectives, development of joint solutions, mutual assistance. This is an integral component of highly competence modern specialist. The implementation of QR-technology as an indispensable and essential component of modern educational technologies requires special knowledge and practical approaches from the organizers of educational process. In this regard there is

an objective necessity of professional development of the teaching staff in the use of interactive educational technology in academic process with the exchange of experiences.

Thus, in the conditions of competence-based approach, the role of educational technologies, which are based on the use of active and interactive learning methods, is increased. Implementation of QR-technology provides a significant approximation of the academic process to the practical professional activity at a high degree of student's motivation, promotes better assimilation of the studied material, and increases the effectiveness of the educational process as a whole. Passage of educational QR-quests activates the thinking of students, develops the cognitive and creative activities, allows to form and evaluate the professional competences, especially in the organization and implementation of teamwork.

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ON TEACHER PROFESSIONALISM: ONE MORE ASPECT OF A TEACHER TOTAL FUNCTION

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Our goal in this article is to contribute to a clearer vision of the emergent role of a teacher in the new movement in education, which has introduced the concept of child-centeredness. This humanitarian pedagogy education model is geared towards bridging the gaps between physical, cognitive and emotional beings of a person and cultivating the competencies and dispositions that will prepare students to be creative, connected, and collaborative holistic human beings. The teacher committed to the role of a co-creator needs to become responsible for setting the optimal stage and context for learning and creating new type of a reality within a supportive framework.

Keywords: whole personality, process drama, stage director, stage-managing pedagogical guidance, performance-oriented activity

In a present-day eduscape, it can be observed that the paths of learning start to change in the direction of enhancing transferable skills that forward the country among the most creative and innovative in the world. The emphasis on personality, identity formation dominates all realms of the Global Age pedagogy. Teachers today are encouraged to get to know each student as an individual in order to comprehend his or her unique needs, personal qualities, interests, and abilities. Traditional didactic approaches are greeted with skepticism. When the learning is not connected to students' "own relevance, their interests, their own needs, then engagement pretty much doesn't occur" [1, 15]. Present-day students recognize the importance of proactively learning in contexts where they are contributing their own ideas, experiences and expertise; they wanted to learn in ways that connected to their futures.

A result of the confluence of several innovative perspectives on teaching is multifunctional performance of the modern teacher who finds herself with many parts to play. The teacher's traditional role is a questioner. This method although often based on deep learning tasks imposes more discussion than action and, unfortunately, does not develop the creativity – this especially relevant globally competitive skill.

Several methodologists [4; 6; 7; 2] have suggested many potential roles for a teacher in the 21st century education model. Richards and Rodgers point out that these are related to the types of function teachers are expected to fulfill, the degree of control the teacher has over how learning takes place, the degree to which the teacher is responsible for determining the content of what is taught, the interactional patterns that develop between teachers and learn-

ers [6, p. 24]. Littlewood conceptualizes the role of the teacher broadly as the "facilitator of learning" [4, p. 92]. According to Littlewood, a teacher's role as a facilitator entails the sub-role a "classroom manager", a "consultant" or "adviser", and sometimes, a "co-communicator" with the learners [4]. Harmer talks about using more precise terms for the roles that teachers play in the classroom: controller, organizer, assessor, prompter, participant, resource, tutor, and observer [2].

The main purpose of this article so far has been to emphasize the importance of the teacher adopting the roles not found in the traditional classroom, and look more closely at a further aspect of the teacher's total function – a stage director.

Drama in Education

Multivariance of today's world, transfusion of community groups, nations, economic models are wondering away from clear-cut schemes typical of the XX century. The recent tendency has been towards eclecticism, selecting materials and techniques from various sources. The humanistic approaches talk about giving equal attention to both the intellectual and the emotional development of the learner. With the object of learners' gaining the experience of wholeness in education, it is necessary to deal with two problems. Firstly, to shape non-threatening creative education environment; secondly, to create co-presence situation and community. To this end, performance methodologies can be transferred to organize classroom hours and, perhaps, a school thread of life.

Dramatic activities as sessions of self-liberation release imagination and energy and take the participants well beyond the limitations of conventional teaching/learning. This educational

objective makes us consider a special role of a teacher in the 21st century education setting. Though the role of a teacher who is creating new learning partnerships between and among students and teachers has been advocated for at least a century (Dewey, Piaget, Montessori, Vygotsky), the conditions for these ideas to take hold and flourish did not exist. Today, the relationship between students and teachers and their respective roles are changing [1, p. 11], and there are signs that these developments have profound implications for curriculum, learning design and assessment.

Education and drama are similar in that they are closely linked in the learning process. In good deep-learning tasks, students go beyond creating new knowledge to doing something with it. Drama in education (or process drama) gives the student

- narrative move of the lesson (from unknown to knowledge acquisition; from introduction through high light – to outcome);
- active forms of delivery and acquisition of the material;
- role playing;
- seamless subject unlocking (global concerns through the lens of a distinct event);
- commitment to collective interaction and creation

To kindle creativity and light up the potential of the human mind the teacher organizes the space of his lesson so that push the students for active intellectual and emotional response to the subject given. As Victor Ilyev, a proponent of stage-managing pedagogical guidance conception [3], asserts, the notions of overarching goal and end-to-end guidance are the stepping stones for managing a lesson designed as a performance-oriented activity (Figure).

Overarching goal (What for?)			
Initial event	Base event	Highlight	Focal point
Controversial fact	Cooperative search for truth	Attainment of understanding	Discovery of universal human values, world order

Staging end-to-end guidance

an opportunity to use his own personality in creating the material and expressing himself; they promote spontaneity, assertiveness and self-affirmation.

However, drama can become an important device of educational experience only through the teacher's own commitment to, and involvement in devising dramatic situations for the participants to discover the surrounding world and their own world. "It is the teacher working with the students within the drama, who will build on the students' ideas and make a bridge for them between their own experience of the world and the meaning of drama, so that both insight and understanding arise from the activity" [5, p. 24].

Organizing a Deep Learning Classroom

Drama pedagogy implicates a lesson organization in the proper art sense rather than under the rules of a typical play. The following are the points for consideration; they represent salient characteristics that will help in the planning and structuring of drama lessons:

- whole-person engagement;
- deeply moving educational material;

Transferring the main idea into the language of action signifies unlocking it via addressing the chain of problem solutions which form a dramatic composition of the lesson, giving prominence to the event that determines the motives, nature of actions, mutual relations of participants, agenda (What am I doing? Why am I doing it? How am I doing it?) and overarching goal). Under well-organized specific direct guidance, the participants will explore their individual scope, try out alternative modes of behavior, cultivate cognitive and emotional intelligence within themselves.

Appropriate strategies for assessment in drama pedagogy include diary, checklists with specified criteria (related to the objectives of the lesson), participant (and non-participant) observation accounts, portfolios, student profiles.

Working out Theatrical Performance Activities

To encourage students' engagement in independent thinking and gaining fresh insights about themselves and their world, a teacher works out *theatrical performance activities*

-ranging from highly-controlled rehearsed dialog performance to complex simulated scenarios. Students are provided with a significant experience that re-structures students' learning of curricular content in more challenging and engaging ways and enables them to improve key future skills, such as character education, communication, critical thinking and problem solving, collaboration, creativity and imagination [1, p. 38]. The multi-sensory experience they afford can particularly appeal to and stimulate students in creating and using new knowledge in the world beyond the classroom. Spectacular displays offer collective experience of self-study skills development based on the practice of repositioning when, in a sequential acquisition, the students take parts of the author, viewer, and reviewer.

Within a complex art form of theatre-based project, students partner with teachers in designing the structure or process of the production. These relationships can only start with a human who they can identify with. So, the basic capacity for a teacher- stage-director is building trust, and then the process of transcending the boundaries becomes real to the learners. A directing teacher provides optimal conditions for psychophysical emancipation of the participants, chooses alternatives; coordinates running all aspects of the task, from developing the questions they would address, to figuring out the design process, continuously challenging students to reach for the next step.

Fundamentally, in a process drama, the teacher suffers a reversal of his or her usual role, which is that of the one *who knows* but takes over a role of a co-creator, or "stalker" in a way, who knows somehow more than others about the route, but he does not know all about it because one cannot [3]. Additionally, a stage director is a professional capable of objective analysis and self-correction. Representing at every turn of dramatic community building

a synthesis of different behaviors and lines of thought, the position of the teacher-stage director is gradually progressing from a facilitator at the initial stage towards a close associate at a higher level of improvised drama activities.

Conclusion

Pedagogic content knowledge and skills are not the only area in which a teacher should be trained. Aforesaid we determined that the building blocks of stage-managing and acting efficiency are communicative and emotional personality orientation; empathy, reflexive response, analytical thinking; psychological and pedagogical indoctrination; organization of spatiotemporal structure of the lesson. Precisely these are the qualities that place a teacher in close quarters with stage director. These personal properties require special training. Used to the role of the controller and organizer, teachers might not be ready for such an innovative role in attitudinal terms. A much broader training in pedagogy is now called for to teach prospective teachers how to create new learning partnerships between and among students and teachers, and design learning tasks that re-structure the learning process towards knowledge creation and purposeful use.

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THE UNITY OF THE IDEAS OF PEDAGOGY CONSTRUCTIVIST AND PERSONALITY-ORIENTED EDUCATION

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Pedagogy of constructivism in the Russian education de jure today is not widely recognized, but de facto the idea of constructivist didactics considered in context of the personality oriented paradigm of education, represented in many pedagogical technologies. The spread of ideas of constructivism pedagogy "from the practice", "bottom" specifies the need for the theoretical comparative understanding of problem of the combination the concept of personality-oriented approach and the provisions of constructivist didactics in the educational process of modern school. In article it substantiates the common ideas of constructivist didactics and personality-oriented education. It is shown that the principles of constructivist pedagogy in essence, comply with the basic provisions of the personality-oriented approach. It was revealed that the essence of the provisions of the pedagogy of constructivism constitute tactics of personality-oriented paradigm of education. Constructivist didactics specifies the strategic ideas of personality-oriented approach. It is characterized by a number of provisions whose implementation allows you to personalize the learning process. The observed ratio of pedagogy of constructivism and personal-oriented learning allows to develop the learning strategies that rely on a wealth experience in domestic and foreign schools.

Keywords: constructivism, constructivist pedagogy, pedagogy of constructivism, didactics of the constructivist, personality-oriented paradigm of education, personal approach, education

New understanding of the ideas of personality oriented paradigm of education, taking into account the current level of social and economic relations – a symbolic feature, and a sign of the process of modernization of the national education system. It is appropriate and important to consider the use of foreign education experience, built in most Western countries on the ideas of constructivist pedagogy. The historically established education system is debugged by many years of successful and efficient operation. Therefore, the direct, "blind" import foreign educational concepts and systems is undesirable and harmful.

As a consequence, the problem of identifying and comparing the features and characteristics of the personality oriented education and ideas of constructivist didactics. This article aims to contribute to the resolution of this problem. It develops the author's ideas, presented earlier in [8; 9].

In the research, we use the methods of theoretical research: terminology and comparative analysis of historical, informative and functional characteristics of the two paradigms – the personality oriented education and pedagogy of constructivism. There are many approaches to understanding personality. We shall consider the person as a "the member of historical and evolutionary process, which bears the social role and has the possibility to choose their way of life in which he transforms nature, society and himself" [7, p. 134]. Personal oriented approach includes the principle of targeting and appropriateness of pedagogical influence.

Therefore the content of the term "personal-oriented approach" is primarily the creation

of a system of educational environment conducive to the formation of personality.

Category "constructivism" originates from the Latin *constructivus* (associated with the construction) and *constructio* (connection, construction). Designing in the process of learning is defined as "a means of deepening and broadening of theoretical knowledge and development of creative abilities, interests and aptitudes of students" [7, p. 127]. In the context of personal-oriented approach means of personality development is the system of pedagogical support. It is significant that the "construction" can be understood as a kind of general system, which includes interrelated and interdependent parts and systems [1]. With regard to the pedagogical process, the construction – is a single integrated system with equal subsystems-entities "teacher" and "student" (in terms of effect on the existence of the system and its integrity).

Consequently, terminological analysis shows: the concept of "creating a system of pedagogical conditions" = "construction" of pedagogical conditions of the system" and "construct = a single integrated system of interaction of subjects of educational process" lexically related. These concepts, in a sense can be used as synonyms.

The similarity of personality oriented education paradigm and constructivist pedagogy we see also in the analysis of the historical foundations of the origin and development of the two concepts.

Personal approach ideas can be traced in a humane attitude towards the teaching and

education of the child (Confucius, M. Montaigne, J. Rousseau et al.). Humanism arose as contrast to authoritarian foundations of training and education, implying the object approach and imperious attitude towards the student, as well as the uniformity of content and organization of educational process. Humanism – is the foundation of learning concepts D. Dewey, pedagogical school of L.N. Tolstoy, the views of representatives of humanistic psychology (Carl Rogers, Abraham Maslow, A. Combs, R. Mey, R. Burns et al.). The basis of personality-oriented approach is the desire to take into account the individuality of each student.

Humanism and the desire for individualization can be seen in pedagogy constructivism.

Educational philosophy of constructivism is the antithesis of behaviorism philosophy. The basis of constructive ideas constitute the ideas of activity and taking into account the individual, “subjective” experience of the learner. Ideas constructivist didactics originated in the writings of J. Piaget, J. Bruner, J. Dewey, G. Gardner and were embodied in many of the author’s method of “self-development” and “flexible education” (M. Montessori, R. Steiner, C. Freinet, etc.)

The defining characteristic of the essential personality-oriented learning and constructivist didactics is the active approach and support of the activity of the student. Learning Technologies, which rely the ideas of pedagogy constructivism (R. Kersten, L.A. Pongratz, N. Mandl, R. Mayer, J. Sweller et al.), related technologies of modern project-based learning (J. Dewey et al.), the concept of self-realization of human (B. Gershunsky et al.), appropriate education of the individual (A. Hutor-skoy) and et al. They rely on the provisions of the underlying personality oriented paradigm of education: the theory of the decisive significance of the child’s activity in his mental development (P. Galperin, V. Zinchenko, Leontiev, A. Leontiev, A. Luria, S. Rubinstein et al.), Vygotsky’s conclusions about the relationship of language and intellectual development, the idea of the personal approach (K. Abulkh-anova-Slavskaya, E. Bondarevskaya, V. Davydov, J. Kolominsky, A. Mudrik, A. Petrovsky, V. Serikov, J. Yakimanskaya et al.) and developmental education (M. Makhmutov, P. Pidkasistyĭ, I. Lerner, S. Amonashvili et al.).

These arguments show that the original basis of the two paradigms are the same idea: the humanistic nature of education, taking into account individual characteristics, activity approach, the activity of student. “Both directions “grow” out the most important values of

humanistic psychology and pedagogy, which are the antithesis of the traditional, authoritarian pedagogy” (E. Polat) [6, p. 16]. As a consequence, there is a reasonable expectation of improving the efficiency of the pedagogical process, built on the ideas of unity of integration of ideas these concepts.

Let us examine their content and functional aspects more detailed.

Traditionally, personality-oriented approach is understood in the framework of developmental education and assumes the maximum account of the individual learner – the unique identity of each person performing their vital functions as the subject of development throughout life [4, p. 9]. I. Yakimanskaya rightly accentuate that “Individuality – generalized characteristic features of a person, a stable manifestation of which ... determines the individual style of activity as a personal education” [4, p. 19]. Personality-oriented approach is “consistent ratio of teacher to pupil as an individual, as a self-conscious subject in charge of their own development, and as an object of educational interaction”. The purpose and objectives of personally focused training are to assist the pupil to realize himself as a person, “in the identification, disclosure of its capabilities, the formation of self-consciousness, in the implementation of personally meaningful and socially acceptable self-determination, self-realization and self-affirmation” [7, p. 134].

The teacher’s role in the organization of developmental education is the creation of conditions conducive to the disclosure of the identity of each student. The system of principles that reflect modern ideas about the organization of personally oriented training, includes the following provisions:

- each student is unique and individual; training school subject is not an end in itself but a means to the development of abilities and inclinations of the learner;
- the student – the subject of the educational process; support for training in the subjective experience of the learner; accounting value opinions and academic achievements of each student, a tolerant attitude towards them;
- providing the student the freedom to choose the content (in accordance with the academic plan), the means and methods of studying the educational material, the organization of study;
- ensuring through cooperation, co-creation, motivation to succeed positive emotional of contact in the systems “teacher-student” and “student-student”;

– evaluation of the student's academic achievements not only to meet the educational standards, but also as the individual stages of personal growth.

Thus, the implementation of personality-oriented approach to teaching makes possible the development of the personality of each student to the fullest, taking into account its individual characteristics. The same goal of constructivist didactics: the maximum possible development of the personality and individuality of the pupil.

Constructivism rejects the idea of objectivism and instructionism theory, considers the learning process as the transfer of knowledge from the knowledgeable to those who know little. This radical constructivism as major theses recognizes the position that the process of perception does not reflect any reality, and man creates (constructs) its relative and subjective reality, the doctrine – fully self-organized and self-governing process, pedagogical influence from the outside in the acquisition of knowledge is not a determining and effective. More flexible is understood mechanism of knowledge within a pragmatic (dialectical) constructivism, which attempts to link the design and instructions, self-managed knowledge and training. Constructivist didactics is now considered primarily within the framework of pragmatic constructivism.

Conceptual provisions of constructivism pedagogy – is: purposeful self-development and “self-construction” of personality during its active interaction with society and the environment throughout the life of man; activity of the person in the learning and the ineffectiveness of the transfer of knowledge to the student in the finished form; the importance of knowledge, endowed with personal meaning; the need to create conditions for self-regulated learning, cooperation; and “soft” management of the teacher of the cognitive activity of student; and others. Constructivism is considering the position of the student as an active, self-governing, built mainly on own constructive activity, only situationally controlled externally teacher [5, p. 27]. Modern approaches to foreign researchers and trainers to the organization of educational process consists in the fact that the teacher creates the conditions for self-development of the student, giving him assistance in case of need, but does not provide ready-made knowledge, models, algorithms and methods for solving problems. Activities of the teacher aimed at the formation of autonomy of each student through self-construction control of their experience [3, p. 30].

The system of the basic principles of constructivist pedagogy consists of the following provisions (according to E. Polat [6, p. 40–41], M. Choshanov [2]):

– cognitive activity is an active process of construction of students their new knowledge to on the basis of the previously generated experience;

– knowledge is inconceivable without the motivation and perception of purpose of knowledge;

– the process of learning a particular phenomenon occurs simultaneously with the comprehension of the phenomena of the system. As a result, designing the content of training is conducted relying on generalized concepts, system knowledge and integrative skills;

– basis for the formation of the cognitive experience of student It is its cognitive activity. Necessary pedagogical stimulation of his mental activity (thinking out loud encouragement, statements of assumptions, hypotheses, and others.);

– learning process is based and is effective when there is a communication and social activity of the student;

– cognitive activities linked with the real life of the student;

– cognitive activity takes time and rethinking what assimilated;

– training is based on the creation of conditions (choice of methods, forms of learning, assessment tools), emphasizing the intellectual dignity of each student, a special value in his view, personal approach to solving the problem, a unique view of the situation, the individual style of thinking.

In summary, analysis of the main provisions of constructivist didactics shows that it can be understood as a pedagogical philosophy, “ideologically” close standing to personally oriented approach (E. Polat [6, p. 39]). The affinity of paradigm personally oriented learning and paradigm of constructivist pedagogy can be traced for several positions: lexical interpretation of terms and categories, the historical foundations this concepts, the content and functionality fullness. The pedagogy of constructivism and the paradigm of personally oriented training a major figure of the educational process is a student. Objectives of personality-oriented learning and constructivist didactics – to create conditions for the development of the personality and individuality of each student.

At the same time, informative and functional fullness of concepts personality-oriented

approach and pedagogy of constructivism have specificity, originality and distinction. Considering learning as an active process in which the student with situational interaction with the teacher constructs their own knowledge, constructivist didactics specifies the goals of personality-oriented approach in training and offers ways of achieving them. At the same time the principles of the organization of training remain the same: activity, relying on the subjective experience and the independence of the student – the main factors of developmental education. Focusing on the development of personality and individuality, pedagogy constructivism offers a way to achieve the goal of developing education, reflecting the tactics of the educational process within the framework of the strategic provisions of personally oriented education paradigm.

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A.V. ZAPOROZHETS (1905–1981): CONTRIBUTIONS TO THE FOUNDATION OF EDUCATIONAL PSYCHOLOGY

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This article aims to describe the preparatory analysis of academic heritage and scientific studies left by the eminent researcher in the psychological theory of activity A.V. Zaporozhets. It reviews the resurgence, systematization, organization, and discussion of the most important aspects of his thoughts and his intellectual production in the field of pedagogical psychology. The text is associated with the investigations, that Grupo de Estudos e Pesquisas em Didática Desenvolvidora e Profissionalização Docente – GEPEDD (english: Group of Studies and Research in Developmental Didactics and Teacher Professionalism) has been doing for already seven years, on the problems related to the psychological theory of human development in the cultural-historical perspective and the conditions of education and teaching necessary for this development. The work of this research group received the support from FAPEMIG, CNPq and CAPES.

Keywords: A.V. Zaporozhets, educational psychology, historical-cultural approach

A.V. Zaporozhets (1905–1981), even though he was one of the foremost followers of L.S. Vygotsky, remains practically unknown in the West, especially in Brazil, where only a few years ago his work and his thoughts became a subject of systematic study in the field of psychology and education.

The theoretical contributions of A.V. Zaporozhets are in two specific areas of psychology:

a) the developmental and age psychology;

b) the psychology of education. In the field of developmental and age psychology he made fundamental contributions in some areas almost forgotten in recent research of children, such as, the forming processes of perception, sensations, emotions, and, especially, the movement or voluntary actions.

A.V. Zaporozhets, along with his colleagues and disciples, created the theory of sensory and mental development of children. He promoted the importance of resolving the problems of formation and education of pre-school children. He also introduced the concept of pre-school pedagogy with the prospect of enriching the child's development by the intermediate use of specific activities within the age group. Zaporozhets defended the idea of extending the period of early school stage to seven years, considering that the childhood extension was the greatest achievement of human civilization.

These studies in the developmental psychology for the above-mentioned ages were the fundamental focus of scientific interests of A.V. Zaporozhets whose research proved to be extensive, original, and creative. His writings in this area were especially helpful for the systematization, improvement, expansion, consolidation, and exposure of the main psychological theses at first in the Kharkov group and

later in the Institute of Psychology of Moscow State University.

Through experimental studies, A.V. Zaporozhets confirmed empirically two of the most important theses of L.S. Vygotsky. First, that the domination of social experience of a child does not happen independently, but with help of adults during the communication process with people that surround him/her. Second, that the domain of this social experience is not given through passive perception, but in an active way through diverse activities, such as play, study, and work. The extensive work on the study of the Vygotsky theory and the creation of the educational system based on this theory was done later by LV. Zankov and his collaborators [2].

A.V. Zaporozhets and his team of collaborators, T.V. Endovitskaya, Ya.Z. Neverovich, G.H. Kislyuk, A.N. Poddiakov, S.M. Kozlovsky, O.V. Ovchinnikova, and L.S. Tsvetkova among others found, starting from these ideas, that the orientation reaction is a functional component, which is necessary for any type of adaptive activity. They concluded that voluntary movements of a man are conscious movements that are acquired throughout the life. This acquisition needs a psychological direction through the guidance of executing activity. This guidance is given through a certain model that determines “what” and “how” to do certain movements. However, this is not enough, because the anticipatory orientation alone will lead to neither the formation of a habit nor the elaboration of the system of relations, which is at its base. The anticipatory orientation should be followed by a series of additional exercises for training the developed habit. At first, the image is formed, then – the entire system.

Important studies of the orientation activity of hands and eyes were conducted by A.V. Zaporozhets team and especially by V.P. Zinchenko. These studies allowed them to determine steps by passing the conditions of an activity orientation task:

a) chaotic – the elements of a situation that have indicated a meaning, yet without identification, for the orientation of reactions to produce both, the essential conditions as not essential for this action;

b) the beginning of the formation of the system of active irritants in the verbal influence and specific examples, moves the character to an investigative activity, the orientation reacts in the direction that the irritants focuses on the experimental situation and in the words and actions of the experimenter, and takes place initially as a system of touch-driven orientation reactions;

c) verbal communication activation – when the child is able to verbally express the identified situation characteristics during the orientation process or during the demonstration actions and it helps to increase the effectiveness of teaching and makes it more conscious and widespread;

d) internalization of verbal activity and reduction of mobilizing engine components in a system of orientation-in a formation stage of the image that supports the further action that anticipates the results and the movements that take place [6, p. 93–100].

From the point of view of pedagogical psychology, A.V. Zaporozhets established that the didactic organization of the processes of assimilation of school students by social experience should be built on the basis of new research, especially, on the laws of such psychology processes. These laws need to be reputed during the selection of content, the organization of study programs and the structuring of new teaching methods. According to Zaporozhets, building the socialist society depended, in part, on the establishment of a strong public education system and, in this case, pedagogy was able to set the bases for a new pedagogical theory and a new organization of didactic processes and teaching.

A.V. Zaporozhets states: “It should be considered that any system for directing the assimilation processes is constructed on the base of certain psychological conception about the nature of driving processes. Before facing the formalization of the process of assimilation, it is indispensable to understand what proposed model is suitable for this term. Otherwise, the formalization of this type ends up with the dan-

ger of false consolidated methodological positions and can deepen the weaknesses of old teaching methods. This way, programs should examine the psychological nature of the assimilation process to solve some problems of methodology and teaching” [1, p. 301].

The biggest concern of A.V. Zaporozhets, in relation to the new didactic organization of teaching-learning processes, is focused on the content and teaching methods. He realized that the chosen type of a psychological concept determined the type and the nature of the content and methods. Based on the theories of L.S. Vygotsky and A.N. Leontiev about human learning, which require the character to make a formation of entirely new abilities, the product of children’s assimilation of generalized operations that are transmitted by adults [3], A.V. Zaporozhets proved importance of the contents during the structuring of study programs, as well as teaching methods through the process of their assimilation. As a part of the content, he highlighted importance of knowledge or empirical information, and skills and capabilities. In the field of methods, he gave prominence to more general mechanisms of the acquisition of new knowledge, skills and capabilities, especially to the formation method of mental actions and concepts created by P.Ya. Galperin in 1950–1970s. A.V. Zaporozhets specifically devoted himself to the study of the formation of perceptual actions, sensitive and voluntary movements [7; 8; 9; 10]. Regarding importance of the contents and methods, A.V. Zaporozhets wrote: “During the design of the programs, it is indispensable to take into consideration not only the gradually complexity of empirical material, but, at first, teaching of the widespread action procedures with this material developed by the humanity. However, this way, it is only noted that the content should be assimilated; the process of this assimilation, for its part, is subordinated to specific laws in the correspondence with which teaching methods should be structured... Formation to the action stages, that leads to their conversion of the external (materials) and the internal (ideal), constitutes the fundamental content of the assimilation process; the proper organization of the external object activity of a student, which ensures such a transformation, is the fundamental principle because it should be guided towards the rational direction of the study process” [1, p. 302].

The research of A.V. Zaporozhets showed that internal psychic processes compose internal ideal (mental) actions, from the reflection of external actions and materials that take their

final form as a result of successive transformations and abbreviations. He researched the fundamental role of the guiding part in the implementation and training of the action and came to the conclusion that the acquisition process of knowledge and skills by a child is conditioned by the proper organization of object-action that responds to the demands of a task. In these actions, he distinguished two steps:

a) the orientation step (which also provides the control) and;

b) the execution step. During the first step, a child, who learns, needs models to explain or the guidance what to do and how to do it.

During the second step, that child needs to perform actions on the object's conditions (handling the concrete objects). In this regard A.V. Zaporozhets said: "The knowledge is formed as a result of actions on the objects. The same actions done in the same form become capabilities, and if they become automatic, they are habits. That explains why the organization and formation of the actions on objects constitute the central process of the acquisition of new knowledge, skills and habits" [1, p. 304].

A.V. Zaporozhets and his collaborators, L.A. Venger, A.G. Ruzskaya, Ya.Z. Neverovich, and V.P. Zinchenko, experimentally confirmed that the sensorial development of the child – hearing, touch, vision etc. – do not simply drill in the organs with senses during the adapting of analyzers to these conditions that present the perceived reality, but lead to the path of the assimilation of social sensory experience, sensory culture. This assimilation of social sensory experience does not occur passively but actively, by perceptual specific actions that bring to the formation of images to the object.

However, it was in the field of pre-school education, where A.V. Zaporozhets concentrated the most of his investigations. His research, conducted in collaboration with L.A. Venger, A.N. Poddiakov, Ya.Z. Neverovich, confirmed that pre-school children subjected to educational experiments, whose focus was placed on the formation of intellectual processes on the basis of practical actions with the objects and the previous orientations of the characteristics of observed phenomena, could produce general reflections of themselves and establish certain connections and interactions, even when thinking continues operating at the level of visual images. For this reason, it creates the basis of representations that contain the premises of scientific concepts that will be formed later in the following evolutionary steps. This

process is only possible under the influence of school and the proper pedagogical orientation by a teacher. Similar studies also confirmed that children of pre-school have the ability to assimilate basic principles of math and reading from their teachers via new teaching methods. A.V. Zaporozhets mentions [4] research undertaken on children's preparation for the school learning at Preschool Education Institute and says: "It is important that the use of new teaching methods not only allows children to elaborate on, at early stages of their evolutionary development, a certain set of basic skills of reading and mathematics, but also to develop its extensive orientation in the language of qualitative relations while the indispensable basis for the aftermost formation of their language and mathematical skills is being placed" [4, p. 231–232].

Beyond the capabilities previously indicated, under the basis of these pedagogical conditions of education and teaching, are formed the skills related to affection, such as social motives of the behaviour, moral and aesthetic feelings. Zaporozhets research on the origin, structure and function of the emotions were pioneering in the psychological theory of activity and they still make a large effect on the didactic field [5].

According to the ideas of A.V. Zaporozhets, pre-school education from the point of view of specific aspects that characterize the psychic development of a child should take the role and function of the establishment of necessary premises for those global restructuring of children's awareness that define the course of evolutionary development and that will take place later at the elementary school. These assumptions are established as he wrote by the way of performing the functional development processes, in which partial changes that occur during the formation of some isolated actions, generate new knowledge, procedures and skills.

A.V. Zaporozhets carried out the studies proving that the pre-school age gives the characteristics of the prevailing psyche of children, and that the type of learning cannot allow the passage to the next level of evolutionary development, related to new structures of the thought and new general schemes. According to A.V. Zaporozhets, "it is unlikely that the conceptual scheme guiding the mentioned forms can exist in the context of the game activity or practise an activity specific to preschool. Apparently, it is essential for the formation to conduct the school study activity such that, by the results of D.B. Elkonin and V.V. Davydov

research, present a more complex content than the activity of preschool, because it is characterized by the procedures, tasks and peculiar reasons" [4, p. 235–236].

These conclusions, if taken into consideration, could help to avoid mistakes made at schools in regards to the determination of teaching content and the methods of pedagogical orientation of the psychological potential of a student. The content and teaching methods need to be determined by the psychological age of a child, the type of main activity it carries out and the place and role in the context of a specific type of social relations. They should be taught and guided based on these principles.

Conclusion

It needs to be said that the extensive and rich work of one of the most important theorists of child psychology in the second generation of Russian cultural-historical psychologists is very important for the developmental education. It is fundamental not only for its historical value, but also for its strength and effectiveness that still remain today. Zaporozhets works can help to deal with the scientific and methodological problems that school and education pose to researchers, teachers, school managers and family, in relation to the psychological development of students and their pedagogical orientation.

Without direct access to published works of A.V. Zaporozhets it is not possible to scale the magnitude of his thoughts and to use them in an appropriate manner. This is why most of the time of this study was related to the localization, organization, clas-

sification and systematization of more than 200 works of A.V. Zaporozhets published originally in Russian.

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STUDENTS' PROJECT ACTIVITIES IN THE CONTEXT OF STANDARDIZATION OF EDUCATION

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The article examines the role of students' project activities in the context of implementation of the federal state educational standards (FSES), showing their potential in the establishment of FSES requirements, such as a system-activity approach, the concept of universal educational actions, which create the basis of the key competence, vitally important for modern schoolchildren in the educational process – the ability to learn. The author considers the advantages of the project method in relation to the implementation of the FSES objectives and tasks aimed at personal, cognitive and general cultural development of the students, emphasizes the relevance of the use of this method in class and extracurricular activities, academic and pedagogic work of an educational institution.

Keywords: federal state educational standard, system-activity approach, universal training activities, project activity, project method, the progress

The transition of modern education system to the federal state educational standards (FSES) requires a qualitatively new organization of the pedagogical process, the use of active methods and forms of learning, innovation, change of the attitude of both teachers and learners.

The educational system is undergoing a change of guidelines. The key focus is on the formation of students' general learning skills which will help to learn quickly and successfully and to solve the problems of education in a more efficient way. In this regard, the pedagogical process should involve, according to the modern researcher A.G. Asmolov, a transition from presenting the system of ready-made knowledge to the productive problem-solving activities; from the acquisition of the individual subjects to multidisciplinary (interdisciplinary) study of complex life situations [2, p. 24–25]. It becomes necessary to create cooperation of the teacher and students in the learning process, and allow the students to become equals in the choice of content, forms and methods of teaching.

The main task of the FSES primary general education and secondary education is a general cultural, personal and cognitive development of students; the key competence, formed in the course of learning, should be the ability to learn. The standards require from a modern student an independent acquisition of knowledge, not acquisition of it in a finished form; self-determination of learning objectives, designing ways for their implementation, monitoring and evaluation of the achievements, the child must «learn to learn». The system-activity approach as the basis of new standards accentuates a critical role of intrinsic activity

of students, formation of their readiness for continuous self-development, self-education and improvement. The main driving force of their personality and cognitive development, according to this approach, is a system of productive activities which results in the mastering of universal educational actions. These are «common ways of activity», «generic skills», «over-subject action», etc.

The FSES of primary general education of students with disabilities focuses on personal, cognitive and general cultural development of the child's personality, the implementation of the program of formation of universal educational actions as a basis for learning skills [9, p. 3, 7, 21].

A.G. Asmolov notes that the ability of the student to successfully acquire new knowledge on his own, to develop skills and competencies, including self-organization of the process, i.e. the ability to learn, is ensured by the fact that universal educational actions as basic actions give students the opportunity to acquire the general orientation in various subject areas and in the very structure of learning activities, including awareness of its purpose orientation, values and meanings, and operational characteristics [2, p. 27]. There is a similar reasoning in the history of pedagogy. The Russian researcher of the late XIX – early XX centuries V.P. Vakhterov in his «new pedagogy» emphasizes that students should absorb not only the knowledge but also methods of its acquisition. The pedagogue pointed out that a lot of material is forgotten, but the ability to work on it remains; so not only is knowledge valuable, but also the ways in which it is acquired [7].

In the context of the modernization of the education system methods and learning technologies, which help to organize the learning

process by means of the development of students' values and ways of life, critical thinking skills, self-construction of their knowledge, integration of knowledge from different scientific fields, are becoming more and more popular. In the search for innovation it is appropriate to apply the practice-oriented, activity-related, problem, group, role, game, reflective and other forms and methods of organization of the educational process.

Among these methods, the leading role belongs to the method of projects, aimed at solving specific problems using a variety of educational and cognitive techniques for independent and group participation of students with a further presentation of the results of their intellectual and creative work. Giving high praise for the project activities, a modern researcher E.S. Polat emphasizes their advantages. These include the development of cognitive skills and critical thinking of students, formation of skills to independently construct their knowledge and to orientate in the information space, focus on independent students' activities (individual, pair, group), using different means, methods and tools in solving problems, as well as integration of knowledge and skills from different areas of science, technique, technology and creative areas. E.S. Polat refers to the method of projects as one of the efficient technologies of the XXI century, providing the ability to adapt to rapidly changing conditions of life of post-industrial society [4, p. 57–58].

Indeed, the project method is characterized by a number of important features and benefits that allow to implement the requirements of system-activity approach, the program of formation of universal cognitive activities: the acquisition of new experience (knowledge, skills) in the planning and implementation of action-oriented tasks (projects) of varying complexity; the ability to develop new ways of human activity in the socio-cultural environment, the connection to real life; the formation of a critical attitude to their actions; creating conditions for the interest of the students, identification of the children's leading positions, the ability to work in a group; formation of skills to predict the situation, end the conflict situation, be aware of their own responsibility; the development of such qualities as self-discipline, self-control, a scientific curiosity, enthusiasm for the work, empathy, the ability to negotiate, social interest, organizational skills; the formation of the humanistic attitude, adjustment of the system of moral guidelines [6].

Participation in the project activities solves such important task as ensuring close connec-

tion between the gained school knowledge and practice as well as real problems of students. Project-based learning is associated with overcoming the shortcomings of academic paradigm of education: isolation of theoretical knowledge from real life, unnecessarily narrow application of the acquired knowledge in real-life situations.

While organizing the project activities, one can observe a new type of cooperation in the «student-teaching» system – dialogue and collaboration. The teacher now estimates not only the results but also the process of student activities, and creates optimal conditions for the development of his personality. The student also changes its position: it is now not a diligent performer and an active creator; his thinking becomes reflexive, that is, result-oriented. Thus, in the changing relationship between teacher and pupil the main objective is the development of the student, the creation of conditions which at each lesson would ensure the formation of educational activity that turns the child into a subject who is interested in learning and his own activities. Students work throughout the lesson, during which there is the ongoing dialogue in the system of «teacher-learner».

Even the FSES of primary general education orients the younger students to participate in the project and research activities, which is also a necessary requirement of the implementation of the basic educational programs of primary general education. This work is very important in primary school, because the lack of the competence to learn in primary school age entails difficulties in training the future student. A university student may have problems with the ability to work with various sources of information, to absorb educational material, critically evaluate the received information and to express his own point of view on this or that scientific facts and events, participate in discussions and scientific debates, actively work at practical classes and seminars. A young person might also experience difficulties in meaningful reading and processing of information, the ability to express his thoughts clearly and convincingly. A.G. Asmolov sees the source of these adult problems in the school's inability to teach students to learn independently, i.e. ignoring problems of purposeful formation of communicative, speech, regulatory, cognitive, logical, and other universal educational activities [2, p. 21].

Project work can be organized both in class and in extracurricular activities. For example, when studying the course “Technology”

students may be offered work in small groups to develop a mini-project, with all its stages with further presentation of the finished product (products, social services, and others.). The subject "The world around us" has a great potential for the implementation of interdisciplinary connections of all subjects, as it allows students to observe the world in general, become aware of the cause-effect relationships, and at other lessons to explore ways to describe them. It might be useful to carry out annual competition «I am a researcher» in an educational institution at which students present the results of their work on individual or group projects.

It is necessary for the educational work of a class and school to involve students in the creation of projects related to moral subjects. The FSES pays key attention to spiritual and moral education [10, p. 5, 7, 20; 9, p. eleven; 8, p. 5, 16]. The evidence of their importance can be found in the FSES concept of spiritual and moral development and education of the individual citizen of Russia. In times of spiritual and moral crisis the work on the spiritual and moral formation of children and young people is particularly important. Participation of students in the project activities aimed at the formation of spiritual and moral values, will create a productive environment in which the assimilation of these values would take place not just at the level of knowledge, but at the level of actions and internal motives that determine human moral choices. Besides, these activities will be focused on the achievement of high personal achievements and student performance in relation to their moral and spiritual perfection [1, 3, 5].

Thus, the active and constant participation of students in the project activities will effectively implement a system-activity approach as a methodological principle of the FSES, the concept of the formation of universal educational activities aimed at the development of students' key competences – the ability to learn independently, which is particularly popular in the situation of rapid updating of knowledge and the rapidly changing social conditions.

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DEVELOPMENT OF MEDICAL STUDENTS' MATHEMATICAL ABILITIES FOR ANALYSIS AND SYNTHESIS THROUGHOUT THE E-LEARNING PROCESS

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The article examines the contribution of e-learning in the development of mathematical abilities for analysis and synthesis of medical university students. The author provides confirmation of e-learning effectiveness in students' mathematical abilities reaching and the development of abilities to synthesis and analytical skill. The intelligent application of the various elements of e-learning in educational process of higher educational institutions is proved to transfer thirty percent of students to a higher level of mathematical abilities for analysis and synthesis development, which is highly important throughout the students cognitive activities development and acts as a guarantee of successful self-education and inclusion into the system of continuous education where students are to solve professional problems by themselves, reaching academic, practical and professional goals. These data given by the author can serve as a basis for the introduction of new and wider usage of e-learning familiar forms and methods throughout the learning process in higher educational institutions.

Keywords: e-learning, effectiveness, mathematical abilities, analytical skill, mathematical abilities to synthesis, development, medical university

The stimulation of students' cognitive activity, maximal visualization and updating the learning material, individual studies optimization are to be considered as the main functions of modern e-learning process [1, 3, 4, 7]. E-learning various elements are the fundamental parts of high school educational process. However the e-learning effectiveness is still to be questioned. And the whole number of research directions of e-learning efficiency studies is taken nowadays [2, 5, 8]. Thus, earlier researchers have pointed out the usage of electronic didactic materials as the factor of students' progress in studies and stimulation of students' cognitive activities [6]. But the e-learning contribution into generation and development of students' skills is still questioned, especially if we talk about the aspect of mathematical abilities for analysis and synthesis.

The problematic importance is caused by the fact that mathematical skills, especially the abilities for analysis and synthesis, are to be considered as the fundamental part of successful professional activities which is highly important while searching for scientific methods, analysis and interpretation of research results. That is why we determined the purpose of our research as studying of e-learning role as an instrument of medical students' mathematical abilities development.

We chose the clinical psychology faculty students of medical university as an object of our research as development of students' analytical skills and mathematical abilities to synthesis is extremely important while searching for scientific psychological methods, analysis and interpretation of psychological research results.

We can point out several tasks of our research:

- to study clinical psychology students' analytical skills and mathematical abilities to synthesis at the initial stage of mathematics e-learning;

- to analyze clinical psychology students' analytical skill and mathematical abilities to synthesis at the final stage of mathematics e-learning.

Materials and methods of research

Testing of 30 first-year and second-year clinical psychology students was carried out. The first-year students were tested as the starters of mathematics e-learning. The second-year clinical psychology faculty students were involved into mathematical e-learning testing after passing the mathematical course examination.

The experiment was held in constant conditions for both groups of students: the research was held at 11 a.m. in the academic auditory. The research duration was about 20 minutes. The clinical psychology students performed the testing independently without using any electronic devices. The testing was built on the basis of Atmhouer intelligence structure test including the scale of mathematical abilities determination.

The subject was to be guided in each task condition and structure initially. That was a highly important element of successful testing. To estimate the different elements in the structure of the task, systematize them and define their hierarchy. The high level of analytical skills was demanded for these operations.

Except analytical skills the mathematical task conditions analysis required the high level of students' mathematical abilities to synthesis development, since the separate elements are to be united into the complexes. To answer the question, clinical psychology faculty students had to find the mathematical relations and functional associative nets between different elements of a problem.

So, the successful solution of the test task was the indicator of the developed mathematical abilities of the examinee to analysis and synthesis.

Results of research and their discussion

The examination results of clinical psychology faculty students' analytical skills and mathematical abilities to synthesis at the initial stage of mathematics e-learning are represented in the Table 1.

Table 1
Mathematical abilities development level to analysis and synthesis of clinical psychology faculty students

Level	The initial stage of mathematics e-learning	Final stage of mathematics e-learning
High	7%	13%
Average	29%	38%
Low-average	29%	44%
Low	35%	5%

35% of the first-year medical university students, starting mathematics e-learning showed the low analytical skills level. 58% of examinees showed an average and low-average levels of mathematical abilities development. 7% of the initial mathematics e-learning students showed the high level of abilities to analysis and synthesis (Fig. 1).

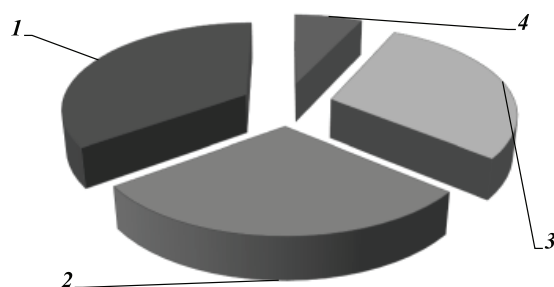


Fig. 1. Level of clinical psychology students' analytical skills and mathematical abilities to synthesis development at the beginning of mathematics e-learning:
1 – results of research and their discussion low level of mathematical abilities development (35% студентов);
2 – low-average levels of mathematical abilities development (29% студентов);
3 – average levels of mathematical abilities development (29% студентов);
4 – high levels of mathematical abilities development (7% студентов)

As Table 1 claims, after e-learning mathematics course of clinical psychology faculty students their analytical skills underwent essential changes. The number of low level mathematical abilities students decreased considerably: from 35 to 5%.

The number of the students showing a high abilities development level to analysis and synthesis was almost twice enlarged. 13% of such students appeared among second-year examinees in comparison with 7% of the first year students. Positive analytical skills development level dynamics was also observed among the average level students. This concrete group showed the 9% extension at the end of the math e-learning course in comparison with the initial stage: from 29 to 38% (Fig. 2).



Fig. 2. Level of clinical psychology students' analytical skill and mathematical abilities to synthesis development at the final stage of mathematics e-learning:
1 – low level of development of abilities (5% of students); 2 – low-average level of development of abilities (44% of students); 3 – average level of development of abilities (38% of students); 4 – high level of development of abilities (13% of students)

The low -average level to the analysis and synthesis students number was also increased. The number of such students was enlarged nearly by 1,5 times: from 29 to 44%. Common growth of students groups with high, average and low -average levels of analytical skills happened due to transition of 30% of low abilities level group to the higher values of mathematical abilities, which undoubtedly shows the active influence of math e-learning on students' analytical skill and mathematical abilities to synthesis generation and development (Fig. 3).

The testing results comparison separately on each task offered to examinees shows that after mathematics e-learning course the students cope with test tasks much more surely due to the higher abilities level development to synthesis and analysis. The Tables 2 witnesses the fact, that after mathematics e-learning in the majority of questions (14 tasks from 20 that constitutes 70% of number of questions), the students' analytical skill and mathematical abilities to synthesis appeared much higher, than at the initial stage mathematics e-learning.

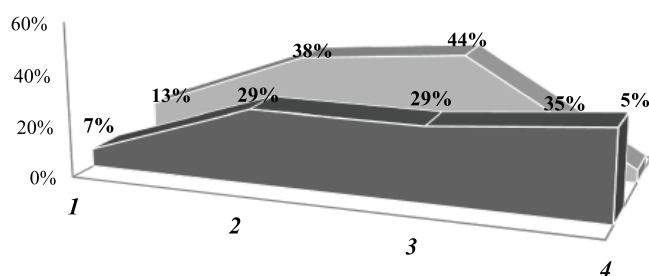


Fig. 3. Comparison of clinical psychology students' analytical skill and mathematical abilities to synthesis at the initial stage and at the final stage of mathematics e-learning:

1 – high level of development of abilities; 2 – average level of development of abilities;
3 – low-average level of development of abilities; 4 – low level of development of abilities

Table 2

The testing results comparison separately on each task offered to examinees

The task number offered to examinees	The number of examinees coped with test tasks surely (%)	
	1 year – students at the initial stage of mathematics e-learning	2 year – students at the final stage of mathematics e-learning
1	100	100
2	79	75
3	79	81
4	50	75
5	79	81
6	79	50
7	86	94
8	86	81
9	36	38
10	21	44
11	50	63
12	50	38
13	79	63
14	21	44
15	14	44
16	43	50
17	21	38
18	14	25
19	29	75
20	14	13

More than 80% of students who passed math e-learning course showed excellent result in five tasks from twenty offered that has constituted 25% of all questions, in comparison with the initial stage students who were able to perform only 15% rate. As a result of e-learning course the number of the students who had exact answer in six tasks from 20 (which is 30% of all questions) became as much as twice larger in comparison with mathematics e-learning initial stage students. The number of tasks which were answered correctly by less than a half of the initial stage mathematics e-learning students was at the 60% average (twelve tasks from twenty offered).

The correlation from 21 to 45% of the right answers can definitely be seen in 25% of tasks comparing initial stage and the end of the e-learning course. The final stage students of mathematics e-learning were not able to beat the initial stage students results only in three tasks from twenty (15% of quantity of questions), showing the same result. The comparison of testing results to the academic progress proves that the high level of analytical skills and mathematical abilities to synthesis allows the students to master the training material much better (Table 3).

Table 3

The comparison of testing results to the academic progress

	The testing results & result of the exam	The testing results & average mark during the academic year
valid	30	30
Spearman	0,589732	0,577140
p-value	0,000604	0,000841

All above proves the effectiveness of e-learning usage in aspect of mathematical abilities development to the analysis and synthesis.

Competently organized e-learning course in discipline “Mathematic” develops students mathematical abilities to synthesis, allows to generate and improve their analytical skills, transferring about one third of students to higher mathematical abilities level, provides strong discipline knowledge formation, and guarantees the professional competence of the modern specialist in the field of clinical psychology.

So, without any doubt the various e-learning elements usage throughout educational process of high school is necessary and reasonable, especially, keeping in mind a fact that variety of forms and methods of e-learning allows to develop the students’ cognitive activity.

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LEGAL EDUCATION OF STUDENTS IN THE MODERN EDUCATIONAL ORGANIZATIONS: PROBLEMS AND SOME SOLUTIONS

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In this article, the author raises the problem of legal education of students in contemporary educational organization. It described the situation in the state educational policy. Noted the trends in modern school education. The necessity of legal education of today's students. Presented by one of the possible solutions to this problem.

Keywords: legal education, modern educational organization, students, education reform, the FGOS

In the context of the transformation underway in the modern conditions of life of the Russian society occupies an important place state social policy.

In recent years, the reform of the entire education system in Russia is given the ever-increasing attention. According to the Russian Federation President Vladimir Putin, the main policy of the state in this direction is the transformation of education and good training “in the main social elevator in the society, the main criterion of respect for the man, which allows people to succeed”.

With that said, you can identify some of the main directions of the state social policy in education:

- widespread transition of secondary schools for the exam (the unified state exam) as a standardized final exams in all schools in the country;
- development of educational programs in accordance with international standards for the recognition of documents on Russian education abroad;
- implementation of the provisions of the Government of Russia signed the Bologna agreement by transferring all Russian universities on a two-tier system of higher education with a view to integration into the European educational space; encouraging personal responsibility of each individual in an effort to get a quality general and higher professional education.

Currently, Russia is trying to regain lost ground in science, the field of education technology. This is due to the fact that the 90's as a result of the collapse of a single state, and the dramatic events. XX century Russian society has undergone destructive processes. To a large extent they have affected the educational system, which until recently was one of the best in the world. Make a technological breakthrough

and innovation of our country, it can only be given the modern requirements to the quality of education.

Note that, in general, developed by the state authorities in the field of education policy includes as an essential component of the education of the individual tasks.

B Currently, education is defined as a purposeful process of education and training in the interests of man, society and the state. In this process, a primary place is given to the interests of the individual, taking into account the need to create conditions for self-realization. In the era of global economic, political and cultural integration and unification, development and self-realization are the key concepts of upbringing and education process, which, in turn, becomes a kind of trend direction over, expressed in terms of the – self-realization, self-education, self-learning, self-education [1, p. 165].

Consider regulatory sources governing the need for legal education in modern school.

Presidential Decree of 06.07.1995, № 673 “On the development of the concept of legal reform in the Russian Federation” has set the development of legal education system as one of the basic elements of the concept of judicial reform and the priorities of legal support of a number of major directions of formation and functioning of the Russian state, and the development of a full-fledged civil society [7].

One of the main functions that are created as part of the Vision 2020 on the basis of public libraries centers of access to legal and other socially significant information (public legal information centers / community access centers – PCPI/DPC) is a legal education. In other words, the subject of legal education, including in the framework of the PCPI element as part of the model of multifunctional

cultural and leisure facilities of club type in small towns and rural areas with the use of modern information and communication technology may well be realized. But it should be noted that this provision Concept 2020 is set out in the section regulating the long-term development of the sphere of culture and nothing to do with education and other areas of social and economic development of the country.

Basics of the state policy of Russia in the sphere of legal literacy and legal awareness of citizens declared that the development of the rule of law, formation of civil society and the strengthening of national reconciliation in Russia require a high legal culture, without which it cannot be fully realized such basic values and principles of society, as the rule of law, human priority of his inalienable rights and freedoms, to ensure reliable protection of the public interest.

According to Art. 15 Fundamentals defines the main directions of state policy in the area under consideration:

1) legal education and legal awareness of citizens;

2) the development of legal education and upbringing of the younger generation in educational institutions at various levels through the introduction in the educational process of training courses, programs, teaching materials, ensuring the acquisition of knowledge in the field of law and a number of others.

A significant development for the purposes of legal education is an art. 19 basis as determined by the development of highly moral person, dividing the Russian traditional spiritual values, having relevant knowledge and skills to realize their potential in today's society, ready for the peaceful creation and defense of the homeland.

The adopted strategy of development of education for the period up to 2025 is intended to form the younger generation of information and legal culture, and the development of justice adequately.

Legal mechanisms of implementation of the Strategy include among others the development of mediation tools to resolve potential conflicts among children and as part of the educational process, as well as in the implementation of the activities of other organizations working with children.

In our opinion, one of the mechanisms for the implementation of normative and legal documents given above can be created centers of legal and other socially significant informa-

tion on the basis of libraries of educational institutions [1, 2, 3].

It is assumed that created on the basis of school libraries centers of legal and other socially significant information will be a new direction in the implementation of the federal state educational standards, as well as act as a supporting infrastructure elements for solving the problems of information support of gifted pupils and teachers.

It should be noted that the centers of legal and other socially significant information on the basis of school libraries is the mechanism of implementation of the Concept 2020 of the creation of public centers of legal, business, environmental, and other information on the basis of libraries (PCPI Program) [8].

It is because of such centers can educate the active members of the Russian and Russian-speaking community, including in the cyberspace environment, with room to solve the problems of formation of information and legal culture, as an essential knowledge necessary for all those involved in building the rule of law, information and civil society.

In other words, in our view, these centers will be able to help form a harmoniously developed personality with critical thinking and a sufficient level of information and legal culture that today is an important aspect in the education of the modern younger generation [2, 3].

SHTSPI – TSPIOO (legal information centers of educational institutions) can actually become a basic platform of All-Russian public and state children and youth organization “Russian movement of pupils” in schools and can contribute to the creation of the formation of the younger generation of educational potential mechanisms, as well as various aspects of personality, in including the formation of spirituality and morality.

In order to create mechanisms for the implementation of the Strategy of education development in the Russian Federation for the period up to 2025 through increased efficiency on the basis of school libraries activity of legal information centers in a network format it seems advisable to begin to coordinate their activities in the form of creating a nationwide network model school centers, logically linked with the already existing networks of legal information centers and centers of public access, created on the basis of public libraries to implement Vision 2020 and Strategy of information society (public access points format), as well as, possibly multiple access points, set up on

the basis of post offices to implement legislation communication [4].

The turn of XX–XXI centuries marked by the effervescence of Russian philosophical thought, in particular, in the bowels of the Institute of Human RAS Nikolai Alexandrovich Nosov has been put forward and proved the theory, later received the name virtualistics. The development of the theory involved a specialized Center of the Institute. The main provisions of the theory are the following:

The basic idea on which to build virtualistics is the idea of coexistence of virtual and real objects and phenomena that influence each other, but do not merge into a common reality.

The world is changing and changing understanding of the world by man. For example, in the last 30 years, there are new approaches in the field of life thinking, and scientific data. For example, synergy, ecology, etc. There were and are experiencing rapid flowering – information technologies, created new profession and changed many of the scientific and practical activities;

The theory N. Nosov proves that the world is largely virtual. Virtualistics makes it possible to conceptualize philosophically virtuality, to make it the subject of scientific research and practical reforms.

Virtualistics – this is not a branch of scientific knowledge, and the type of worldview. This outlook does not deny the traditional philosophy and science. Virtualistics introduces additional world of reality and, therefore, offers a new view of the world.

Virtual reality, regardless of its nature. The physical, psychological, social, biological, technical, etc., has the following properties: begotten, relevance, autonomy, interactivity. It is necessary to stop on the comments, which modern scientists (Mikhailov A.N., Genisaretsky O.I., Nosov T.V.) give each of the properties:

- **Begotten.** Virtual reality is produced by the activity of any other reality external to it. For example, the development of computer technology has created a virtual reality – the Internet.

- **Relevance.** Virtual reality, there is only "here and now", but is active generating reality. Any virtual reality, such as a novel in letters between two lovers can be stopped. Ends correspondence, and this virtual connection between the two men end with correspondence. For example, the American film "You've Got Mail", directed by Nora Ephron is a fine example. Two people in the correspondence and

in life have completely different relations. The anonymous correspondence – is to understand and respect each other people who each letter become closer to each other, but in real life – it's rivals and enemies. Their virtual life exists quite independently and in many respects even in contradiction with reality. According to the laws of the genre melodrama ends happy ending – virtual and real life merge and there is a new reality, where the characters are quite different from the previous social and professional roles.

- **Autonomy.** In virtual reality, the time, space and the laws of existence (each has its own virtual reality "nature"). Pictures from this provision may be Facebook, or rather its pages that are librarians. Very calm, quiet people can say on Facebook pages are ardent fighters for the idea. They arise supporters and opponents. In general, there is a virtual life in most of its manifestations. Pages different librarians and library communities have different professional, emotional, due to different pictures and graphics – even a different design. Each page on Facebook – is a separate state with its own laws and regulations.

- **Interactivity.** Virtual reality can interact with all the other realities, including a generator, which is confirmed by the basics of ontology – the doctrine of common categories and patterns of life, the existence of the unity of laws, the theory of knowledge and logic. A very good example in this regard can serve as a federal target program "Electronic Russia". At the time of creation of the project of the program we assumed certain functions and activities that will be implemented with it. However, when the program was launched, and its implementation involved a significant number of people from different regions – this virtual reality has found another life and in many other functions than assumed its ideologists and developers. The program was developed under the program, which differs from the planned, that, according to experts – led her to a standstill [3, p. 10].

In virtualistics considered two types of realities – the constant reality, such as scientific and technological progress, the development of electronics and virtual reality – the Internet generated by the progress of the development. These realities are considered as independent philosophical categories which do not come into opposition with each other, that is the reality that gave rise to the virtual world does not conflict with it. In turn, the virtual world is not intended to affect the reality created it. Some sociologists believe that the virtual world is

largely influenced by the realities of the world of natural, especially on its youth sector, but this phenomenon is quite a different nature, it exists, it has not been denied, but to say that the Internet has influenced the development of scientific and technological progress, specifically, the electronics – it is impossible. Here you can talk only about the one-sided influence. The development of scientific and technical progress, in particular electronics, affect the virtual environment of the Internet, in turn, the virtual Internet environment for the development of scientific and technological progress does not have any direct impact. Invalid understand virtuality like unreality (possibility, the illusory nature of potentiality, imagination, etc.), there is another reality of virtuality. In virtualistics assumed the existence of two types of reality: the virtual and constant, – all of which are equally real [7, 8, 9].

From the standpoint of virtualisticheskogo world of legal information centers are one entity that is able to generate virtual worlds pupils to meet their spiritual, cognitive and aesthetic needs. And paradoxically it sounds – to become a serious alternative to the Internet and other customary entertainment schoolchildren. It should again be emphasized that the “virtual” in this context means not remote, and temporary and not fixed rigidly to any traditional form of intra-operation.

Modern Students grow in an era of active use of various gadgets which take them into virtual worlds. Students who are part of lesson system respond to teacher questions posed, and the expression of opinion should be left to the change or after school, these students can respond positively to the emergence of multifunctional, including communication and recreational area inside the school.

Confirmation of this hypothesis are the school with a strong student government. For example, a school, where the school parliament, school press center, school club – is a comfortable environment for self-expression and maturation make it possible to assume that the centers of legal and other socially significant information (if you call them more attractive to students name), it is also may become a medium of interpersonal communication, social place to obtain new knowledge and skills.

If you break away from the pattern, you cannot turn the activity of legal information centers in mandatory tutoring for students in legal disciplines. From the traditional areas of work with electronic resources – legal information center may become actual cinema club,

the informal leader of a school, center for informal education, that is the place where the school provides students additional opportunities for self-development and self-education, communications. That's imagine legal education D.S. Likhachev and N.I. Eliasberg [5, 6].

Personal development of human rarely occurs only in the silence of the academic lesson or library room. In this age, it requires the ability to express themselves in a variety of active forms, including as a voluntary assistant, creator, mentor, protector. Popularity or unpopularity of the Center of Legal and other socially important information and activities on legal education depends, in our view, only on two points:

1. If a school librarian and teachers who are interested in legal education, own or borrowed ideas, both traditional, everyday to do interesting and important personality.

2. Students in the center of legal and other socially significant information is actively involved in the choice of forms of work, not only do the job, or pre-cooked orders.

They are equal participants in the discussion and selection of the most interesting topics and trends, and on the basis of collective choice determining the vector of the center of legal and other socially important information. For example, legal and other socially significant information could be named “Talk. Discussion. Debate”. In such a center is possible even with the involvement of students and young professionals from universities and non-governmental organizations can learn how to debate, to be a referee (judge), to learn how to organize a debate among the younger students, etc. A subject of particular debate or discussion will be ethical and legal, which means that a very wide.

The value of creating a network of centers of legal and other socially significant information on the basis of school libraries will be that they will all be different. And, therefore, from the center to the center will be transferred not only the resources that are available today is any center, but will be transferred to the experience, techniques, approaches, solutions of pedagogical problems, that is, everything that is the essence of teaching.

Centers Networking can help solve another problem, which we mentioned at the beginning, that is, the creation of conditions for the separation of children from immersed in the virtual world. By offering students something unusual and interesting in the real world, and even with the possibility for self-development and self-expression.

In the second stage, when students get information, entertainment or any other purged (movie, concert, play, debate), you can hold a competition between the centers, networked one set theme that each center will disclose specific means for him.

We must not forget that the center of legal and other socially significant information is based on the school library. Therefore, the first theme that can serve as a tool to introduce teachers and students from different centers and from different schools – can become the theme of “Read – it is fashionable” or vice versa – “It is fashionable – to read”.

Thus, in our opinion, one of the solutions to the legal education of students the school can become a center of legal information, organized on the basis of the school library. Note that the importance and necessity of the structure caused by the requirements of modern standards, as well as time.

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AXIOLOGICAL TECHNOLOGIES OF SIMULATION IN TEACHING COMMUNICATION SKILLS IN MEDICAL STUDENTS

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Being able to provide effective clinical care is fundamental to becoming a medical doctor. It is pointed here that complaints about medical doctors by the patients do not deal with clinical competence, but very often with problems of communication. Teaching communication is challenging. The ideas of medical education modernization through using simulation technologies are considered in this article. The author centers on the axiological peculiarities of communication skill teaching process in medical students when using simulation technologies. Pedagogical aspects of teaching medical students' communication skills, as well as simulation technologies, are also described in this article. The article aims to show that good communication between a doctor and a patient increases patient's satisfaction and positively influences health maintenance and recovery.

Keywords: simulation technology, values, communicative skills, tomorrow's doctor, medical student, higher medical school

The present day situation in the sphere of public health shows that the main reason of conflicts lies not only in insufficient level of professional competence, but in poorly developed communication skills of a medical student. The profession and everyday activity of a medical doctor comprise a lot of skills both theoretical and practical to maintain the utmost respect for human life. People come to physicians for help with their most pressing needs – relief from pain and suffering and restoration of health and well-being. Every tomorrow's doctor needs to orient himself masterfully in great variety of clinical information, make competent conclusions at rapid fire-pace in critical situations and possess practical skills to render effective medical aid. The thing is that a physician should always act according to his/her conscience, and in the best interests of the patient. The health of a patient is the first consideration for the doctor. Doctors must be competent in what they do and be aware not to put patients at risk. But what is more, any medical doctor is considered to be a person with highly developed humanistic values. The main idea of higher medical education modernization consists in the axiological development of student's personality through introduction and applying into training process personality-developing pedagogical technologies (from Greek "techne" – art, skill, mastership and "logos" – conception, teaching, doctrine) from the point of view of medical profession peculiarities connected with saving people's health and life. That's why it is very important and actual to introduce into the practice of medical education so called simulation technologies (from Latin "simulatio" – pre-

tence). The doctor – patient relationship is the cornerstone of medical practice. The primary role of simulation technology is to portray an actual patient.

Having analyzed a great bulk of pedagogical and psychological literature we can't but mention here that simulation technology itself, as any other pedagogical technology, when having the purpose to develop and improve communication skills has the following peculiar features:

- purposefulness;
- orientation to the result;
- integrality;
- planning and programming;
- systematicity;
- projectability;
- functioning within given criteria;
- succession and consistence;
- personally-motivated provision of both student's and teacher's actions [6; 7; 8].

This technology is directed to the formation in each medical student an ability to develop own mode of professional behavior on the basis of moral values, system of values and professional skills on prevention of people's health. Axiological orientations of medical students and deontological rules serve as the basis for making moral decisions [4]. Basic simulation training gives students an opportunity to learn professional behavior in supervised environment that is safe for patients. Considering the rapid advance of medical knowledge, simulation technology is a continual challenge to maintain competence of both medical doctors and tomorrow's doctors.

It is worth pointing out that foreign language occupies specific niche in the process of tomorrow's doctor training. Language,

being cultural phenomenon, executes different functions: instructional, developmental, and educative. That's why in higher medical school special attention is paid to *linguo-professional* training helping to develop and improve communication skills, and is oriented to the development of the axiological potential of tomorrow's doctor personality [2]. The whole process of training passes through the student's personality, his or her motives, aims, interests, life plans and perspectives, system of values. When using simulation technology from the point of view of communicatively-valuable aspects at the lessons of foreign language, students get the possibility to work off and try out the skills of work with patients under the conditions most closely resembling the real ones.

While speaking about simulation devices we should mention that they are quite variable and include: computer manikins, rescue manikins, virtual simulators, training models, phantoms, and manikins for specific purposes. Advantages of simulation training introduction are evident as they allow medical students, who have successfully passed necessary theoretical training, getting and improving practical skills on simulators. Working with training models, medical phantoms, and simulators gives the students the opportunity to return to the initial point in case of making mistake. The reality of simulation training is determined by using highly technical devices (phantoms and training models) modeling different clinical cases, physiological reactions of a human body, definite organic and functional deviations in patient's living abilities. They allow tomorrow's doctor to see, touch and manipulate every part of a "human body". Simulation training gives an opportunity to learn to manage the mistakes, this helps improve the quality of medical aid and decrease the potential risk for a patient. Medical students can try to make alternative arrangements for the care of the patients [1].

The personal sense of activity of medical student consists not only in acquisition of ready-made system of knowledge, but in formation on its basis integral structure of future professional activity [9]. At the lessons the students activate the skills of history taking, physical examination of a patient, main principles of conducting programs of laboratory and instrumental examination and treatment.

Honestly speaking, simulation training is directed to the organization of such educational area where medical students consciously accomplish professional actions and improve communication skills in the atmosphere simulating real one. Simulation is used to assess clinical skills or competence. Simulation technology make students aware of the professional values and these values are reflected positively within school curricula. Value of simulation technology consists in problematization, heuristicity and projectivity.

Problematization manifests itself in overcoming distance from educational area.

Heuristicity produces subjectively new information when providing creative activity allowing building up original ideas and finding out proper solutions activating projectivity process.

Projective activity is the process of passing from cognitive component of axiological potential of medical student for creating axiological perspective of the personality himself or herself.

Having studied the results of simulation technology introduction, we have to mention that it allows:

- providing succession and continuity in realizing practical skills;
- improving monitoring of student's theoretical knowledge;
- conducting autonomous work of medical students;
- helping in establishing communicative and deontological skill of intercourse with patients.

The system of axiological orientations of tomorrow's doctors defines their cognitive motivation in professionally determined reality. During the process of studies the value system establishment of a medical student takes place. All pedagogical conditions have to be created to allow and support interiorization of such moral values as "human", "health", "life", "mercy", "compassion". It is worth pointing out that all values of *socium* become personal because of their selectiveness and subjectivity as they are the results of conceptualization, experience, and evaluation by a person the events of surrounding reality [3].

Applying simulation technologies in the purpose of improving communicative skills should be considered from the point of view of three aspects: gnoseological, praxiological, and axiological. Gnoseological aspect allows us pointing out:

- getting and processing information;
- forming and developing gnostic skills and actions with cognitive value;

- decision making.

Under praxiological aspect we should mention:

- skills and actions connected with topical area of professional activity;
- skills and actions having organizational character;
- information skills;
- communication skills of professional intercourse.

In axiological aspect simulation work allows considering and disclosing the peculiarities of medical student as a whole through:

- attitude of tomorrow's doctor to the surrounding world, people and substantive work;
- self-regulation and the attitude of medical student to himself / herself as to the subject of professional activity;
- understanding professionally important features;
- assumption of professional values.

The use of simulation technologies in the educational process of higher medical school helps mobilize student's knowledge through application of different means of exercising professional practical skills, and emotional maintenance that contribute to realization of their motivationally-valuable attitude towards their future professional activity. In the process of technology realization every student can independently assess the level of preparation, disclose gaps in knowledge and take attempts to liquidate them. Medical student has got an opportunity to put theoretical knowledge into practice and use it as an instrument for achieving definite aim – to render effective medical aid. The acquired knowledge and practical skills, including communication ones, when using simulation technologies help understanding life priorities and values in the strategy of personal development of tomorrow's doctor. The core idea of educational area of medical higher school involves getting professional knowledge and practical skills on rendering medical aid. But it is impossible to bring up a good doctor without displaying initiative, adherence to principles, and due care in realization of his/her professional activity. As part of axiological approach the use of simulation technologies receives accomplished character: from the aim of action, its motives, operations, means of regulation, and its correction up to the control and analysis of its final result. The simulation technology gives an opportunity to know and exemplify the core values of medicine, especially compassion,

competence, life and health. These values along with respect for fundamental human rights serve as the foundation of medicine. In order to deal with the patient's problems, the physician must identify the symptoms that the patient is experiencing and their underlying causes and must want to help the patient achieve relief. Patients respond better to treatment if they perceive that the physician appreciates their concerns and is treating them rather than just their illness.

The problem of formation and development of personal qualities of tomorrow's doctor, the problem of bringing up competitive ability of a competent specialist come to the foreground. The formation of professional (clinical) thinking is of enormous issue which allows modeling integral subject and social content of future professional activity and motivation.

Not unimportant, as we have already mentioned, this technology allows students improving psychological basis of interaction in mode "doctor – patient", train students to avoid conflict situations or effectively overcome them, orientating students to communication, interaction and cooperation being accomplished in the process of axiological development of a personality. Good communication skills do not come naturally to most people; they must be developed and maintained.

The technological basis of communication skills development consists in integration of simulation training with the modes of humanitarian technologies (case study, role play, simulated patient, etc.). The work with virtual simulators provides medical students with the opportunity to utilize and expand upon the conversation techniques acquired during communication. The advantage of role play is that all students are involved in the process. They work in groups and may play different roles: doctors, patients; they may as well develop other roles (based on the experiences of friends and families). At the lesson the teachers move between the group of students, listening, making comments and suggesting may be different ways of solving the problems. The thing is – the students are taught communication within realistic context of basic medicine. The students participate in discussion of interviewing techniques. Case histories serve as the basis for the examination and discussion of the exchange of information concerning prognosis or probability of health-related issues. Tomorrow's doctors are given cases and are asked to work independently on key

components of the cases in small groups to learn about illnesses from diagnosis to treatment and follow-up. Students can receive the information about the patient ahead of time and decide among the group members an approach to interviewing the patient. Future specialists in medicine can divide the interview into various categories, depending on the size of the group. After each interview the students and “the patient” (using simulation technologies) have an opportunity to return feedback and discussion [5]. These categories of communication may include:

- interview instructions;
- current symptom assessment;
- past and family history;
- diagnosis;
- treatment plan;
- follow-up.

To achieve the aim of formation of communication skills we have to solve such tasks as:

- to form in students of higher medical school linguistic skills, provide (foreign language) oral activity;
- to prepare the student for the participation in professional and socio-everyday communication;
- to improve common standard of culture of medical students on the basis of perfection, the skills of oral communication.

To establish good rapport with patients nowadays communication requires much more of doctors. They must provide patients with all the information they need and want to know about their diagnosis, prognosis and treatment options. Doctors should make every reasonable effort to probe their patients’ understanding. Communicative culture of tomorrow’s doctor is one of the most significant professional values, displaying itself as personality’s ability to assess other persons adequately, finding specific way of communication to every patient. Communicative culture is considered to be integrative quality of a personality of tomorrow’s doctor (which provides successful interaction of doctor and patient), creating new attitude towards himself/herself as a representative of medical profession, people surrounding medical student and world on the whole. The structure of speech communication in the mode “doctor – patient” includes: subjects, i.e. participants of the communication (doctor and patient), as well as object – i.e. the ground of communicative relations. This involves respecting the skills and contributions of colleagues and other professionals, and developing effective communication with other members of the

team and with patients. Medical students must learn to build valuable relationships with patients based on openness, trust and good communication. They must establish and maintain effective relationships with sick people and act responsibly and appropriately.

In the training process a student acquires skills in establishing valuable contact with patient making communication with a patient productive. Frank conversation (listening and questioning, explaining and advising, involving patient in management) helps discovering and understanding the essence of disease process, i.e. pain relief and the fastest recovery. This will help students gain confidence in their ability to interview. In a teaching session, the simulation will be used as a focus for learning about a problem. Students can observe and try a variety of approaches to interviewing the patient.

The medical interview should follow a logical progression. The student gets an opportunity to invite questions from the patient and be empathetic to patient’s condition. It’s important to assess the patient’s perceptions and understanding through exploratory questions and to gauge the dialogue accordingly. Communication between doctors and patients has been clearly shown to affect many aspects of patient care.

When carrying out professional activity on rendering medical aid doctor has to explain, elucidate, persuade, prove and sometimes even make a patient change his/her mind. In other words, when using simulation technology valuable communication skill becomes one of the defined clinical skills of professional characteristic of tomorrow’s doctor personality. We might as well mention here, that one of the main tasks of simulation technology applying is to improve the efficacy of mastering manual, therapeutic – tactical and communication skills through introduction into learning environment of medical schools highly technological, robotized training models, virtual simulators, simulated patients, etc. with the purpose to make the quality of both theoretical and practical preparation better.

Medical students participating in this work were surveyed at the beginning and end of the course. The survey assisted in self-assessment of their skills and an evaluation by means of a questionnaire. As a result the students exhibited a considerable increase of communicative skills. It was also observed that medical students had a greater degree of self-assessed competence following training. The empirical results of the study showed that simulation

technology enabled students to acquire specialized competence in communication. The personal meaning of tomorrow's doctor activity was shown to consist in the formation on the basis of received theoretical knowledge, practical and communication skills of integral structure of professional activity. And it is well seen that the effective realization of communication skills provides benefit for both doctors and patients.

Overall, competent doctor has to recognize the signs of illness and know how to restore good health. The empirical findings of our study indicate pressing usefulness of simulation technologies in teaching communication skills in tomorrow's doctors. This is impossible without well-developed communication skills which are fundamental in clinical practice. As part of medical education, simulation technologies underline the importance of good communication in patient – centered care and provide the valuable ground for training communication skills that are required of tomorrow's doctors in specific clinical settings, involving the application of medical science and technology for restoration of health and well-being of the

patient. In other words, axiological technologies of simulation when teaching communication skills help to achieve the main goal of medical education as well as public health – improved health of all people.

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STREETISM IS THE GLOBAL TREND OR THE FLIPSIDE OF THE DEVELOPING WORLD

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The understanding of streetism is presented in this article by providing definitions of both; scholarly and policy sources. Explanations to the growing trend of streetism is described, it consists of introduction, literature review and conclusion. Definitions will lead to understanding of the reasons and causes of this phenomenon worldwide. Streetism is not exclusive to the third world countries but developed countries also experience it. The limited education opportunities, poor or no income will make young adults in developed countries want to attain their goal through illegal means. Then the review will focus on the causes leading to streetism among children. Special attention is paid to case studies conducted worldwide.

Keywords: streetism, domestic violence, family, parental divorce, infectious diseases, emotional impact, street children, sexually transmitted diseases (STD), behavior

It is estimated that about 100 million children between the ages of 5 and 18 live on the streets in less developed world countries [5]. There are many reasons why children go to the streets of the cities, towns, and villages. All children who found in the streets can be allocated into one of the two major types of street youth depending on how much time they spend on the streets.

The first category of children lives at home and they are on the streets to earn for their livings and support their families. They are often forced by their parents to do everything they can to earn money and such children do any possible job requiring minimum skills or knowledge. They are engaged in shoe polishing, newspaper selling, begging, sometimes in prostitution or into other illegal activities connected with menial income.

Children in the second category accept street as their homes and the only place for living, because they sleep and live on the streets. These children usually do not have any ties with their families and siblings. They run away from their homes for various reasons. Mostly conflicts with parents or family members force them to go to the streets.

This article aims to provide explanations to the growing trend of streetism, it consists of introduction, literature review and conclusion. The literature review will present the understanding of streetism by providing definitions of both; scholarly and policy sources. Definitions will lead to understanding of the reasons and causes of this phenomenon worldwide. Then the literature review will focus on the causes leading to streetism among children. Special attention is paid to case studies conducted worldwide.

The definition of streetism is often contested and argued by scientists, practitioners and policy makers. And for this reason, the following definition by UNICEF (1995) is used in defining the target group as of children who are under eighteen years old. According to this concept, there are two categories involving children. On the one hand there are vagrant children for whom the street is the source of income. On the other hand there are children for whom the street is the constant place for living. In "Working with street children", these children are not adequately protected by adults and they do not have permanent home. They have to survive day and night on the streets and such style of life is the only open option for them. Street children live on the streets spending all their time or they spend some of their time just to earn money to support their families. However street is the only source of income or even shelter for both types of street children. Street plays an important role to the target group children, as it is the only environment for those children, the word *street* is reflected in the term streetism [6].

According to Encyclopedia Britannica, "*Streetism*" is the term that refers to the life situations of street children who usually live in the streets and engage in menial income. These children experience homelessness and they live on the streets of towns, cities, villages. There are children who work on the street and the other group who is called children of the street. They are called so because they not only work on the street but live, sleep, have food on it.

Why do children go to the streets? Streetism is a social and an individual problem; it is very common in developing countries. Various issues influence the growth of streetism, the most prevalent causes of streetism are: domestic violence, low income of families, family

related problems, physical and sexual abuse, and various sexually transmitted diseases such as HIV/AIDS, (United Nations, 1990). Above mentioned factors place children in difficult situations where they cannot enjoy the life as majority of children in normal families do. The other complication is that such children are responsible for their lives, they are often without any support and they are often ignored by the society. Children are vulnerable because they do not have steadfast support system, and they have to deal with their problems on their own. The absence of support and secure conditions contradict to the Convention on the Rights of the Child [7]. Children in developing countries face difficulties on the streets due to the absence of children supporting programs. Researchers, policy makers must apply their efforts to develop effective measures to support them. Until the society accepts the existence of the problem and it introduces measures to prevent it, the streetism will escort the developing countries.

The changes in the family dynamics might be one of the most significant factors in the growth of streetism. It can occur due to domestic violence, death in the family, parental divorce or remarriage among many others. Such drastic changes in the family structure can have significant and emotional impact on a child. Children may feel unhappy or neglected in such family structures. According to UNICEF (2001), such neglected children prefer to move into the street rather than staying within step-parent settings (stepmother or stepfather) or in extended family settings. The UNICEF (2001) suggests that family members, stepparents physically and sexually abused such children. Such attitude to vulnerable children suffering from the loss of biological parent(s) made children to go to the streets.

The children's choice to go to the streets sometimes lead them to other problems connected with streetism such as bad influence of peers. In such, young people are exposed to harmful behaviors of peers, such as use of violence to dominate their peers and alcohol and drug abuse. This influence may bring vulnerable children to premature sex; because youth being affected by the usage of drugs or alcohol and being unconscious of their implications often become the victims of various consequences of such behavior. Particularly children in Zimbabwe are at high risk of infectious diseases such as HIV or other severe sexually transmitted diseases (STD) [8]. Other research conducted in Zimbabwe shows that street children are at high risk of having such danger-

ous (STD) such as HIV. This study also indicates that street children; girls and boys have intercourses which can lead to being infected by HIV disease. The study describes types of sexual activity where the children are engaged, they are boys engagement into sex with males, sex with prostitutes, or even more sophisticated forms. Boys and girls use their bodies as forms of payment for services through providing sex or girls become sex workers to support their new families. Child marriage / underage girls are in a relationship with men who groom and further force them to prostitution. In most cases they live as a husband and a wife, such husbands usually send their young wives to earn money for the "couple". Engagement into criminal activities is not only offensive but dangerous because vulnerable children can become victims of various gangs.

Streetism is not exclusive to the third world countries but developed countries also experience it. Unlike children from poor families or rural areas, children from developed countries also go to the streets. Where they like peers from developing countries, often make crimes or they are involved in various street gangs. A comparative study conducted by Guide, et al., shows that the essential raise of youth violence took place not only in developing countries but in many countries in Western Europe in the early 1990s [2]. According to England and Wales statistics of 580 in 100,000 aged 14–16 were convicted by the police in 1994. The statistics for western Germany revealed that young people aged 14 to 18 years were suspected for violent crimes almost six times higher about 3000 per 100,000. Such high crime rate among children put the target group to high risk to become a victim. For instance, the 1995 records of Netherlands indicate that young people at the age of 15 to 17 years are four times at a higher risk than adults to be assault victims. At the same time the criminal rate among young offenders grows up every year.

Many street youth live harsh and violent lives; such lifestyle has risks of violent trauma, accidents or even of death [3]. Many vagrants finish their lives as a result of social marginalization and street dangers. Day to day struggle for survival push them to anti social behavior such as street conflicts. These conflicts in turn often end with fatal cases because harsh lifestyle makes such children cruel even to each other. They get traumas and die on the streets, in prisons or they just disappear after being wounded. A vast number of street children go missing. The problem is that youth do not have social guarantees and are not provided medical

treatment in a timely manner. Vulnerable youth do not have access to medical care and services as a result this leads to complex health problems and even to death.

Another reason why children go to the streets and join gangs is the will to possess the stuff and seduces of luxury life and the promises of lucrative or luxurious lifestyle. Young children want to consume and the amount of such demands is often beyond the capacity of normal family. The TV shows, films and various programs advertise high style of life; youth driving luxurious cars, wearing expensive clothes, attending top class clubs and restaurants attract youth to the streets. They covet what is not affordable to their parents. The youth's understanding of good living is based on this type of consumer standards and will go to a large extent to meet up with the lifestyle that is not affordable to their parents. The limited education opportunities, poor or no income will make young adults in developed countries want to attain their goal through illegal means. Therefore, the unavailability of legal means of attaining their high or even unfeasible goal at the instant moment make them unhappy with their families and as a result go to the streets.

Streetism in Kazakhstan. The situation with streetism of Kazakhstan needs to be researched since there is a gap in the literature and empirical researches. The confusion is that according to official information there are no street children in Kazakhstan. Official papers narrate about what is being done to orphanage children and they do not mention that there are street children. The other problem is that there is no clear or even definition to streetism in Kazakhstan. For this reason, there are only children in families no matter whether children live there or not and children in orphanage institutions isolated from the society. On the other hand, unofficial sources report that, there are hundreds of thousands of street children [4]. We tried to find the reasons of streetism in other sources and found out that they are the same like mentioned in this paper. They are: low income of families, addiction to alcohol, family problems, and lack of parental guidance [1]. The science of Kazakhstan has to apply efforts to the issue of streetism, which in turn may bring policy makers to accept the phenomenon of streetism. The acceptance of streetism definition will produce positive effect on the society in general and to the development of inclusive education of Kazakhstan.

In conclusion of this article the children of all social statuses, nations, race and financial

backgrounds face the same risk to be a street child. As studies show, financial background of the family is only one aspect of being vulnerable to streetism. The issue is that some children financially is in more beneficial position than others but there are many other reasons to be a victim of streetism. The examples in this article assert that children as adults can think critically and take extraordinary decisions such as: leave their warm houses and go to the streets where nobody is going to take care of them.

It was very sensitive for us to write this article because of our background of working as teachers and a group masters at the college and university. During our work experience we met many children who were the subject of streetism. When we read sources explaining the reasons for streetism, we kept remembering those children. They struggled against harshness of life and often they were not understood by the society. Although some of them worked as waiters/waitresses or other low skilled works and paid for their education, most of them did not get proper support. Stakeholders, practitioners, teachers often did not interfere to their families since they did not have legal right to do so. All that they could do is just wait until they brake the laws or successfully finish their education and move forward.

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IMPLEMENTATION OF THE METHOD OF ART – THERAPY IN THE DEVELOPMENT OF COMMUNICATIVE RELATIONS

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The author gives an original perspective on the art – therapy that is included in the segment of the many personal growth programs. This is a special form of psychotherapy based on the art and behavioral change in the client. Art – therapy is based on the basic position of psychoanalysis of Freud, according to which artistic images created by the customer reflect the processes in the unconscious of the author. Experiences are not superseded and sublimated into creativity, and through which there is an improvement of communicative relations, progress in therapy and further successful rehabilitation.

Keywords: educational support, art – therapy, a synergistic approach, communicative relationship

An interesting history of art – therapy is a trend in modern psychotherapy. In the late thirties of the last century provincial painter from Great Britain Adrian Hill (Adrian Hill, 1895–1977) was treated for a very dangerous infectious disease tuberculosis. This disease were treated in those days for many months and even years. So, bored, he began to draw, making landscape sketches on paper that, to the surprise of the staff, greatly accelerated his recovery. Later Adrian Hill was invited to work of art – ducators with patients in private and public clinical settings, and he’s more convinced of the therapeutic efficacy izotvorchestva. Since the beginning of the fifties in America Adrian Hill was recognized and highly effectively implement already as an independent original method of teaching art – therapy for many physical and mental diseases. Today, art therapy is part of the segment in many personal growth programs. It makes it possible – to unlock the creative potential of the customer, to find the source of its vitality. This is a special form of psychotherapy based on the art and behavioral change on the client, improving adaptation abilities of the individual by means of spontaneous artistic activities. Art therapy is based on the basic positions of psychoanalysis by Freud, according to which artistic images created by the customer reflect the processes in the unconscious of the author. Experiences are not superseded and sublimated into creativity. Classical art therapy involves self-expression through various kinds of paintings, graphics, photography, sculpture. But today use other kinds of art: kukloterapiya, maskoterapiya, music, etc. The relativity of the concept of “therapy” gives reason for its introduction in the conceptual apparatus of psychology and pedagogy. The phrase “art therapy” in scientific and pedagogical interpretation is understood as a concern

for the emotional well-being and psychological health of the individual, group, collective means of spontaneous artistic activity, which in turn leads to improved communication relations. The modern view of the literature on the art – therapy indicates that it is prefabricated concept that includes a wide variety of forms and methods of painting, drawing, sculpture, design, etc. The central figure in art – therapeutic process – identity of the customer, striving for creative self-discovery, to strengthen mental health, emotional well-being of harmonization, expand the range of its features. The basis of art – therapeutic process – is that the most important thoughts and experiences of the person easier to express in the form of images, rather than words (E. Kramer, M. Paumburg). In the process of art – the customer first therapy is in the role of “artist”, then it becomes a bystander. Over time there is a change of attitude, initiating a sensation of harmony and integrity of the image of “I”. Benevolent psychological atmosphere, the adoption of “artistic image”, regardless of its aesthetic value, positive attitude – the basic conditions for personal growth and self-knowledge, participants of the art – therapeutic activities. During the “lesson”, does not require previous experience in drawing or special artistic abilities, this spontaneous, arbitrary, “free sketches” that are not “wrong”, encouraged experimentation with a variety of non-standard representational forms and materials. Drawing, painting, working with clay, plasticine, making decorative objects, collages, creating compositions of various natural and semi-precious materials – all of this iconic work, and psychological patterns of development are the same (Vygotsky, Yu.L. Poluyanov). Art – therapy figuratively called “healing art”. Spontaneous activity is accompanied by pictorial therapeutic effects

(psychological, emotional relaxation, psychoprophylactic, social and communicative). This is – a humane process, which is contributing to the socialization of the individual, it allows you to save your own unique, personal and cultural identity [1]. To give the fullest definition of art – therapy is difficult. Therefore, the definition would depend on the theoretical concepts and the field of applied professional activities, from specific to a particular national model of art – therapy and the degree of their professionalism. There are examples of different understanding of art – therapy.

Edith Kramer thought it possible to achieve positive effects primarily due to the “healing” capabilities of the process of artistic creation, giving the opportunity to express, to relieve internal conflicts and, ultimately, resolve them.

Adrian Hill links the healing possibilities of graphic activity first of all with the possibility of diverting the patient from the “painful experiences”. Margaret Naumburg believes that a person as a result of artistic activities overcomes doubts about their ability to freely express their fears, acts in contact with his unconscious and “talking” with them on the symbolic language of images. Expression of the content of his own inner world helps a person cope with the problem. Thus, we can say that some of the scientists emphasize that artistic expression helps the therapist to establish with the client closer contact and get access to his feelings, the other – on the fact that the healing effect of art is achieved, primarily due to distraction from the sore and create a positive attitude, and others – on the fact that it is itself capable of sublimating his feelings and give vent to destructive tendencies. If we consider communication as a special kind of activity, it is necessary to agree with the well-known domestic social psychology that through communication activities organized and developed, including the system of “art therapist – client”. In this work by communicating not only organized, but also enriched, is enriched with all the complex and multifaceted communication process, there arise new connections and relationships between people. Main side communication function “complex and multifaceted process of interaction between individuals and how to process information, and how people’s attitudes to each other, and how the process of empathy and mutual understanding of each other” [2].

BD Parigin notes that this process can serve at one and the same time as the process of interaction of people with each other, and how the process of their mutual feelings and mutual understanding of each other. There are three main functions of communication: the exchange of

information (communicative aspect of communication); the interaction (interactive aspect of communication); as the perception of each other (the perceptual aspect of communication). General purpose of educational activity is the formation of harmoniously developed personality, willing and able to carry out an objective system of social roles. The basis of the education system is a synergy, which is manifested in the interaction principles – psychological personality synergies, synergy of experience and synergy of interaction of the teacher and the pupil. It defines a new position of pedagogy: the effect of educational activity is achieved not by the influence and sinergetizmom educational interaction [3]. In our integrative personal-social concept of psycho-pedagogical support is synergistic principle acts as an integrator, and allows us to consider psychological and educational software to optimize the quality of life as a process that is largely self-organizing, not based on the direct cause-and-effect relationships, and flowing ambiguous; process due to a variety of internal and external influences; regular and random; predictable and natural, ordered and chaotic.

Problems synergistic approach in the formation and development of personality became the area of research of many modern scholars (A.I. Bochkarev, V.G. Vinenko, A.A. Vorozhbitova, V.A. Ignatova, E.N. Knyazeva, S.P. Kurdyumov, S.N. Simonov, E.A. Solodova, N.M. Talanchuk, S.P. Firsova, G. Haken, Yu.V. Sharonin et al.).

The term “synergy” is derived from the Greek “synergeia” – “commonwealth”, “cooperation” and focuses on the consistency of the interaction part in the formation of the structure as a whole. Synergetics is translated as “energy of the joint action” (from the Greek “syn” – “Accordance”, “together” and “Ergos” – “action”), founded by Professor Hermann Haken of the University of Stuttgart.

Philosophical Dictionary contains more detailed definition: “Synergetics – the modern self-organization theory, a new vision of the world to associate with the study of self-organization phenomena, nonlinearity, disequilibrium, global evolution, the study of the formation processes of” order through chaos, “bifurcation changes, irreversibility of time, the instability of both the fundamental characteristics of the processes evolution”. Some aspects of the theory of self-organization from an educational point of view is reflected in the works V.G. Budanova, V.G. Vinenko, V.A. Ignatovoy, E.N. Knyazevoy, S.P. Kurdyumova, L.N. Markarovoy, N.M. Talanchuka, M.A. Fedorovoy, Y. Sharonin et al. [1, 4, 5].

L.N. Popov noted that synergies can be understood as a kind of systemic approach as an approach to understanding the development of open nonlinear systems and a particular style of thinking. The basic concepts of synergy are “self-organization”, “transparency”, “non-linearity”, “disequilibrium”, “bifurcation” – branching paths of development, “fluctuation” – random deviation values, leading to a new structure of the emergence of “attractor” – a relatively finite, sustainable state of the system.

According S.N. Simonova Synergetics enters into a universal methodological paradigm relating to the areas of knowledge, which examines complex systems, the phenomenon of self-organization, and is an integrated multidisciplinary approach to the studied subjects and objects. According to the author, the subject of synergy are the mechanisms of self-organization, and so it is called the theory of self-organization. “Under the self-organization in synergy refers to the processes of occurrence of a macroscopically ordered spatio-temporal structures in complex nonlinear systems under conditions far from equilibrium near singular critical points”. Sometimes, self-organization is defined as “the ordering of any elements due to internal reasons, without influence from outside”. A distinctive feature of the self-organization processes is their focused, but at the same time a natural, spontaneous: the processes occurring in the interaction with the environment, to a certain extent autonomous, relatively independent of the environment. The process of self-organization is the result of the interaction of chance and necessity, and is always associated with the transition from instability to stability [6].

Conceptual and methodological novelty of the ideas associated with self-recognition of the ability of different systems to self-development is not only due to the flow of energy, information and matter from the outside, but also through the use of their internal resources. S.P. Firsova notes that in recent years has become increasingly noticeable interest from various fields of scientific knowledge to the methods and principles of self-organization theory. There is a multitude of adoption of relevant terminology in the area of humanities. This process is quite natural, since the general systems theory and Synergetics provides the methodological basis for a complete description of the study and any kinds of systems regardless of their nature, the forms of existence, the degree of complexity of the functioning [7].

At the same time, educational activities in art – therapeutic process is considered as a process of solving a large number of psychological and pedagogical problems. Since educational

activity is defined as “a professional activity aimed at the creation of the pedagogical process, optimal conditions for education, development and self-development of the individual pupil and choice of free and creative expression” [4, 3]. Consider the essence of educational pedagogical activity in art – therapeutic process: In our opinion, it is that the art expert – therapy poses a pedagogical aims and objectives, and then transforms them into the client’s objectives, which clearly stimulates the activity, it causes a positive change in his personal development. This specialist in art – therapy, it is important to be clear about the changes that you need to call in the worldview educability the end of a certain stage of training micro cycle. This is possible by finding a specialist in art – therapy in a state of empathy when he sensitively perceives the mental state of the client, the nuances of his experiences, no doubt, his most subtle shades of meaning and emotional. Further, production of pedagogical problems must come from the relationship to the client as an active, equal participants in correctional and educational process that is likely to have its own logic of behavior or interpretation of the proposed image. Finally, the solution of psychological and pedagogical problems requires a specialist in art – therapy urgent action in professional situations, while their outcome is delayed in time and makes it difficult to monitor the success of the task. Our view on the educational support on the basis of synergetic paradigm art therapeutic process, different from the traditional in that it is not any arbitrary set of elements, and their system. The basis of pedagogical support system synergies, which manifests itself in the interaction of elements of psychological and psychological synergy personality, experience and synergies synergism interaction specialist in art – therapy and its customers, with a view to more effective treatments, and further successful rehabilitation.

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PROFESSIONAL MOTIVATION OF THE DOCTRINE AS SUBJECT OF SCIENTIFIC RESEARCH

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Results of empirical research of individual and psychological features of students with various level of educational and professional motivation are reflected in article. Some approaches to a motivation problem are reflected in domestic and foreign psychology, and also to a problem of the characteristic of student's age.

Keywords: motivation, educational and professional motivation, structure of motivation, external and internal motives of educational activity, emotional stability, dominance, hardness, courage, uneasiness, intensity, self-checking

At all variety of approaches to consideration of development of the personality in the period of students researchers directly or indirectly point that the leading factor causing it is the position taken by the personality in relation to educational, i.e. actual for it, activity and to professional, i.e. perspective, activity. The identity of the student develops in the presence of educational and professional leading activity, and development assumes a transition period from self-determination before clearing of specifics of a profession, formation of an image of the professional. At the same time the educational and professional motivation of the student reflecting an orientation of his personality acts as an important factor of personal development. The motivation is one of fundamental problems in psychology. Complexity and versatility of the problem of motivation causes plurality of approaches, to understanding of its essence, nature, structure, and also ways and means of its formation and development.

Materials and methods of research

The motivation is connected with requirements and motives, outlook of the person and features of his idea of themselves, personal features and functional states, with experiences, knowledge of Wednesday and the forecast of measurement, with the expected consequences and estimates of other people. H. Hekhausen points that the concept "motivation" is often used as descriptive, pointing that the behavior finds focus. In a number of theoretical statements not observable "intermediate processes" which are entered for a communication explanation between initial conditions and the subsequent effects are also called motivation [4, p. 408]. P.M. Jacobson speaks about a possibility of use of the term "motivation" in narrower and in a broader sense. In the first case it is motivation of concrete forms of behavior of the person, in the second – set of those psychological moments by which the behavior of the person in general is defined [5, p. 227]. The main characteristic of the motivational sphere is the hierarchy of motives which allows to reveal personal sense of activity for the person. The general name for processes, methods, means of motivation of trainees to productive cognitive activity, active development of content of education is the concept "educational motivation". The motivation of educational activity usu-

ally is understood as all factors causing manifestation of educational activity – requirement, the purpose, installations, call of duty, interests, etc. However, the motivation of the doctrine in general is not the sum of motivations of studying of separate objects, and the new more difficult education having the specific signs. We understand motivation of the doctrine as a complex of motives to educational activity and after A.K. Markova we recognize that the motivation of the doctrine consists [2] of many factors which are constantly changing and entering new relationship with each other. Motives of educational activity can be external and internal. The strongest external motive of educational activity, according to L.V. Zankov, is receiving good and excellent marks. When similar motives, overcoming of difficulties, tension about which it is told in didactics work, occur for achievement of the purpose which is external in relation to knowledge, and mastering knowledge becomes means [1, p. 405].

Are even more sated with external motives study as the compelled debt, study process as habitual functioning, study for the sake of leadership and prestige, aspiration to come under the spotlight, study for the sake of liberal remuneration, avoiding of failures, understanding of need of the doctrine for life, process of the doctrine as a possibility of communication, motive of a praise from significant persons. These motivated factors can exert noticeable negative impact since in case of external motivation positive changes can take place only until receiving promised by the trainee. In the researches L.V. Zankov allocates the following signs of external motives of educational activity: the doctrine for the sake of the doctrine, without interest in the taught subject; the doctrine for the sake of private interests and benefits; the doctrine for social identification; the doctrine for the sake of success or because of fear of failures; the doctrine on coercion or under pressure; the doctrine based on moral obligations (the standard norms); the doctrine for achievement of the purpose in ordinary life; the doctrine based on the social purposes, requirements and values [1, p. 319]. V.P. Petrov and A.T. Rostunov's researches confirmed a great influence of power of professional motivation and its structure on success of activity [3].

Results of research and their discussion

Proceeding from modern psychological representations concerning the category "motivation", we understand set of the resistant motives having a certain hierarchy and the expressing focus of the personality as the motivational sphere of the personality. Besides, we

recognize from the fact that the motivation has significant effect on success of professional activity and training. We undertook empirical research of personal features of students with various level of educational and professional motivation. Selection of examinees was made by 120 students of 3–5 courses of humanitarian and technical faculties of DGPU and DGU of Makhachkala.

For studying of educational and professional motivation of students the Motivation of the Doctrine test representing the questionnaire offered by V.Ya. Yakunin for students of higher education institutions was used. It allows to characterize quantitatively five primary groups of educational motives of students: professional, developments (informative), utilitarian (pragmatical), socially important and personal prestige. This selection of the studied motives is based on data of the numerous researches which showed that the motivation has structure, multiple-valued on contents and forms. In its structure of V.A. Yakunin and other authors allocate professional motives (success of training is defined by steady and conscious choice of profession, desire to become the qualified specialist, it is closely connected with a professional orientation), informative motives or motives of development (aspiration to professional personally growth, receiving new knowledge, satisfaction from the process of knowledge, participation in facultative occupations, studying of additional special literature outside the training program), pragmatical or utilitarian motives (it is good to acquire the current training material, to avoid punishment for omissions in study, not to start occupation, to receive a profession with a high salary and social privileges), broad social (socially important) motives (to bring benefit to the state and society), motives of personal prestige (to be an example for other students, to get approval of teachers, parents and friends, to have good situation in society and to approve itself as the personality, aspiration to career). The technique "Motivation of the doctrine" includes 20 statements demanding the end: "In study for me the most important – ...". Surveyed has to estimate the importance of each of statements on 5 to a mark scale: the extreme pole of an assessment in 1 point corresponds to the minimum importance of this statement for surveyed, and an assessment of 5 points – the maximum importance of the statement. On the basis of the received values the histogram of distribution of estimates is under construction, and levels of expressiveness of motives, the dominating group of motives, and also their general struc-

ture at the specific student and are determined by selection in general. As a result the average arithmetic value of five groups of motives is counted (professional, informative or motives of development, utilitarian or pragmatical, socially important motives, motives of personal prestige). By results of complex inspection of educational and professional motivation three levels of development of motivation were allocated (high, average and low), and all students were broken respectively into three groups on expressiveness at them educational and professional motivation. As a result the low level of motivation was shown by 34 persons, the average level 62 respondents and at 24 students is revealed the high level of motivation of the doctrine. Studying of specific features of the identity of students was carried out by us by means of Kettell's questionnaire (13 PF). The 16th factorial personal questionnaire of Kettell (13 PF) – a contracted form which is intended for an assessment of degree of expressiveness of 13 personal lines offered by R. Kettell as model of structure of the personality. Adaptation of a questionnaire on Russian-language selection is carried out by A.G. Shmelyov, V.I. Pokhilko and A.S. Soloveychik. Styudent's t-criterion was applied to detection of distinctions in groups of students with high and low levels of educational and professional motivation. Apparently, reliable distinctions ($p < 0.05$ and $p < 0.01$) in the compared groups of students are revealed on the following factors 13 PF: C – emotional stability, E – dominance, H – courage, I – the hardness, Q – uneasiness, Q3 – self-checking, Q4 – intensity.

Factor "With" ("emotional stability"). Resistance to stress, an emotional maturity, endurance, working capacity are peculiar to students with the high level of educational and professional motivation, they are realistically ready, are better capable to follow requirements of collective, are characterized by constancy of interests. Students with the low level of educational and professional motivation are characterized by such qualities as low resistance to stress, emotional unbalance, changeability of mood and interests, irritability, fatigue, susceptibility to feelings, low tolerance in relation to frustration.

Factor "E" ("dominance"). At students with the high level of motivation authoritativeness, aspiration to independence, independence, ignoring of social conventions and authorities are shown. They act safely, vigorously, actively, aggressively assert the rights for independence and demand manifestation of independence from people around. Low estimates

of motivation are combined with conformality, inability to argue the point of view, lack of self-confidence and the abilities, dependence and subordination stronger, passivity, compliance.

Factor of "N" ("courage"). Students with the high level of educational and professional motivation show social courage, activity, readiness to deal with unfamiliar circumstances and people, they are inclined to risk, keep freely, is stirred up. Low level of motivation is peculiar to less confident in the forces, preferring to be in a shadow, differing in hypersensitivity to threat. Factor "I" ("hardness"). Strength of mind, independence are peculiar to students with the high level of educational and professional motivation, they rely on themselves, do not suffer senselessness. Low level of motivation is shown in dependence, insufficient independence, helplessness, hypersensitivity.

Factor of "Q" ("uneasiness"). Serenity, tranquility, composure self-confidence are peculiar to students with the high level of educational and professional motivation; with the low level of motivation – uneasiness, depressiveness, vulnerability, an impressionability.

Factor of "Q3" ("self-checking"). High level of educational and professional motivation is combined with self-checking of behavior, steadiness, good control of emotions and behavior, accuracy in implementation of social requirements, care of the reputation, attentiveness to people, is systematic and ordered by determination, ability to work, high strong-willed qualities, tendency to leadership; low level of motivation – with low self-checking of behavior, unbalance.

Factor of "Q4" ("intensity"). Slackness, tranquility, satisfaction and coolness are peculiar to students with the high level of educational and professional motivation; with the low level of motivation – intensity, a frustration, overexcitement, concern; the condi-

tion of frustration is caused by dissatisfaction of aspirations.

Conclusions

The received characteristics make a basis of a psychological portrait of the identity of the students possessing various types of educational and professional motivation and can be used in practice of psychological diagnostics and forecasting.

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THE ESTABLISHMENT OF TRIAL BY JURY IN RUSSIA IN SECOND HALF XIX CENTURY – THE DEMOCRATIC BREAKTHROUGH IN JUDICIAL AND POLITICAL SYSTEM

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In the given article we prove, that the court with participation of jurors is the best form of judicial proceedings and trials. This court was the best guarantee of freedom, equality and justice in the second half of the XIX century in Russia.

Keywords: guarantee, publicity, independence, spontaneity, continuity, principle, publicity, equality, freedom, competitiveness, court, jury, the judicial reform of 1864, Judicial charters of 1864

The jury – is rather a difficult form of legal proceedings, urged to protect freedoms, rights and legitimate interests of the accused people and the victims. This form of legal proceedings promoted the development of the fundamental principles of domestic legal proceedings.

Judicial charters, November 20, 1864, proclaimed such advanced principles of legal proceedings as: independence of people of any class, court independence of administration, an irremovability of judges and investigators, equality of all human beings before the law and court and some others. The process itself became competitive and public. The accused had the right for protection – the domestic Bar system was created. Jurors were involved to consideration of criminal cases, on which serious sentences could be imposed (the long term of imprisonment, the exile). The above mentioned attempts were developed in England, on which the work of courts of jurors was based. The same method was used before the revolution in Russia. Today, the work of courts of jurors is generally done everywhere in the same way and on the same principles.

Undoubtedly, the majority of scientists saw «the best guarantee of civil liberty» [1] in a jury. In the professor I.Y. Foynitsky opinion: the jury is «the best ornament and the firmest support of our new judicial system» [2].

Dmitry Aleksandrovich Rovinsky was one of supporters and direct participants in drawing up the project of Judicial reform of 1864, he also made the official proposal about the implementation of the jury in Russia. In February, 1862, he was attached to the commission as a lawyer, being in a position of the Moscow provincial prosecutor at the same moment.

In his note D.A. Rovinsky introduced the idea that, first of all, the general success of judicial reform is caused by the good structure of criminal court, as: « first of all, thanks to pub-

licity, the society will go to the criminal court, but not to the civil one, and on the basis of the seen there, they will make their general opinion about the judicial reform [3].

D.A. Rovinsky, criticizing the old court, refers to one case on which the court pronounced three different sentences, and draws a conclusion, that the basis of the old court and its relation to proofs are the following: judges just make decisions under the influence of their personal mood [3].

The implementation of the jury in Russia was more necessary than anywhere else, as nowhere else the historical life, as itself, didn't make such deep differentiations between various classes of society as in our country, that is why there is the whole abyss between concepts, customs and the way of life of the crown judges, belonging in the highest estate, and defendants from the lowest estate. They say, that the Russian people are too little developed to have a jury. But, this quality of the people, i.e. its backwardness, represents the basis to absolutely opposite conclusion, the matter is, that exactly such people are in need of the special guarantees in the court and judges who would quite understand it and were as close to the people as possible [3].

However, participation of the national element can more fully provide realization of all democratic transformations, realization of all principles of criminal legal proceedings and the judicial system. Just participation of the public in the criminal court can more fully eradicate bureaucracy, bribery and another negative phenomena, which were inherited in the former court in Russia.

In due time, N.V. Muravyev, the minister of Justice, concerning a question of a public element in the criminal court, claimed that it is impossible to do without the assistance of citizens, inhabitants in the field of criminal justice. Jurors, as the nonprofessional judges, called

from society and the people, divided government powers of trial of violators of the criminal law with judges [4].

There is no doubt, that the profession of the crown judge dulled an objectivism of the crown judges who were not completely capable to consider specific features of the case, that was compensated for the account of the entered public element. Thus, both the accusatory beginning and the attraction of a national element to criminal justice provided the correct judgment on the case and the correct administrations of justice, by division of labor between various factors, that certainly is possible to refer to the basic principles of a jury.

As L.A. Zakhozhy and A.V. Poshivaylova stated, the main arguments of revival of a jury were: its democratism, big collective nature in comparison with the other forms of participation of the people in administration of justice, objectivity, orientation to wisdom and justice of national representatives, inexperienced in a legal formalism, an exception of passivity of jurors at the solution of the questions raised before them, etc. But the most important, advantage of a jury was that the jury provides independence of judges [4].

A.S. Koblikov wrote: «It is unlikely to imagine such a situation when one judge is able to persuade twelve called human beings on a lot (jurymen) to declare a sentence, concerning the innocent, contrary to their belief or to justify a crime» [4].

The Minister of Justice N.V. Muravyev in the State Council stated, that only thanks to participation of a public element, such as assessors, in the criminal trial on equal with professional judges, we may reach the inaccessible possibility for the crown court to consider the case from the point of view of truth and justice. There is the beginnings of ingenuousness, verbal ability, publicity and equality of the parties are strictly observed in court. That is why, sentences are independent and objective that causes their internal authority based on inseparable communication between administration of justice by public authorities and by legal views of the people [5].

However, the perfect court is the one, where realization of the principles of criminal legal proceedings is possible the most fully. It is the court, which is quite independent and capable to resolve all arising issues and may inspire trust to its decisions and to its whole activity.

There are no doubts, that the crown court is more independent in comparison with the court of jurors. Independence is the basis of bases of Judicial reform of 1864 in Russia and the integral principle of a jury.

Jurors are independent both of the state, and of society. Jurors can't be renounced from their position; deprived of their wages or transfer to the other position. Besides, jurors are absolutely independent of professional judges, they confer independently and secretly. The opinion of public representatives can't influence on jurors. The number of jurors also allows them to remain quite independent, unlike professional judges, class or other national representatives [6].

It is necessary to refer wide collective nature and smaller risk of a mistake and a miscarriage of justice to the principles of a jury. Also, it is necessary to refer to the principles of a jury the following: democratism, nationality, removal bureaucratic and official spirit from the court, originally public legal proceedings, strengthening of the competitive beginning in the criminal trial and increase the prestige of legal profession. «For an objective assessment of proofs on the criminal case one needs big knowledge of life, not connected with the stereotypes which are developed in the court, integrity and moral purity. The juror should possess all these qualities» [7].

The value of the principle of democracy is defined by the correct application of laws and right judgment sentences as far as it promotes.

Any new form of the of court organization makes sense only when the task is set and there is a real hope for decrease in probability of miscarriages of justice, but not vice versa.

According to S.A. Pashin's opinion, introduction of a jury is valuable as it guarantees the right of an accused on protection, competitiveness and a presumption of a innocence. It is impossible to speak simply about these things, but they are in need of being realized in activities for consideration of criminal cases. Revival of a jury in Russia is «not only a procedural innovation, but it can and has to be considered in the context of the carried-out democratic transformations. At last, the jury excludes possibility of self-incrimination, biased expertise, illegal proofs or their insufficiency» [4].

The critics of the court with participation of jurors place emphasis on two important moments. The first is that jurors have no special knowledge for the solution of the question of guilt of the defendant. The second moment concerns the existence of a significant amount of verdicts of not guilty, by results of the rendered verdict by jurors. However, those, who point out the above-mentioned defects of the court with participation of jurors are deeply are mistaken, as the practice itself testifies only positive influence of participation of the public in the criminal court without the existence of special legal knowledge. Besides, the practice

also testifies to equal quantity of both verdicts: accusatory and guiltlessness, pronounced on the verdict of jurors and professional judges.

In our view, all sense of the jury is in its independent opinion from the court, in independence at decision-making, in lack of pressure from government and other public institutions. The decision of the most important question – guilty or innocent, made by society, not administration, – guaranteed objective and fair sentence and realization of all rights, provided by the legislation, and what is more important – the belief in justice and legality. All this was possible only thanks to the principle of division of labor between professional judges and jurors.

The second argument, which opponents of the court with participation of jurors apply, is the excessive number of the verdicts of innocence, pronounced in the end.

In the 90th of the XIX century N.V. Muravyev, the general prosecutor, in order to please the yard, formed and headed the commission on revision of the judicial right. The final goal of this invention was Abolition of a jury. But it was not fulfilled. At that time, A.F. Koni, the remarkable Russian jurist and the prosecutor of criminal and cassation department of the Senate, called on meeting of elite figures of justice: the senior chairmen and prosecutors of trial chambers. A.F. Koni, in his report before the audience, with figures in his hands broke the conjectures about corruptibility of jurors and about their excessive tendency to the verdicts of innocence. It became clear, that for some years the jury made 35% verdicts of «innocence» among the total number of verdicts, whereas in «courts without a jury» it was 32%. The divergence in 3% was insignificant in itself, that was explained by distinction of cases of different courts [8].

In one of the cases, which were in production of the senior chairman of the Kazan Trial Chamber, we have the correspondence according to the Ministry of Justice about: «bringing the data about the reasons of a large number of verdicts of innocence, in cases of crimes against an order of management and service, and the conclusions about drawing up the lists of jurors» [9]. In particular, K.I. Palen, the count and the Minister of Justice, sent the letter to the Kazan Trial Chamber addressed to the Senior Chairman with the request for an explanation of the reasons of so significant amount of verdicts of innocence in cases of crimes against an order of management and service, and, exactly, in cases of crimes on service, where from 68 defendants 40 was justified by jurors, and in cases of crimes against an order of management, where from 115 defendants 35 was justified by jurors.

By results of consideration of the above-mentioned letter, the following explanations were made: So significant amount of verdicts of innocence was explained by shortcoming or «by weakness of the proofs, when the belief of jurors in the valid guilt of the prosecuted couldn't be formed» [9].

Besides, Chairmen of the Kazan, Samara, Simbirsk district courts paid attention to the absence of fault of jurors in a justification of a significant amount of defendants, on the responsible and objective relation of jurors to the considered cases, and on the need of more successful maintenance of charge and granting more convincing proofs [9].

So, it is impossible to agree with those who declare low repressiveness of a jury as a shortcoming. Though, the crown courts submitted a little (and besides insignificantly) smaller percent of verdicts of innocence, the force of repression of jurors was alien to fluctuations, peculiar, for example, to the court with class representatives, and besides, it gradually increased whereas at more repressive crown court there was the inclination to some decrease. Jurors in Russia, even under the most adverse circumstances, were able to make and express sensible and quite independent opinion in a verdict. However, the main qualities of the Russian jury were lack of formalism, the careful relation to the case, the clever use of proofs in general, the use of indirect clues in particular, and extremely expedient attitude to recidivists and to juvenile criminals [9].

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GENDER ISSUES AND THEIR VERBAL EXPRESSION IN N.GAIMAN'S NOVEL "NEVERWHERE"

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The article analyses one of the important aspects of gender studies: peculiarities of male and female verbal behavior in the outstanding bestseller of the contemporary English writer – Neil Gaiman. He proves that the gender discourse is influenced by a number of socio-cultural features and that the resurgence of masculinity in the modern world is achievable only through escapism. In the universe of fantasy a man can acquire his own voice, retrieving the half-forgotten but significant roles of a warrior, hunter and leader.

Keywords: masculinity, escapism, feminism, gender, verbal expression

Currently the verbal behavior strategies have become a central part of gender studies. The content of the statements, and, more importantly, the hidden meaning of the uttered phrase, define the essence of our ideas about gender and relationships between the sexes. There is no doubt that they are also influenced by socio-cultural and historical aspects.

The second wave of feminism in the United States of America (1960–1970) created a new perspective on language. However, at that time, researchers were more interested in the problem of reflection of discrimination against women and the domination of patriarchal values in the linguistic system. For example, the fact that the lexeme *girl* was used in relation to a woman was seen as an example of a derogatory assessment indicating a lower social status of the nominated object.

At the end of the XX century all that was mentioned above led to the emergence of gender-neutral terminology, for instance, to indicate the occupations: *police officer* instead of the *policeman*. This period is marked by the beginning of the studies of the effect of the sphere of activity on the use of groups of terms by representatives of the opposite sex. In particular, the vocabulary associated with the preparation of food, especially desserts and fruits, is supposed to be the prerogative of women. While the men's discourse is dominated by linguistic units, indicating the food consumption and words connected with violence.

Thus, this discussion of the XXI century has gone so far as to argue the possibility of the use of the word *marriage* not only in relation to the union of opposite-sex individuals in European countries and the USA.

The content and form of expression is important for self-identification. Linguists have paid attention to the pronunciation of vowels, tone, rhythm, tempo and other phonetic features of speech. Researchers did not disregard

other levels of language: lexical (the frequency of use of terms, obscene (taboo) words, slang, euphemisms); grammatical and syntactical (sentence structure, a choice of one or another form). Much of the early research work on the problem of gender-based discourse gave rise to a lot of unfounded stereotypes.

The difficulty in the identification of strategies of verbal behavior is caused by different factors. First, people often deliberately change the communication strategy by choosing a role which is not peculiar to them in everyday reality in order to meet the expectations of the listener or interlocutor. Secondly, the language units cannot be considered in isolation. It is essential to consider them in social situations of light flirtation, humiliation, domination in the dispute. One should take into account social factors that are much more complex than a simple count of the number of various forms in the "female" or "male" speech: how many times he said the word *dude*, or she uttered the lexeme *sorry*.

An important step in the XX century studies was the distinction between masculinity as a biological and as a gender category, which is the result of interaction of cultural, psychological and social principles. It has alternative components and a hierarchy of the main components.

The culture of the XXI century, especially mass media, creates in its products (books, films, articles and photos of glossy magazines) an image of the ideal masculinity, which is supposed to be followed by every one. Accepting this model, a man shows his agreement with the existing gender stratification of society.

V. Seidler in his work on the manifestations of masculinity in thought, language, and sexual relationships, says about the crisis of the phenomenon in the modern world: "We are left as observers, rather than participants, in our own lives" [5, 131]. We cannot but agree

with the fact that new technologies, changes in the value system limit the scope of application and manifestations of the “ego” for a man. The experience of masculinity is realized only in the surrogate form: a man takes on the role of a pack leader in online games or risky business projects. In this case, he uses the “language of action” [5, 133], when the purpose of the interaction is to prove something to somebody.

Seidler identifies as a main component in a hierarchical masculinity system such traits as independence (“showing we do not need anything from others”) [5, 141]), excellence and joy of challenge (“superiority over our wants, desires, emotions and feelings”) [5, 124]. Modern man compensates for the lack of adrenaline and quenches the thirst of domination in society participating in extreme sports and in historical reconstructions of medieval battles. For adventurers like these the Hollywood film industry has created many examples to follow, from the heroes of westerns to fantastic creatures, saving the world from one more disaster. All these methods of self-realization are only poor imitations of this activity, a pathetic semblance of life, because they have neither real danger, nor struggle in which the winner is the one who is physically and mentally stronger.

Overcoming the blurred boundaries between masculinity and femininity, the crisis and the revival of masculinity are in the center of Neil Gaiman’s novel “Neverwhere”. The protagonist is Richard Mayhew. His surname comes from French and means “Gift of God”. The personage gradually comes to understanding what he really strives for: independence, realization of the natural potential aggression (it is no longer necessary to suppress it, guided by the rules of modern etiquette), i.e. all the necessary elements of masculinity.

The storyline of the novel recalls the story of a young knight’s road to manhood. The reader can see how he leaves home, and is instructed by friends before parting, dreams of “great” future, and even meets with the “prophetess, Sibyl” – a homeless old woman who predicts: “You got a long way to go...” [4, 5]. This is the way to the discovery of the God’s gift in a person, acquisition of masculinity.

Richard Mayhew’s fate in the novel is shown in several different ways: in the form of real existence in *London Above* and adventures in *London Below*. This young man goes through a few turning points. For the first time he experiences a shock when he realizes that in his *London Above* nobody notices him (taxi do not stop, ATM does not accept the card, ex-girlfriend does not remember his name): “It’s

like I’ve become some kind of non-person” [4, 31]. This metaphor suggests that in fact he, as a man, has long ceased to exist. He is taken into account neither by his boss nor by his landlord, when he is evicted. He is an invisible, amorphous, sexless creature, causing contempt.

The dependence of the young man from the others is expressed in the text of the novel on the lexical and grammatical level. As the main characteristics of the masculine verbal behavior Seidler emphasizes restraint in the manifestation of a number of emotions: “mask emotions other than anger and hide quests for intimacy with others” [5, 141]. Richard Mayhew at the beginning of the story, on the contrary, is very emotional in the statements. This can be seen in a large number of parenthetical structures, signaling the uncertainty (“I mean”, “I think”), incomplete sentences which show confusion, with a large number of homogeneous members forming the gradation (“I could not get a taxi this morning, and then the office, and the Tube and – ...”). He kept apologizing for something in front of his colleagues and his girlfriend Jessica: “I’m sorry”, which is also characteristic of the “female” speech. In a moment of crisis, he rushes through the city in search of a kindred spirit, which would not ignore him, repeating his own name, desperately urging others to attract their attention, to hear him: “Listen”, “Look”, “I need to talk”. All ends in a helpless “I do not know what to do” [4, 35].

J. Coates sees the masculine purpose of the communication as the search for recognition among the “tribesmen” [1, 2] and building a hierarchy [1, 141]. In describing the role of Richard in a relationship with Jessica the author uses the verbs “trail”, “accompany” (which is used twice), the form of the passive voice “had been awed” [4, 9], which indicates the low status of the personage, he is on the very last step of the social ladder. The girl in this situation dictates the rules of the game, trying to make him fit the model of a “perfect guy”. She chooses for her man books, clothes, tells him what to do to succeed and when to laugh, when to be quiet, and confronts him with a choice. Her activities are aimed at the transformation of the object. All the verbs she uses are only in the form of the active voice: *gave*, *told*, *would pick out*. Complete loss of independence becomes even more evident, as Gaiman uses words like *drag*, *tugged into motion*, when Jessica takes Richard to the restaurant [4, 14]. To create a picture full of sarcasm the author shows how a girl drags the young man, like a tugboat pulls a heavy barge. Only her speech contains modal verbs

with the imperative meaning of categorical obligation: “he *should* wear, *must* make sure, laugh, dial 999, you put that girl down”; ob-scene language: “You are an *idiot*” [4, 15].

The whole stream of instructions from his companion makes contrast with the male personage’s sentences containing two or three words: “She’s hurt”, “Look”, “She’s bleeding” [4, 15]. As he has to repeat everything twice, it can be concluded that the “companion” is absolutely deaf to his point of view and to the needs of others. Thus, Gaiman underlines the lack of dominance in the male personage’s verbal behavior. Aggressiveness and brutality as masculine features appear only in the woman’s discourse.

Substitution of roles continues further in London Below. The name “Richard” (Richard) goes back to the proto-Germanic roots *rik – “ruler” and *harthu – “hard” (stern ruler), but the main character is not a Leader, but a Follower in the world below – a weak, sometimes hysterical, lost in his strivings. The role of a leader again belongs to a woman. This is a guide in the dark city – teenager Anaesthesia, bodyguard – militant Hunter, the leader – Door. Even a rat, which scours the sewage, is more respected by the strange locals than Richard.

One of the symbolic scenes takes place when Richard talks on the phone with Croup. First, in response to the killer’s words he *threatens* to call the police. Croup remarks: “... but I’d hate you to think we are making a threat ... We’re making a promise” [4, 38]. Croates attributes “promise” to so-called “trouser words” (masculine words) [1, 131]. It’s not just the intent but understanding that every action or threat should be carried out. The result must be achieved.

Up to a certain point almost all the other male characters in the novel represent a grotesque caricature of the archetypes traditionally opposed to femininity. The Earl is a half-mad old man, who almost lost his memory, the lord, riding with his retinue of elderly knights on the subway; the killing machine – a half-animal Croup, pulverizing with his teeth the statue of the Tang Dynasty into powder. At first glance it seems that the only positive character is Door’s father, as for the sake of his memory she decided to avenge the killers of the family. However, he himself appears in the role of a victim because of his naivety. It is symbolic that in the suicide video message to his daughter, he does not speak in his voice and Vandemar’s voice helps to trap the girl.

Every crisis in Richard’s world view is indicated by Gaiman in the images and symbols

that are associated with the urban environment. These are bridges, the station BLACK-FRIARS, District metro lines, the maze, at the end of which there is the bloodthirsty monster; the doorway at the end of the novel. All these man-made objects imply the choice of a situation change, and the link between the worlds.

The most important turning point in Richard’s life – the rejection of “powerlessness, meaninglessness and uncertainty” [2, 6] – occurs during the test at the station of the London Underground. It turns out that the meeting with himself is still much worse than a host of monsters. It is difficult to reconcile with the one who is “the-other-Richard-who-wasn’t-him” [4, 112]. The second self cannot be deceived. The apotheosis of Richard’s depression is the moment of epiphany when the station advertising signs he sees show some suicidal slogans: “BE A MAN-DO YOURSELF IN. HAVE A FATAL ACCIDENT TODAY” [4, 114]. Racing through the dark tunnel, the train can stop his pain in an instant. However, the quartz bead in his pocket, the only reminder of the deceased Anaesthesia, reminds him that the way of the warrior is thorny and full of suffering, and he should go for it, gritting his teeth in pain. Suicide in this case is the simplest, but wrong way to solve his internal problems. So Richard fearlessly enters the train full of dead men, sighing: “I think I got through it...” [4, 115]. Hence it is logical that he rejects self-pity on the part of the abbot, saying: “- I am not ... not the poor creature ...” [4, 327]. We see that the personage of the novel has already got rid of the role of the victim. He is to take another step and see who he really is: “who am I?” [4, 115].

Fight with the Beast in the maze is crucial to the determination of Richard. On the way to the angel’s dungeon Richard is in the company of two men: Hunter and Marquis. He was the only one completely unarmed. The Marquis has a famed for centuries long bow, which had brought so many victories to the English in the Hundred Years War, as it punched steel plate armor of the French easily. The Hunter has daggers and a spear, for which she had committed treason. Weapon has always been sacred to a warrior. It was given a name and was decorated with ornate patterns, it was a desirable award for valor, and was placed in a grave mound after a leader’s death. Hunter treats her weapon like something precious: she calls the knife by a feminine personal pronoun (*she*, *her*). It is more important for her than a human life, loyalty, love. That’s why not the Hunter but Richard, who makes it to the victory over his childhood terror, for the sake of saving the

lives of those who were dear to him. He carries out an ancient magic ritual without any disgust; the blood of the defeated beast helps him to find a way out of the maze.

There is a final transformation of a miserable spineless creature, bored in the limited space of the London apartments and offices, into the Warrior: "... So now you're the greatest hunter in London Below, The Warrior" [4, 143]. His head is throbbing with some melody of an ancient song which Gaiman has chosen as the second epigraph to the novel. The soul of the hunter, warrior is free from the confines of progress and stereotypes imposed by modern society: "he could be anyone at all-able to try on any identity; ... And in waking he found that he was Richard Mayhew, whatever that was, whatever that meant" [4, 151]. It seems that in this way the plot is "looped", having exhausted itself, if not the next, full of bitter irony, dissonant note in this majestic hymn of victory, – Richard's knighting ceremony by the Earl. Firstly, the comic effect is created by the description of the situation: the "action" returns to the same London subway car that immediately detracts us from the solemnity of the occasion; secondly, it's in the tone of Earl's speech: "Sir Richard of Maybury With this knife I do give to you the freedom of the Underside May you be allowed to walk freely, without let or hindrance and so on..... and so forth et cetera blah blah blah, "he trailed off vaguely" [4, 155]. The following "blah blah blah" completely destroys the gravity of what is happening, turning the medieval saga into a comic.

Gaiman shows us that history takes the form of a spiral. So if Richard in his new identity stayed in London Above, having become a more confident person, whose opinion is respected, with a new, higher status, he would again be deadlocked in the dull monotony of everyday reality. Anyway something constantly troubled him not letting him unpack his possessions in the old apartment, making him ask "strange" questions.

The verbal behavior of the protagonist changes radically. During the last meeting with Jessica he makes reticent, brief remarks "no", "yes". However, the reader understands

that the situation is totally different compared with the way it happened in the first chapters of the novel. Here Richard is full of confidence, categorical; he dominates due to significant pauses before formulating his thoughts. The protagonist has no doubt that he is right. Now he dictates how to act: "You keep it, Jessica" [4, 162]. His masculine verbal strategy is even more evident when his former girlfriend turns to a typically feminine manner of a conversation. She uses the subjunctive mood ("well, if things worked out, well, perhaps one day you'd give it back to me", modal verbs, and lexemes with the meaning of the possibility of committing the action (may, perhaps), fillers (well, ...) and tag-questions ("It's not important, though? Is it?") [4, 162], demonstrating her weakness and vulnerability.

Thus, Gaiman sees the crisis of masculinity in the modern world, since it is no longer given as a gift but requires constant confirmation. On the pages of the novel we see the tragedy of a failed personality: an amorphous, invisible being, worthy only of contempt. However, according to the writer, masculinity should not be seen as some kind of an "anti-femininity" [3, 3]. He is inclined to believe that the acquisition of his own voice for the man at this stage of development of society is possible only through escapism, flight into a different reality. For Gaiman's personage the platform for dominant masculinity is a fantastic world London Below, where he can realize himself as a hunter, warrior and leader. The awakened masculinity leads Richard to cut a door in the wall, frantically pound his fists on the brickwork, begging to let him back to Neverwhere – into the world of battles and desperate acts, real feelings, defeats and victories.

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STEREOTYPICAL LAYER OF LINGUISTIC AND CULTURAL CONSCIOUSNESS (WITH SPECIAL REFERENCE TO RUSSIAN)

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The article explains the reflex nature of the stereotypical layer of linguistic consciousness, which is confirmed by the modern French linguist J. Dyuren's stereolinguistic approach to the phenomena of language. It is also proved that the stereotype layer may be used by speakers as a structural basis generating different communicative meanings in the process of verbal communication. Non-native speakers of a language cannot decode emotionally conditioned meanings of stereotypical statements without background knowledge. The interpretation of semantically independent expressions cannot be separated from culture.

Keywords: language, "linguistic and cultural" consciousness, stereotypical layer, stereotypical statements

As far back as in the early 50s of the 20th century Émile Benveniste, a French linguist, drew his attention to the speaker's ability of the language acquisition in its application process. V.M. Shacklein at present claims that, "language represents the language of the speaker, as the tool of his actions, the practical attitude towards the outside world and the means of influence upon people" [18, 507]. However, language is social in its nature, "... the origin of language and its formation never belong to an individual, it's a social phenomenon. Linguistic ability is deep in everyone and is put into practice only as a means of communication" [5, 381].

Language functions in the social environment, and the social factors influence on its function and development. "Language serves society in all its spheres; it embodies the reflection of public consciousness, reacts on the changes in all the spheres of social life and, eventually, is created and formed by the same society. Moreover, in social life people treat the language and the same linguistic phenomena differently and, by giving preference to one, they refuse the others" [20, 11].

Frequency is a social factor. The frequency of this or that constructions and word – formations is the fact of social preference. Namely, the frequency of the usage of the ready reproducible linguistic units in their constant combinations and constant meanings have led to the formation of speech stereotype/standard or as for V. Krasnikh, to stereotype-presentation [see 8, 270].

The speech behavior of the speaker is defined by "a complex situational-thematic factor" [10 2003, 56]. The situations and aspects of human interaction in their everyday life are often repeated and that is the reason that they are stereotyped. In their turn, the reiteration and stereotype nature of the real-life situations

have led to the formation of the complete stereotype utterances which are known in linguistics as sentence-formulae (O. Jespersen), pattern phrases (L.P. Yakubinskiy), phraseological units (P.A. Lekant), indivisible (V.Yu. Melikyan) or **stereotypical statements** (A.M. Peshkovskiy, N.V. Cheremisina, L.B. Matevosyan).

From the other hand, the frequent use of the given "expressions" is determined by the fact that as complete phrases they compile "the assortment of lexicographic and phraseological thinking" [16, 59] or inherent vocabulary of people to express certain ideas. They co-exist in the native speakers' consciousness as complete, preliminary determined forms where the speaker makes a choice depending on the tasks, conditions and communicative situations. In other words, the stereotype-situation predetermines the stereotype of behavior and the stereotype presentation, i.e. the speech stereotype which is kept in "the human consciousness in the form of a **frame-structure**" [8, 270]. Thus, the stereotype-situation "transport-ticket" gives rise to the stereotype behavior: "asking the nearest passenger" *to punch the ticket/pass the ticket*, etc... [see 8, 270].

Linguistic consciousness is multifoliated. V.V. Krasnikh distinguishes the following layers in linguistic conscience:

- 1) myth and lyric;
- 2) stereotypical;
- 3) informational;
- 4) metaphoric.

"The stereotypical layer is performed particularly by stereotype-presentations both as images and situations connected with these images" [9, 121].

Therefore, the stereotypical layer along with myth and lyric, informational and metaphoric layers is **the component of the structure of linguistic or "linguistic-cultural" (N.V. Ufimtseva) consciousness.**

Thought stereotype presumes social structure and is reflected in human behavior, particularly, in discourse behavior. As a rule, the discourse behavior adequately recreates the world around us, particularly, a certain social structure with a certain type of thinking.

The emergence of stereotypical statements is conditioned by language pragmatics, its direction towards communication which is much in demand in the required standard. The role of stereotypical statements is vital in the process of communication. In "About the Nature of Human Communication" V.M. Sokovnin states, "Evidently, the standardization as the process of stereotype establishment in the subject activity and human relations is one of the general principles of the construction of the organized social systems" [21, 105]. The same idea is emphasized by V.P. Levkovich, "In order to function as a whole, as a complicated social system, society should establish such frames of human behavior where it becomes uniform, stable and frequent" [13, 212].

At present, stereotypical statements have been elucidated in terms of psycholinguistics and have been substantiated in "stereolinguistics". The stereolinguistic approach is such a method to linguistic phenomena which is based on the interlocutor's perception of the utterance depending on the distance between the latter and the speaker. According to stereolinguistic approach, a human lives in four concentric spheres. The founder of stereolinguistics, the French linguist J. Dyuren, refers these spheres to cognition and names them cognitive sub worlds [see 3, 275–276]. The first sphere is the sphere of singular or actuality. The second sphere is the sphere of privacy as well as non-actuality, the usual. This cognitive sub world is characterized by the speaker's habitual, routine behavior. The third sphere is the sphere of universality. This huge sub world colossal in its size lays claim to universality. J. Dyuren calls the fourth, zero sphere which is the nearest to the human body, a situational sphere [see 3, 275–276].

However, J. Dyuren himself, taking into consideration the heuristic nature of his approach, finds that "... due to it, the solution to different issues in the sphere of human phylogenesis, ontogenesis, psychology and linguistics can be newly interpreted" [3, 277].

Namely, indivisible stereotypical statements, such as *Fat chance! – Еще бы! You bet! – Держи карман шире!* led Dyuren to the discovery of the fourth, zero sphere, the closest to the human body. "Time and space of the zero sphere are narrowed down almost to a dot; the space is the place occupied by the given essence or the bearer of the given feature, and its

immediate proximity; the time is the given instant without any conscious past or future. The human being who has just felt the button under his bare feet, has rapped out and mouthed curses gives an idea about the speech (and non-speech) behavior within zero sphere" [3, 275].

While emphasizing the zero sphere of cognition, J. Dyuren is guided by the position of the French psychologist Henry Wallon, who sets off practical mind against the discourse or speech mind [23, 264–265]. H. Wallon provides the following example as an illustration of the practical mind. The chimpanzee sees a hanging banana, cries out and flings its arms. Then it suddenly drags the box, climbs on it and grasps the banana. But if the banana and the box aren't in the field of its vision at a time, it does not make the right decision. There are species who cannot find a way out at all.

Although the human conscious vocabulary possesses stereotype expressions as complete sentences, they come to the surface of the memory only in certain situations (the situation carries out the function of the box in H. Wallon's example). Some people do not recall them at all, since the capacity of the operative memory of the human isn't large and varies in different people. **Stereotypical statements are arbitrary reactions on the external stimulus, which is a situation. The situation here has a conditional reflex function. Thus, linguistic consciousness is multilevel and the reflex-driven stereotype level is considered to be one of its structural supports.**

One of the essential peculiarities of human character is the self-acting behavior in certain situations, i.e. without preliminary consideration and often against objective logic. However, the automation in human actions is not only and so much the corollary of the biological stipulation as the result of the social ascendancy over the individual. The biological factor here embodies "the reduced socialized form" [15, 121]. The stereotype of thought and speech behavior is apparently conditioned by the fear of people to stay in "isolation".

The main difficulty of any teaching, including language teaching, is to develop and evolve the right skill to remember the claimable rule. Despite the specific nature of certain languages, linguistics defines them using principally the same model. The similarity of such models is not commissioned only with a priori and deduction, but with the specific material of different languages. Wilhelm von Humboldt considers that "the principle aim of comparative linguistics is the thorough and circumstantial research of different methods through which different nations solve

the universal task of the creation of language" [5, 47]. He also states that "not only the elements of the language, but the languages themselves often obey the rules of general analogy" [5, 348].

In our opinion, the spoken standard is one of such analogies. The comparison of languages "by analogy with all conceivable rules" [5, 346] will help to comprehend and reveal the mechanism of the language and thinking interaction in the process of speech activity.

It is important and expedient to reveal and describe routine and emotional life situations and, consequently, speech situations in mass communication, since each life situation is guided by the formation of speech and the availability of the list of the communicative units serving for the given situations practically to help the teacher in foreign language teaching.

As an example we will provide the comparison of the following greeting expressions in the Russian, Armenian, English and Japan languages. The first three languages are in full conformity: some greeting expressions cover broad situations (Russian: *Здравствуй (-me)* [*zdrastvui (-te)*], *Привет* [*privet*]; Armenian: *Բարև (ձեզ)* [*barev (dzez)*], *Ողջունի* [*vogd-juin*]; English: *How do you do! Hello!*) and temporary situations (Russian: *Доброе утро* [*dobróie utra*], *Добрый день* [*dobryi den*], *Добрый вечер* [*dobryi vecher*]; Armenian: *Բարի լույս* [*bari luis*], *Բարի օր* [*bari or*], *Բարի երեկո* [*bari eréko*]; English: *Good morning, Good day, Good evening*). According to A.A. Akishina and K. Kamogava [see 1, 9–24] Japan greetings are namely distinguished by situational fraction relating to the situations of the speakers' location, for example the greeting expressions while entering and exiting the building are different.

The greetings in the Russian, Armenian and English languages are differentiated according to diverse styles: formal, neutral and informal. The greetings in Japan differ due to the level of politeness (informal familiar and respectful).

Each nation according to its national and cultural peculiarities has its world outlook, attitudes towards life being based on "the language frame" [25, 163]. R.B. Sabatkojev states, "Caucasian nations have strictly regulated forms of addressing, greeting, parting, expressing condolences used to express the benevolence, respect and sympathy towards people. Some of them to a certain extent differ from the corresponding Russian speech formulae" [17, 472]. N.B. Mechkovskaya mentions, that "The category of politeness contains seven levels in Korean:

- 1) deferential;
- 2) respectful;

3) the form of politeness characteristic of female speech;

- 4) polite;
- 5) personal;
- 6) familiar;
- 7) protective.

Each form of politeness has its own set of grammatical, word-building and lexical markers. There are also grammatical and lexical synonyms which mainly differ by various levels of politeness" [14, 60–61].

According to Worf's terminology these two "linguo-cultural types"¹ belong to the European and Eastern standard.

Stereotypical statements are combined in the groups based on thematic unification and similar situations, the so-called **thematic-situational groups**. Separate thematic-situational groups are combined in larger groups, as "Urban stereotypes", "Speech etiquette", "Keeping contact", "Expressing different emotions" constituting the essence of the lively speech of the Russian language. The last group is perhaps the most interesting and less examined.

Emotionality is considered to be the pronounced stress on the feelings and their free expression. According to T. Kozlova [7, 232] expressivity is a common feature of the Russian culture of communication and according to the surveys conducted by A. Wierzbicka [24, 33–34], Russian speech is characterized by intensity of emotions and abundance of linguistic means to express emotions and emotional overtones.

In accordance with a Harvard study of the Russian national character, the Russians are considered to be "expressive and emotional", they are characterized by "general expansiveness", "easiness in expressing the feelings", "impulsivity" [2, 141]. The Chinese scientist Li Inann, considers that the Russian national character "strikes out for being irrational, emotional, affective and polar <...>. The specificity of the Russian character seems to involve a combination of inconsistent features expressed in a bright, affected way with sharp and unpredictable changes of emotion and mood" [6, 153].

J. Dyuren considers emotions to be physiological reactions that occur in usual real-life situations and are "either simply a shout or an utterance of one or several words" [3, 278]. Intonation (a manifestation of the emotional and expressive function of speech) is used to express the speaker's emotional state as well as

¹ The concept is suggested by B.M. Gasparov [4]. He distinguishes between Eastern and Western European standards. R. Kipling's famous words "Oh, East is East, and West is West, and never the twain shall meet" immediately come to mind.

his/her attitude to the content of the utterance (approval, reproach, mockery, etc...). J. Dyuren claims, that "intonation is usually more important than the segmental, lexical and grammatical structure of the utterance" [3, 278].

Russian colloquial speech is full of polysemantic utterances with various meanings. As a rule, the polisemy is developed when the speaker emotionally reconsiders the utterance, which is possible, according to Leontev due to "the double life of the meanings" [12, 136]. On the one hand, meanings are included in the social memory of the society; on the other hand, they are an integral part of the inner world of any human being [11, 49]. Such meanings (that are implicitly contained in the expression) are differentiated in the process of perception of meaning through intonation.

Hence, the Russian expression *I have no time for you (Mne ne do tebya/bas)* means, first of all, that the speaker is busy. The meaning of this expression can be interpreted in at least two ways:

- 1) *I am very busy now;*
- 2) *I am sad now*, with the general meaning, ... *that is why I cannot spend time with you (talk to you, help you, etc...).*

In certain contexts the expression *I have no time for you (Mne ne do tebya/bas)* can express "dissatisfaction". For example,

[Viktor:] *Go away, Afonya, I have no time for you...* (Uydi, Afonya, *ne do tebya...*) (A. Arbuzov, *Irkutskaya istoriya*)

Or the *Big thrill/deal! (Podumaesh!)* expresses, first of all, something that does not deserve serious attention from the speaker's point of view. Cf.:

– *He is injured! (– U nego travma!)* – *Big thrill! A small bruise. (– Podumaesh, nebolshoy ushib.)*

– *I have received a watch as a gift! (– Mne chasi podarili!)* – *Big thrill! And I have a tape-recorder. (– Podumaesh, chasi! A u menyia magnitofon est'.)*

The expression *Big thrill/deal! (Podumaesh!)* implies disagreement with the interlocutor's opinion. In a certain context it can express "discontent". Cf.:

[Viktor:] *Old chap, Irina Sergeevna called again. Left a message that she is waiting for your call.* [Tumanskiy:] *Ok. What? Irina Sergeevna?* (Abruptly) *Mind your own business!* [Viktor:] *Big thrill! You did ask me, and now – "mind your own business".* (A. Afinogenov, *Mashen'ka*)

[Viktor:] *Starik, opyat' zvonila Irina Sergeevna. Prosila peredat', shto ona zhdyot tvoyego zvonka.* [Tumanskiy:] *Khorosho. A? Irina Sergeevna?* (Rezko) *Ne lez' ne v svoyo delo!* [Viktor:] *Podumaesh! Ti sam prosil, a to – "ne lez'".* (A. Afinogenov, *Mashen'ka*)

Native speakers easily perceive implicit meanings. But foreigners often do not understand such meanings and that is the reason why this fact should be focused on when teaching Russian to foreigners.

The following joke justifies the urgency and the necessity of the present research: "A Russian woman, an Englishwoman and a Frenchwoman share the same hotel room. In the morning the Frenchwoman discovers that her shoes are lost. She does not speak Russian, but speaks a little English. The Englishwoman speaks a little Russian and French. The Russian woman does not speak any language except Russian. The Frenchwoman asks the Englishwoman to find out if the Russian has taken her shoes by mistake, and the Russian replies: *Hello, I am your aunt (Zdravstvuyte, ya vasha tyotya)*. The Englishwoman translates: *She says good morning and says, that she is your aunt*. The French is outraged: *I have never had any relatives in Russia. Let her give my shoes back!* Hearing the translation the Russian replies *A fat lot of use her shoes to me! (Ochen' oni mne nuzhni!)*. The English translates *She needs your shoes badly*. The French is confused: *But I also need them!* After this translation the Russian retorts: *Horseradish I give her back! (Khren ya ey vernu)*, and the translation follows: *She says that she will give you some vegetable instead...*²

This dialogue includes such stationary sentences as *Hello! I am your aunt, A fat lot of use her shoes to me, Horseradish I give her back! (Zdravstvuyte, ya vasha yotya; Ochen' nuzhni oni mne! Khren ya ey vernu!)*, which are used in daily Russian speech both in direct and figurative meanings (*Hello* – as a "greeting" and as a "surprise"; *I am your aunt* – in direct meaning and as a "surprise-contradiction"; *A fat lot of use her shoes to me!* – as necessity and vice versa; *Horseradish I give her back* – in the direct meaning and in the meaning "I will give you back nothing" The homonymy of the given expressions is the result of the emotional reconsideration by the speaker. The linguist-practitioner should consider the task of describing the homonymous expressions while teaching Russian as a foreign language, because, as we can see, homonymous expressions very often hinder and even, in some cases, endanger the communicative process: the speakers cannot understand each other in a right way.

² There are no equivalents in English for stereotypical statements *Zdravstvuyte, ya vasha tyotya* and *Khren ya ey vernu*. To avoid misunderstanding, word for word translation is made.

The translator in the joke did not understand the Russian expressions in a right way (if we exclude the factor of the translator's "deafness" to intonation). The translator did not know that these expressions have a figurative meaning in Russian, i.e. the accumulative function of the language, the function of accumulation of the public experience and knowledge equals zero. The next reason is that the given meanings do not exist in her native language: the given expressions are used in the mentioned meanings neither in French nor in English.

Anna Wierzbicka mentions that the Anglo-Saxon culture disapproves of emotional behaviour [24, 41]. "When comparing English language with Russian it is particularly interesting to note that the Russian language [...] particularly attaches much more attention to the emotions and has the copious vocabulary of lexical and grammatical expressions to distinguish emotional expressions" [24, 44].

Communication and mutual understanding are facilitated by the ability to feel and perceive all emotional and expressive shades of meaning, to choose the right expression in various situations and to find the correct intonation. The expressions set the style and determine the tone of the dialogues.

Like other linguistic units, stereotypical statements are less informative than non-stereotypical statements due to their frequency in speech. However, this fact does not diminish the significance of their research, since stereotypical statements are the result of the action (manifestation) of such a linguistic function as the function of acquisition of public and historical experience (coined by A.A. Leontyev) or the accumulative function, i.e. the function of accumulation of public experience and knowledge (coined by V.A. Avrorina)³. Foreigners cannot decode emotionally conditioned meanings of stereotypical statements without background knowledge.

The interpretation of semantically independent expressions cannot be separated from culture. V. Telia's [22, 226] "...the idiom is another culture" is true for stereotypical statements whose content is not motivated and consequently is not transparent and reflective. The stereotype layer, which is considered to have a reflective nature and to be the structural basis of linguistic consciousness, is included in linguistic and cultural consciousness of the speaker. However, it is not reflected in the inophones' consciousness. In our opinion, this is a field of study to be considered by Communicative Linguistics, or more precisely, Communicative and Cognitive Linguistics.

³ About the functions of language see 19, 10–11.

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