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*Materials of Conferences***FEATURES OF THE CREATIVE METHOD  
FOKINE IN THE CONTEXT OF THE  
ARTISTIC HERITAGE OF XIX-XX  
CENTURIES**

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Are examined the not investigated aspects of the creation Of m.Fokina, connected with the region of the plastic skills: by drawing, by painting, by sculpture, that showed bright action on the addition of choreographic means. Is analyzed the designation of baletmeysterskikh sketchings - explications, graphic figures, sketches of suits, sculptural work of master. Are examined the visual special features of the creation Of m.Fokina, its ability to think by abstract and real categories. On the materials Russian and foreign museum and particular collections, and so archive sources is emphasized the synthesizing role of choreography and its value in the artistic process of boundary XIX - XX of the substances.

There is great interest for contemporary art study in Russian ballet master M.Fokin's personality. Its skill - the unforgettable and bright page not only in the history of choreography, but also entire cultural heritage of boundary XIX - XX of the substances the Ballet master- reformer of large intellect and uncommon, bright thinking, M.Fokin always strove for the comprehension of the new forms of ballet work and new conceptual approaches in the theatrical solutions, which give the space of the creative fantasy, which maximally reveals the ideological content of plays. It solidly decided to forego the ballet stencil and for long erected its own concept of means. Hence constant discovery itself and peace, the neostanovimoe tendency toward the creative improvement. Constant deepening of analytical artistic thought and the simultaneous growth of its generalizing force, scale of historical joinings and revealed interrelations - it is such one of the most important tendencies of the artistic process of end XIX - the beginning XX of the substances. It distinctly revealed itself in "Russian seasons" f S.Dyagileva 1909 - 1929 yr., where choreography of all subject layers and directions was represented. [1.] Not without reason many-sided fokinskiy talent with the inherent in it variety of ideas and genre forms, the entertainment plastic of dance they caused this deep resonance in all forms of skill, and the depictive heritage of M.Fokina itself is so considerable which deserves a special study. The depictive region of the creation of choreografa is less known, barely investigated; however, it is valuable for us, since precisely it shows that depth, originality of thought, constant search for ways and inspired craftsmanship of the author. [2.] The open in the archives documents in the museum, in essence in the particular foreign meetings

of sketching, the picturesque and sculptural works of M.Fokina were created not for the completion of general cultural luggage, but they were directly connected with its personality and its choreography. [3.] The features of descriptiveness in turn express themselves extremely varied: both in many internal semantic "cohesions" and in the mutual enrichment of artistic forms. Therefore the principally important position of our article is the fact that a study of the named problems is separated not only on the material of depictive skill, which is regular, but it is insufficient; we emphasize the synthesizing role of choreography and its value in the artistic process. Thus, the problems of the reciprocal effects of skill in the creation of M.Fokina is examined complexly in entire its variety.

It is possible to isolate four directions in the depictive creation of M.Fokina: baletmeysterskie sketchings and explication to the plays, the graphic figures, connected with the thematics of concrete choreographic settings, picturesque and sculptural self-portraits, the sketches of suits. Moreover there is no dividing line between strictly the labor of ballet master- artist and his existence generally: the work on one or other setting or another - this is the specific moment of depictive- expressive vision and the moment of experience, which absorbs into itself many impressions, observations, meditations. In the depictive sources of M.Fokina- ballet master are seen the counterpoint of the choreographic solutions, their ideological and artistic grain, from which it grows curious reflections, observations, sometimes scattered by grains, sometimes assembled together into the certain "algorithm" of means. M.Fokin became accustomed to think and to express thought not is only verbal (by words), but also by abstract images. To think in the limits and according to the laws of the visual number, where each motion has its outline, and figure, in turn, becomes the agent of visual ideas. Specifically, this function carries out explications to the ballets: "The sleep of marquise", "firebird", "dark-blue god", "Egyptian nights". For the ballet master it is here important to carry out a process of generating the composition of new plays, not not so much actually as conditionally, but it is in detail. Not in the bright artistic form to show the generation of new artistic plan, but in many figures, built first is diagonal, first is humid, then symmetrically grouped by the numbers, which have ordinal numbers, is solved one of the main problems of choreography - problem of rhythm. Let us emphasize: specifically, rhythm, but not rate. They frequently confuse them, but also the problem of rate (growth, strengthening, weakening) in the separate sheets is also read.

Figures - the exposure of ballet master clearly are divided into two groups. One of which is the plans (top views) of choreographic constructions. Sketchings bear complex composition nature. Sheet

is divided into parts (small sizes) similarly, as ballet play it is divided into the reports, the pictures and the scenes. In the sequence under numbers 1, 2, 3 follow one after another the sketchings of groups with their the composition, the linear, the circular, the oval, the diagonal, grouped or scattered construction. Specifically, is such the explication of the order of dances for the ballet "firebird" (1910, PTM). Another group of figures - these are the profile sketchings of single three figured compositions. Figures are concrete, each is a designation of the specific motion of dynamic or static pose. These are not only diagram, but also the means of motion - sketching to the ballets "dark-blue god" (1914, PTM) and "Egyptian nights" (1908, PTM). In the chronology of figures to the ballet "dark-blue god" is visible the evolution of motion from the single figures to the the two-figured, then to the three-figured constructions. Motion occurs from the dynamics to the statics. The graphic line of the pencil of M.Fokina without the corrections almost recovers proportions and gestures of man and female figures, in it the hand of artist is felt. In the sketches of dancing groups to "Egyptian nights" especially attracts the stylized central female figure, as if derailed from the sculptural originals of ermitazhnogo or Cairo museum meeting. This was completely schematic, but nevertheless output to that, as M.Fokin it attempts to organize the structure of future play. It as architect adds from the figures the different structures conformably to the stated goal, for which the abstraction - not dead diagram, but the effective, efficient, converting force. Therefore the author considers it possible, resting, first of all, on the depictive methods, to speak about the role of expressive culture already in the first stages of choreographic composition.

The means of magnificent baroque dance is imprinted in the figures to the ballet "the sleep of mar- quise" to the music of Mozart (1921, PTM). Three figures: king, queens and small page, who supports the train of queen, vary the direction of the circular dance, which frontally moves to the spectator and horizontal- linear. These figures, virtuoso made by black India ink, create the means of the magnificent and pompous style of baroque, so vividly appeared themselves in the suits XVIII of century. Heavy skeleton skirts, the tightened bodice, high hair-dos, the powdered wigs, tseremonialnost of motions and the retarded demonstrativeness of poses - all this is outlined in the such small, but expressive choreographic sketchings of M.Fokina. In them topical sense is concluded, they cost on the face of balet-meysterskikh exposures and machine-tool concepts. The distinguishing feature of M.Fokina were indefatigability in the knowledge of new, constant tendency toward the self-perfection. It with the enviable perseverance attempts to master the new for it spheres of human existence, to penetrate in still not known by it spaces, the complexity of the ambiguity of existence. According to documentary

sources, M.Fokin was still painter and sculptor. From the youth it gravitated towards to the depictive skill, it wrote pictures and created sculptures in original, his manner, and, without pretending to the professional acknowledgement in the artistic medium, nevertheless found it. M.Fokin did not have systematic formation, but was fixedly studied skill. The creation of the dear artists could not but influence its own artistic style of khoreografa. [4.]

In the separate group can be attributed the self-portraits of M.Fokina. Hero occurs the precise, mirror reflection of the specific sincere state of personal I. This moment specifies the important significance of distance between the author and his mapping. It is emphasized and aesthetically it survives. It is strong, it is expressive, in a general manner stamps the form of the head of ballet master in two sculptural "self-portraits" (gypsum of tonirov. - GTSTM, gypsum - s.z.). In them is truthful transmitted not only extrinsic ethos of the author, but also characteristic for it stress of thought, internal concentration. M.Fokin, creating him, thought before not only about himself, but also his contemporaries. It is possible to name it intimate, autobiographical contact in the course of time. In each of two picturesque self-portraits (both - s.z.). M.Fokin finds its dominant of means. In one of them, earlier, it shows itself in entire increase in the stage suit in the role attempting to obtain, first of all, visual effect from the image. In the portrait is an element of pozirovaniya, even naryadnosti, the interest in itself as actor's individuality as the personalities of dancer. Another, polufigurnyy, executed already during a stay in New York in 1926. in the late period of creation akin to sculptural self-portrait. The means of ballet master came out by self-sufficient, first of all, its scale, concentration, psychological wealth of nature. The author sketches his portrait by the deep, multiplan, allotted romantic emotionalism and simultaneously by tendency toward the introspection. Each of its portraits bears to us directness and freshness of artistic experience, gives happiness of approximation to amazing to the variable and at the same time eternal appearance of khoreografa. Besides "the self-portraits" of M.Fokina is known by its living and expressive, completed graphite pencil "portrait of i.F.Stravinskogo" (GMII. F.L.K.), which was the author of music of many creation of ballet master. [5.]

Another task places M.Fokin in the figures to a number of choreographic ideas. Artistic method here is not new, is new its cohesion with the material of reality. On this moment, first of all and it is worthwhile to concentrate attention, investigating a question about the stylistic expressiveness in choreography of M.Fokina. In the figures "a harlequin even two ladies" and "the adventure of a harlequin" to the music of A.Betkhovena - to grotesque in the spirit of the Italian comedy, where clearly is emphasized the coloring of epoch, to "the student of magician" to the music of p.Dyuka and "the firebird" and

to "Russian fantasy" (everything - s.z.), where are easily noted the elements of splint, characteristic for the stylistics of N.Goncharovoy and M.Larionova them intended by the simplified methods of image. This is the really vital material, which unavoidably appears in the process of rehearsals and settings. It attracts increased attention of spectator to the stage action, to his basic dramatic motion. Subject here the semantic, dramaturgical and emotional engine of means. It would seem, the subjects of these machine-tool graphic sheets are built at the sufficiently extended artistic method. In our adult memory with their survey living associations with the Russian folk tale, the magic, the invention, the miracles be born. From other side, it notes the novelty of author's view on the subject, which is rested on the generalized traditions. Thus, on the sheet "Russian fantasy" before us appear rural house with the two-slope surface roof, magic forest, dark sky with the sparklets of stars. The subject of image are here not separate objects, but atmosphere itself, general feeling of life. Now, we do not concern a question about the innovating in the region of the stylistics of language, about the original use of the traditional methods of expressiveness, which can be observed, for example, in a number of other works of Fokina. This is the special problem, which was extremely important for the prospects for the development of choreography in the end XIX - beginning XX of the substances. Completing conversation about the graphic sheets of fairytale thematics, let us emphasize the value of expressiveness, entertainment, clarity in the creation of artistic means.

Important stage in the formation of the artistic thinking of M.Fokina became its method of operation on the ballet "Egyptian nights". Ballet master appears in this work as scenic designer, the master of stage suit. Specifically, its vision of costume means became basis for creating the new contemporary ballet vocabulary. They are attractive fact that the ballet master undertook in them the attempt to transmit the peace of ancient-eastern plastic, to give the visible life to heroes. Its suits, built in a number as on the friezes of ancient temples, vossozdayut the known faces in the profile poses, which rhythmical move for each other. Clothing clearly delineates figures, concealing the details of outlines, revealing only silhouette, basic forms by the wide rhythm of folds. They do not abound with wealth of colors, artistic language am restrained, laconic and delicate. Each suit is sustained in the specific sulfur-ocherous range, which corresponds to the generalized essence of the revealed idea. In the new style appeared the wigs, make-up, foot-wear (elongated eyes, black eyebrows, the vividly outlined lips) as on the polychrome Egyptian sculpture. Instead of the ballet shoes the feet were dressed in the sandal. Specifically, the depictive stylistics, which goes from the monuments of ancient Egypt by its "canonical" development of artistic thought created the ideal model of means, it became dynamic spring

and semantic rod of play. At the same time, the ballet, created on the real sources - least of all historical chronicle item. Is faster - the poetized iconic sign of Egypt, where the importantly not photographic similarity of the reproducible features, but artistic means, the integral picture, which is folded similarly to mosaic from the fragments of real.

This latter, designated by us stylistic method, gives not less interesting, in many respects not expected they are interesting and insufficiently realized were in the ballet theater of the possibility of stylization. At the turn of the century the solution of this problem together with the artists "of the peace of skill" - A.Benua, L.Bakstom, By B.Anisfeldom, N.Rerikhom, A.Golovinym, M.Dobuzhinskim attempts to give M.Fokin. Especially large role in the formation of its creative individuality played It I.Bakst - main artist, who designed practically all ballets, set To M.Fokinym in "Dyagilevskoy enterprise". Its experiments are remarkable not only in the river bed of the biography of one master, but also over the long term for the development of entire Russian ballet. The sketches of suits to "Cleopatra" illustrate the motion Of M.Fokina thought from the topical image to the stage embodiment. Is exponential in this respect author's accent not on the atmosphere, and not on the black-and-white state of episodes, but in the plastic figure of means, on the graphic search for gestures, poses and the motions of dance. However, in our consciousness does not remain sensation some of insufficiency, since, the verbal system of thinking khoreografa is subordinated to the requirements of contemporary depictive expressiveness, i.e., first of all, - visual narrativity. and the unique forms of the transformation of the classical styles of depictive skill in the ballet settings of M.Fokina. Its creation can be considered as the sum of self-determination, in which were reflected its artistic sympathies and ideological installations on the boundary XIX - XX of the substances. Admiration before the models of wooden sculpture and painting, their detailed study had an effect on the depictive stylistics of its ballets. "Hardly it is possible to dispute the general opinion about the fact that the largest force of Fokin composes the stylization and that the best ballet - stilizatsionnye, such as "Shakherezada" (east), "Cleopatra" (Egypt), "Dafnik and Khloya" (Greek antiquity) is other In these ballets Fokin appeared this amazing knowledge of the style of different times and different peoples, this unusual erudition, such as possessed to it not one khoreograf in Russia (yes, perhaps, in the entire world) [6: 233-234] - wrote S.Lifar. Ballet master turned himself to the exposures of known Petersburg museums, precisely, to this with the entire obviousness it indicates I.Ivanov: "From the earliest age after revealing exceptional love and the capability for drawing, it was the permanent visitor of hermitage, and the picture galleries of the Russian museum, where it completely mastered brush, copied the pictures of Russian and foreign artists.

Subsequently in its choreographic works so vividly comes out that promising artistic background, which was formed in it under the impression of many-sidedly developed aesthetical tendencies” [7: b.c.]:. Encyclopaedic knowledge in different regions of artistic culture, and so authentic historical materials ensured the authenticity of a visual number in the named ballets draws the skill of the author to give to the monuments of skill (to reliefs, to paintings, to machine-tool works) descriptive, stage visual equivalents, to make understanding of idea and concept by process that agitating not only mind, but also soul. The work on each choreographic setting is received as special, filled with surprising sense the separately squandered life. In the new work of M Fokin are posed before itself ever more complex creative problems, raising to one more step of craftsmanship. The bright creative individuality of M.Fokina specifies the unique alloy of dance, graphs, paintings, sculptures. Moreover each of these fundamental component of internally complex, it is brought in each of its settings to the new degrees of manifestation. In proportion to the scope of phenomena, for the concentration of original ideas and fundamental judgments, on the clarity of thought, that subjugates picturesqueness and freshnesses of associations the choreographic works of M.Fokina occupy unique position and present the important part of the artistic heritage of boundary XIX - XX of the substances.

#### The reductions

GTSTM - state central theatrical museum accepted by them A.Bakhrushina.

PMTMK - Petersburg museum of theatrical and musical culture. s.z. - meeting abroad.

GMI FLK - state museum of depictive skills im. A.S.Pushkina. Fund for personal collections.

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*Materials of Conferences***TAKING INTO CONSIDERATION  
CULTURAL MENTALITY OF DIFFERENT  
NATIONS IN THE CROSS-CULTURAL  
COMMUNICATION**

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The article analyzes the main features of cultural mentalities Kazakh and Russian people shows how their community, and their differences, because of the conditions forming mentality of people (social and geographical landscape, type of business, etc). Authors article, an attempt was made on the basis of examples give an analysis of vocabulary, as reflected in the national mentality, the nominative density of few words, is presented paradigmatic and syntagmatic communication of the concept.

The current state of the civil society with the development of various modern information technologies requires to attain the objective of quality linguistic research. Knowledge of a language thus always involves knowledge of phonetic, lexical and grammatical rules, as well as conscious enculturation, attempt to discover the different way of thinking, the desire to see the world through the eyes of others and their "point of view".

There is a problem of creating a new theoretical concept of learning a foreign language, which could be built on the existing methodological framework, to assist students to internalize the content of foreign culture (to acquire the structures and vocabulary, norms and values of verbal and nonverbal communication, adopted by community of the target language; empathic understanding of a specific cultural mentality of native speakers). Nowadays there are many investigations in different scientific fields as cultural linguistics and cultural studies, sociology, ethnic psychology, psycholinguistics, pedagogy, and others. Listed range of sciences suggests that the mentality is an interdisciplinary study. It is important to emphasize that comparative studies is getting more and more relevant in studying this issue. It is focused to reveal the universal and specific national features of linguocultural communities. Knowing any culture better involves the study of the material components of the culture, the acquisition of historical, geographical, and economic determinants, as well as the attempt to discover the different way of thinking, the desire to see the world through the eyes of others and their "point of view".

At the present stage of development of human linguistics is necessary to use a cognitive approach for the analysis of linguistic phenomena. In this case, the language is taught not in reductive terms, "in itself and for itself," [1], and a distraction from the subject of linguistic communication. Creative collaboration with other sciences of language con-

tributed to the implementation of new facets of language and the study of it as a dynamic activity in human life.

Cognitive aspects of language study and research involve the study of language in several sides. Firstly, as a set of characters that accumulate in the form of verbal information about Universe Sciences, microfeeling of people, the experience of people, passed on from generation to generation. The language, in this case, is a universal form of initial conceptualization of the world and the rationalization of the human experience, as the keeper of knowledge about the natural world, and secondly, because the classical cognitivism focuses on the study of knowledge structures, the introduction to the educational process of the cognitive approach assumes identification in teaching language of knowledge and ideas, which are made in the linguistic sign as a form of coding and storage of information [2].

Conceptualization of the objective world in linguistic knowledge can occur in several forms. In the first case of conceptualization, that is objectification of knowledge about the world in linguistic signs, in order to make the concept of the subject. In this case, the concept appears as a linguistic-mental unit, stored in the mind and in the language of the course explication in terms of expression. In the second case, conceptualization of knowledge of the world comes in the form of objectification of cultural and mental knowledge of the world has developed in the course of the parody in the accumulation of a certain social experience that is passed from generation to generation in the form of verbal (idioms, words and phrases that contain the structure of the national and cultural components, case names and in a non-verbal form of gun-where cultural information is transmitted in the form of gun-imitative, do as I do (traditions, customs, rituals, ceremonies). Concepts having a cultural sense are based on archetypes. They express values principles of the culture of an ethnic group, contain the idea of a stable element of culture (language awareness). Such concepts are linguo-cultural, since, first, have a national form, characterized by national coloring, secondly, explicated using various linguistic resources and have the nominative density. Such concepts are the components of languages, which are connected to the national way of life. So, for we refer to concepts and national mentality that is the projection of the outside world ethnic linguistic consciousness and carries in itself the information about the features of the national mentality. National mentality, according to cultural studies is a failure the level of public consciousness in which thought is not separate from the emotions, the mental habits and techniques of consciousness [2]. Sociocultural approach treats the mentality as a set of



ideas, beliefs, "feelings" common people of a certain age, geographic area and social environment, which affect on the totality of processes [3] in linguistics, psychology and mentality is understood as a historically constituted, stable system of cultural, epic, psychological, mental installations, individual predispositions. The mentality is formed varies depending on traditions, culture, social structures, and the whole human environment. Russian mentality, as the core of national identity, is a set of different psychological characteristics and qualities of the Russian ethnic group, and results in a specific form of ethnic behavior as a way of implementing ethnic stereotype to individual level. System of values, ideas about the traditions, customs, taboos, and the linguistic code that is embedded in the structure of mentality is the "socio-determined type of programming. "National mentality of the Russian people was formed in other nature geographical conditions (South East Europe). It influenced the formation of his main occupation, occupation of the Russian population, agriculture as well as the internal structure of the ethnic group, in promoting specific patterns of behavior, inherent in a Russian, norms of relations between the collective and the individual ethnic and ethical received in this ethnic group and in every era as the only possible way to the hostel. Russian mentality or Russian consciousness expressed in the national form, typical for the Russian outlook. It appears contradictory traits of Russian nationality. According V.V.Vorobyova [5], Russian mentality is a combination of contradictory traits, coexist in its structure: on the one hand a high sacrifice in the name of common goals, on the other structures on the one hand a high sacrifice in the name of common goals, on the other despotic power. Unselfish love of country combined with the lack of respect for its historical past. Longsuffering, bordering on self-denial and a tendency to binge-eschatological messianic religiosity and external piety, collectivism-that features covering identity Russian mentality. Namely, the conditions of the ethnic characteristics determine the ethnic identity, direction of his intellectual activity, a special mentality, expressed in national form. National form, it is the whole system of people's thinking, which found its expression in the psychological make-up in the images.

It is due to peculiar history, daily life, beliefs, customs, skills and tastes of every nation. Thus, the close proximity of the Kazakh ethnic group to the realities of life, sensual proximity to the observed and perceived the world, semi-nomadic livestock, geographical dispersion (0.5-1.2 people. per sq km), due to the domination of rocking economic-cultural type-all this has resulted in the understanding of time, space, man's inner world, the meaning of life, moral principles. Weight is a real being, hence the national image of the world outlook, which can not be confused with any other worldview.

Comparison of manifestation of the national mentality of the national character shows their relevance and distinction, reflected in linguistic structure. Thus, the features of the national character of the Kazakhs are: trust and childish innocence, simplicity, breadth of soul Wed: "Kazakh people have infant characteristics, trustful, generous and charitable. Maybe he had a long walk and talk with nature. He isn't petty-minded: trusting, respecting person very hospitable. As he earns a living honestly from Mother Earth, he doesn't sell or ask money. The reason he is not a merchant and was ashamed of it." (M. Sundetov, *Eskeksiz kayyk*, p. 171). responsiveness; comparison, "Strangely Muhith turned back, looked closer to the light-Is uncle Kanat? - My car,-confirmed Galymzhan - This steppe replied Mukash -Wayfarer, suffering from disaster, do not leave half way "( S.Sanbaev, *Seasons of our lives*, p. 430).

Another feature of the national character of Russian and Kazakh people is 'welcome'. Hospitality can be opened through the identification of its paradigmatic and syntagmatic links: Paradigmatic relations: Synonyms: friendly, hospitable, welcoming, Antonyms: inhospitable, unkind, ungenerous,

Derivational relations: hospitality, welcoming, guest lounge, guest.

Syntagmatic relations: intruder worse than a Tatar, a visit to go, away from the guests to come, all that is in the oven, on the table, swords, treat pies. Context of use: friendly "boss would not hear, so I left without having tasted his bread and salt (M.E. Saltykov-Schedrin. Well-meaning speech p. 403)" Both the hostess were very hospitable and treated us not as strangers, well as a close and welcome home "(B.Polevoy. *Mama Claudia*, p. 234).

Associative field: hospitality, kindness, bread and salt, cover a table, dishes, rich table, charitable, guestbook, fairing, kind, treat, mean winter snow does not beg, treat, ready to receive guests, hotel, and guest. Demyan uha, racket, a neighbor calls to porridge, soup and porridge, our place, not red corners and red cakes, simmer the soup, so that the guests were, etc. In the Kazakh national trait «Hospitality» (Konakzhaililik) is represented in the following paradigmatic and syntagmatic relationships: Paradigmatic relations: Synonyms: konaguar, konakzhayly, konakzhay, konakshyldyk. Antonyms: konaguar emes, konakzhay emes.

Derivational relations: konaguar, konakshyl, konaktau, konakzhay, konak uy, konagasy, konakkæde etc. Syntagmatic relations: Arnayy konak, beytanys konak, kutty konak, syly konak, konakka shakyr, aldyngy konak, songy konakka oryn beredi, Ata-anaga Kyz-konak, Jaman oz uyine ozi konak, bir konsa konak-kut, eki konsa, konak-zhut, konak koydan zhuas, May de Bercy zhata beredi, kudayy konak, konakka soz edges, etc. Associative field: konakzhaylylyk, konakzhayly, konaguar: konak, bass Tartu konak kadesi, konak kutu,

konalkalyk, konakshyl, konakzhay, Maiman, Mirza, konakasy, konaksyrau, konakuy, meymanhana, kymyz sapyrp, kut, konakasy.

A positive feature of the national Russian character include: industry, term and a little effort, "the soul must work", "from dawn to dusk", "inside back", "work like a horse", "work up to the seventh note", the hospitality, the last give the shirt, "I was there, honey-beer drinking," "backslapper", "bread and salt to taste," "in the cake break", the mind, "light head", "genius", "Chamber of mind "" click as seeds ", " small packages but the roads ", " it all bark but a string ", " from cover to cover, "caught with chaff", "snapping like nuts". Negative features of Russian mentality:

1) carelessness, "while thunder breaks peasant will not cross", "Russian peasant krenok hindsight", "Russian love maybe, probably, how-ever" and 2) talkativeness: "loose tongue", "stranded Emelya your week", "Mary-lied", "plow the sand", "chatter", "will give the language", and 3) cunning: "Fox Patrikeevna, "goose gripping ", "cast a fishing rod", "cover traces", "pretend Kazan orphan", "old hand", "to go through fire, water and copper pipes", "teeth spell", "fish in troubled waters", "cream", "twist rope"; glupast "oaf King of Heaven", "tolokopny forehead", "mess in my head", "look like a sheep at a new gate", "otnety fool", "head of speech", "worn as a sack to write"; 2) laziness: "lazy Teterya", "is another's bread", "slack", "spit at the ceiling" etc.

To a positive feature of the Kazakh mentality we can also add hard work, hospitality, and to the negative: boastfulness (tumedeydi tuyedey etu), deceit (mysyk majus tyngdady, ku muyiz), glutony (tuyeni tugimen, bieni zhugimen zhutu), etc. Different national mentalities Kazakh and Rus-

sian languages appear in the presence of singular phrasal verbs denoting worst person in the Kazakh and Russian languages: 1) the young, young age: a little porridge eaten, inexperienced, milk on the lips not absolute of young so early, young, green, uyzday jas, Jas orim, beti ashylmagan, shop zhelke, tis karpagan, etc. 3) Seniors: ash gray municipalities themselves with a mustache, to wind itself on mustache kari Tarlan, kari koydyng zhasynday, tis kakkkan, Sarah zhilik etc.

Thereby, analyzes the main features of national mentalities Kazakh and Russian people show how their community, and their differences, according to the conditions forming mentality of people (social and geographical landscape, type of business, etc.).

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*Materials of Conferences***APPLICATION OF ULTRASOUND AND LOW-FREQUENCY IMPULSE THERAPY IN COMPLEX TREATMENT OF PATIENTS WITH GONARTROSIS**

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**The study** was the assessment of the efficiency of application of ultrasound and low-frequency impulse therapy in complex treatment of patients with gonarthrosis.

**Materials and methods.** Examined 83 patients with gonarthrosis of the I-II stage in age from 35 to 67 years.

Patients were divided into 2 groups on conducted therapy. In the main group consisted of 45 patients with gonarthrosis of the I-II stage, received at the background of the standard treatment course ultrasound and low-frequency impulse therapy, the comparison group made up of 38 patients, who had received only standard treatment.

Assessment of the degree of inflammation of the joints was carried out with the help of the scale VAS (Visual Analogue Scale), index WOMAC (Western Ontario and McMaster University Osteoarthritis), ultrasonography, roentgenography and measurement of the circumference of the knee joints.

Of main group patients in the complex with standard treatment was included ultrasound therapy from the apparatus «Sonomed-5» (BOSCH) on the area of the knee joint, with frequency of 1 MHz, with capacity of 0,1-0,2 W/cm<sup>2</sup>, in the pulse mode, for 5-6 minutes and low-frequency impulse therapy with frequency of 100 Hz, current strength of 1-2 mA, for 5-6 minutes. The course of treatment is 10-12 daily procedures.

**The results of the study.** The results of the study showed that in patients with gonarthrosis of the I-II stage of the main group received combination of ultrasound and low-frequency impulse therapy, indicators of clinical symptoms, ultrasound examination of the knee joints surpassed the results of the comparison group, in which applies only to standard treatment.

After the course of treatment at 89,9% of the patients of the main group was decrease of pain syndrome, inflammatory phenomena, volume of movements in knee joints increased, which was confirmed by the positive dynamics of the evaluation of the level of pain on VAS with decrease by 27,3% ( $p < 0,05$ ), index WOMAC - by 25,5% ( $p < 0,05$ ), with increase in volume of movements in knee joint - by 19,5% ( $p < 0,05$ ).

Analysis of ultrasonography of the knee joints showed an reduction of inflammation symptoms at

75,3% of the patients with gonarthrosis of the I-II stage.

After the course of treatment in patients of the main group the treatment duration was  $21 \pm 7$  days, while in the control group -  $42 \pm 5$  days. The duration of remission in patients of the main group was 9-12 months, in control group – 4-6 months.

**Conclusions.** Application of ultrasound and low-frequency impulse therapy in the complex treatment of patients with gonarthrosis of the I-II stage contributes to the improvement of clinical condition, the reduction of pain syndrome, reduction of inflammatory phenomena, treatment time and increase in the duration of remission.

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**RESULTS OF THE SEARCH OF SUBSTANCES WITH NEUROPROTECTIVE ACTION AMONG THE NEW DERIVATIVES OF BACLOPHEN**

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**Introduction.** As the modification of the structure of existing medications is a productive way of the search of neuropsychotropic substances allowing to increase their effectiveness and safety [1, 2, 10], we have worked out several salts and compositions of baclophen (a GABA derivative - (4-amino-3-(para-chlorophenil)- butyric acid) with organic acids: citric, succinic, malic, oxalic, nicotinic, glutaminic and glycine. Neuroprotective action is typical of the GABA derivatives. Many structural analogues and derivatives of GABA possess neuroprotective activity – phenotropil, phenibut, pikamilon, and others [3, 8, 9]. The combination of baclophen and metabolically active acids was supposed to allow the creation of substances with marked neuroprotective effect.

**Materials.** Screening among 10 baclophen derivatives was performed on male Wistar rats. We used the model of brain ischemia produced by gravitational overload in craniocaudal vector in combination with the estimation of the degree of neurological deficit on the McGrow scale [6, 7], the model of electroconvulsive brain injury with maximal electroshock with the estimation of the duration of coma, time of restoration of spontaneous motion activity [4, 5] and the degree of amnesia of conditional reflex of passive avoidance, produced before maximal electroshock [1]. Baclophen, its derivatives and the comparison medications – pyracetam, phenibut, phenotropil were injected intraperitoneally in the equimolar concentrations one time 30 minutes before the modeling of neuropathology. Check rats received physiologic saline in the equivalent volume. Statistical processing of results: Crusc-Wallace analysis, the Dunn criterion.

**Results.** Baclophen and its derivatives displayed neuroprotective and nootropic effect: decreased the degree of neurological deficit with the model of brain ischemia produced by gravitational overload in craniocaudal vector, reduced the duration of coma and time of restoration of spontaneous motion activity, prevent the amnesia of conditional reflex of passive avoidance on the maximal electroshock model. Glutamate-, glycine- and citrate comprising analogs of baclofen are statistically significantly more active than the initial substance. The majority of substances exceeded pyracetam, phenibut and RGPU-184 - even phenotropil by effectiveness.

**Conclusion.** The conducted studies point at effectiveness of the creation of effective neuroprotectors on the basis of baclophen derivatives. Baclofen citrate excels baclofen in activity, all its' examined derivatives, and the comparison medications – pyracetam, phenibut, phenotropil and is considered to be perspective for studying in the capacity of neuroprotector.

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#### THE DIAGNOSIS AND TREATMENT PSYCHOSOMATIC DISEASES

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The method "Installations of a positive majorant" is a diagnostic and correctional method. 1- the estimation to a psychological condition is given, 1- the psychological installation is formed, 3 - the quality of life raises, 4 - the psychological condition is improved, 5 - the dysfunctions disappear.

The clinical and biochemical analysis of blood are a dynamic parameter of a condition at stress. At chronic stress the elements of blood do not leave for frameworks of normal intervals. At vegetative balance the quantity of crates comes nearer to average arithmetic. This analysis is an express train - method of definition of a condition sympato-parasympatic domination and shows condition dynamics.

Aikido - psychophysical east system of struggle, which application optimizes a functional condition. Not aggression of the given direction, impellent activity and application of respiratory practice allow to apply it as a correctional method at the increased background pressure, psychosomatic infringements.

Feature of correction psychosomatic infringements at an exhaustion sympatic department of nervous system is the necessity of realization a relaxation of procedures at support of immunity, as

the increase of activity parasympatic department carries behind itself downturn иммунной protection of immunity.

Alternative to correction psychosomatic infringements at an exhaustion sympatic department of nervous system can be selection of methods of correction carrying in the basis elements of psychological and impellent correction.

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#### **PHARMACOLOGICAL PROTECTION OF HEART BY STRESSPROTECTORS DRUGS IN EXPERIMENTAL CONDITIONS**

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Emotional stress is a modern risk factor and complicates the course and prognosis of cardiovascular system diseases, therefore search cardioprotective agents among the anti-stress drugs actions will help to optimize the treatment of cardiovascular disease, and which is currently not only medical but also a social problem of modern medicine.

Pharmacological protection of heart was studied in 340 Wistar rats weighing 150-250 g in experimental model of an emotional stress “The Conflict of afferent stimulations”, simulation of myocardial ischemia in the experimental model pituitrynic coronary spasm (Pituitryn 10 U/kg) and calcium ar-

rhythmia models pathology (Calcium chloride 500 mg/kg), exponentiated by a stress.

Pharmacological protection of heart from damaging operating of an emotional stress and avoidance of development of myocardial dystrophies of a stressful genesis was investigated using anti-stress drugs: following adaptogen Eleutherococcus (0,5 ml/kg), tranquilizer Phenazepam (2,5 mg/kg), nootrop Pyracetam (200 mg/kg) and metabolite of a tryptophan Nicotinamid (50 mg/kg), for which one for the first time in conditions of a pilot model of an emotional stress “The Conflict of afferent stimulations” is rotined availability of cardioprotective properties. Fixed, that capdioprotection with the help these anti-stress drugs realising with help intensifying of developments an own stress-limiting systems of an organism and limitation by them of reactings of stress-realising systems. It confirms by positive dynamics studied electrophysiological, haemodynamic and metabolic parameters of a functional condition of myocardium in stress and in the pituitrynic coronary spasm and calcium arrhythmia models pathology, exponentiated by a stress.

Availability of cardioprotective properties of studied anti-stress drugs, which one are most expressed for Pyracetam (Pyracetam>Phenazepam>Nicotinamid>Eleutherococcus), allows to recommend them for further targeted application in clinic as cardioprotectors with the medical and preventive purpose in a structure of complex therapy of a pathology of heart of a stressful genesis.

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**PROVIDING EDUCATION QUALITY AND COMPETENCE APPROACH  
IN NEW GENERATION SES CONTEXT.  
KAZAKHSTAN HIGHER SCHOOL EXPERIENCE**

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There are presented the reasons that brings up to date the problem of higher education quality provision in Kazakhstan. There are considered methodological features of the new generation SES. There is noted the necessity of the creative interaction between the higher school institutions and employers in forming competence-oriented educational programs, increasing higher school funding and increasing the higher school institution teacher's social status.

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**Keywords:** quality provision, competence approach, state educational standard, Bologna process, bachelor's degree study program, teacher's role.

The public opinion poll [1] carried out by 700 experts in 24 countries of the world on the problem of higher education development, showed that by 2020:

- about 60 % of secondary school leavers will study at higher school institutions. At this the main emphasis will be made on graduates' competences and abilities, their functional ability to employment;
- about 20 % of the bachelors' class hours will be oriented to the general training, the remaining resource – to general vocational and special training;
- costs for scientific-research works will exceed 3 % of the GDP;
- over 50 % of scientific and academic journals will be issued in the electronic format;
- the students' academic mobility will increase till 40 %;
- the principle of “studying throughout the life” will become a vital need and reality;
- higher school training will develop dominantly in the pragmatic course.

In the conditions of globalization and mass character of higher education there increases the role of the social measurement. The share of budget students in the European social states is very high: over 90% in Germany, over 80% in France. On the contrary, in the United State and Great Britain there are but few such students (no more than one third), however, there exists a developed system of educational crediting permitting a citizen to pay for education after graduation and with very preferential terms [2].

Higher education internationalization, unfavorable demographic situation, insufficient budget funding of Kazakhstan higher school made topical the problem of education quality provision. Its mass character and the problems of quality came into contradiction with each other. The mass character development is accompanied by decreasing the level of social

base. At Kazakhstan higher school institutions only about 23% of students study on the budgetary basis. There appears the students' contingent with different starting educational levels and demands which aggravates the problem of comparable quality provision [3].

In European practice “quality provision” means the process of forming conditions assisting the education quality. The main indicators defining higher education quality can serve [4]:

- the level of competence and professional mastership of the staff;
- study programs and pedagogical training technologies and knowledge control quality;
- entrants' erudition level and their motivation to study;
- level and quality of the resource provision (academic-and-methodological, material-technical, information);
- administration's innovation activity and quality management system efficiency.

The problem of quality provision in the developed countries is solved using decentralized mechanisms and procedures of education quality assessment based on self-assessment, external control, accreditation by independent bodies. In Kazakhstan, opposite to the majority of the countries-members of the Bologna process, there are a lot of controlling-and-inspecting procedures burdened by bureaucratic elements (licensing, state certification, institutional accreditation, scheduled inspections for conformity with the license requirements, specialized accreditation, and now external assessment of the study achievements). There is, perhaps, no such a “developed” control system in any world country. It is appropriate to remember the proverb: **“Too many cooks spoil the broth”**.

Initially in the Bologna declaration the problem of quality was given rather a low profile: **“Assistance to the European cooperation in the field of the quality assessment by**

### means of developing comparable criteria and methodologies”.

The effectiveness of the reforms in higher education in the context of the Bologna process depends strongly on the level of the institution public awareness and the society on the whole about the essence of this European project and the staff's readiness to realize it. Certain conservatism and advocacy of the successful before commonplaces prevent from adopting the Bologna process. A lot of higher school institutions demonstrate the semblance of the reforms but not real transformations [3].

The main reasons that make topical the problem of higher education quality provision in Kazakhstan are:

- systematic under-funding of Kazakhstan higher school (0.3-0.4% of the GDP for higher education is negligibly insufficient as compared to the general European 1.2-1.6%);
- inadequacy of higher education development mechanisms to the formed social-economic conditions;
- uncompetitive level of the staff wages, the staff ageing and absence of the talented youth inflow in the scientific-pedagogical sphere;
- weak scientific-methodological substantiation of the carried out reforms of higher education in the context of the Bologna process and the State program of the RK education development for 2011-2020.

Now we need not hollow claims of the education quality but practical actions to increase higher school funding and teachers' social status, culture of thinking and scientific character of education. Education is not so sphere of services but rather the main element of the public production – human capital reproduction. Costs for education are not a burden for the state budget that must be reduced but long-term investments in the man profitable for the state.

In the RK system of higher education the main instrument of quality control is the State Educational Standard (SES). Methodological features of the new generation SES adopted by the RK Government Decision No 1080 of 23.08.2012, are:

- leaving no alternative cycle of general educational majors (GEM);
- sharp reducing of the core subjects in the cycles of basis (BM) and profile (PM) majors;
- strengthening the role of students' autonomous learning and reducing the laboratory-contact workload;
- strengthening the role of practice;
- more contrasting definition of the competence approach.

There looks non-logical the cycle of GEM leaving no alternative. Without disputing as for the role of this cycle for general educational

and vision training it should be noted that such a labor intensive cycle does not leave place for special training that is especially important for science intensive technical courses. At foreign technical institutions the GEM cycle makes only 10-15% of the whole study program while in Kazakhstan this cycle takes a quarter of the program. Such an imbalance causes difficulties when forming joint educational programs and double-degree programs.

Within the frames of the new generation SES higher school institutions are given more autonomy when designing bachelor's degree programs. Sharp increase of the institutional component strengthens the significance of the regional component. Strong HEIs are able to legalize the study programs, weak HEIs can be in a difficulty to transform the abundance of credits (71 credits) of the institutional component in the needed list of training modules with the required competences. Between the HEI autonomy and its responsibility for academic quality there is observed but weak interconnection that sharpens the problem of quality provision.

It should be noted that in the new generation SES there are given only common competences: requirements to general education, requirements to social-ethic competences, to economic and organizational-managerial competences, etc. Professional competences HEIs are to develop for each course based on professional standards taking into account employers' demands and the society social demand. The absence of professional standards for a lot of training lines limits the designing of competence-oriented study programs.

In the State program of the RK education development for 2011-2020, for the purpose of providing the integration in the European area of higher education in accordance with the Bologna process parameters, there is marked the reducing of the general educational majors' share in the bachelor's degree programs from 25% to 15% [5]. Some institutional majors of the GEM cycle will be transferred to the school education programs. Unfortunately, such a transformation has not taken place. Moreover, all higher school institutions were recommended to enter an additional major “Religion science” in the GEM cycle. This does not assist in forming professional competences of the future bachelors of engineering and technologies.

In the SES projects for technical specialties developed in 2011 based on the graduate's competence model, there were for the first time defined professional competences by the kinds of professional activities. In this connection there was quite non-logical fast decision of refusal from state standards for the courses of higher and postgraduate education. Instead of

SES diversity in courses there were introduced adopted by the RK Government two normative documents: SES for a bachelor's degree and SES for postgraduate education. These two SES having a somewhat frame character, do not take into consideration the specificity connected with the differences between the humanities, technical and other trajectories of training. In addition to these two SES there are developed Typical curricula for the courses of higher and postgraduate education in which there is regulated the structure and volume of the study program for three cycles of majors with indication of the list and amount of credits of the core subjects and all types of practice, final certification. The institutional component (elective component) is not concretized, there is indicated only its total labor intensity.

A characteristic feature of the RK present day educational system development is growing mass character that bears mainly the function of socialization but not professionalization. Higher school budget funding deficit led to the fact that the state, as the main stockholder of the higher education system, happened to be unable to control HEIs activities neither from the point of view of the expediency of the rendered educational services (demand for personnel) nor from the point of view of their quality.

The Bologna process is actively developing, and its interim results are constantly monitored and fixed in the international documents: Prague (2001), Berlin (2003), Bergen (2005), London (2007), Leven (2009), Budapest-Vienne (2010), Bucharest (2012)).

In the communiqué of the Conference of the European countries education ministers in 2009 it was noted: **“We recognize the key role of higher education for the successful solution of the problems facing us and for the further social-and-cultural development of our societies. So we consider the state investment in higher education to be of the prior significance”** [3].

The main aim of the Bologna process is providing the transparency of national education systems based on the adopted recommendations and procedures by the way of maximum presenting the agreed information with pertaining characteristic features of each of members-countries education systems.

At the jubilee meeting of higher education ministers of the countries-participants of the Bologna process on March 11, 2010 in Budapest (Hungary), the new ENQA President Akim Hopbach (Germany) presented the basic principles of developing the systems of education quality guarantee:

- higher school institutions are responsible for higher education quality;

- all forms and procedures of quality guarantee are to be oriented to the further improvement of education quality;

- diversity of approaches is greeted if there are used unified for everybody principles of quality assessment and guarantee;

- all participants of the educational process, especially students, participate in the procedures and work of quality guaranteeing bodies;
- quality guaranteeing agencies are independent.

In the conditions of the postindustrial society with high dynamics of changes, the traditional knowledge-centered paradigm of education loses its effectiveness. There is obvious the deficit of competence-oriented specialists able, after graduating from higher school institutions, to work effectively in new conditions.

In Kazakhstan higher school in the context of the Bologna process, orientation to the 12-year cycle of training at comprehensive school and refusal from higher education course SES, there has been begun forming bachelor's degree programs with strengthening practice-oriented training and competence approach. This brings up to date the faster introduction of professional standards in which there must be specialists' qualification characteristic in the format of competences in relation to the National qualification frame [3].

Thus, the main efforts in higher education reforming are directed to approaching the positions of employers and academic community. However, here it must be kept in mind that **“the culture of a social dialogue between higher education and economy requires special HES's vigilance, sense of reality, high scalability. In this dialogue the last word is left for the academic public. On it there also lies responsibility for this culture forming... By establishing competences, we reveal the present day demands. But higher education is to work for the future...”** [6].

Apparently, the norm will become bachelor graduates' entering the world of professional activity and their return two years later in the world for the master's cycle, and this return will be deliberate and weighted from the point of view of the professional choice.

To reveal general and special competences, alongside with the academic community, there will be attracted employers and last-year alumni that will permit the education system to respond more operatively the demands of the labor market and will pay more attention to the prospects of employment of their graduate, their real career success.

The competence approach to building new curricula stipulates deep system transformations in all the components of higher education touching the content, teaching, organization of



the teaching process, forms of control, academic-methodological provision. Designing and realizing such training technologies that would develop the situations of involving the students in various activities of active and interactive character will become the main principles.

Freedom presented to HEIs with introducing the new generation SES, on one hand, gives the possibility to implement their innovation educational trajectories, on the other hand, it will be difficult to ensure the minimum basic level of training and comparability of educational programs of different HEIs claimed by the Bologna process requirements.

At the same time, with increasing the interaction between the labor market representatives claiming requirements to the final results of the HEI educational activity, increasing the educational programs openness for external assessment, and, as a consequence, strengthening competitiveness among HEIs, there is a possible positive effect manifested in increasing HEIs responsibility for graduates' training quality. This will require strengthening the role of chairs and every teacher in the consistency of actions to develop and realize educational programs. Special significance there acquires not only the content of the educational process but also forming and developing students' skills of self-learning. There is necessary the transition from the passive perception of knowledge given by the teacher, to the active one, when the knowledge are mainly developed by students themselves in the process of their independent work under the teacher's supervision.

In the postindustrial society of special significance there becomes not the amount of the acquired knowledge but the system of the key and professional competences, among which there is the ability to systemize and generate new information, to solve independently non-standard problems. So, the teacher's role also changes. It is necessary to differentiate the requirements and forms of interaction with the students, to ensure the designing of individual educational trajectories. The solution of this problem is complicated not only by its didactic novelty but also by higher education mass character, when the students there become those who adapt to the institution requirements with difficulty.

Forming necessary competence at the students supposes the development of corresponding professional competences at the teachers. This is a necessary condition for pedagogical activity quality and effectiveness increasing that supposes teacher's regular passing various forms of qualification improvement, their active participation in scientific research in the sphere of professional activity.

Professional competence increasing is an important condition for ensuring the pedagogical personnel's international competence that is a necessary condition for the Kazakhstan educational system integration in the international educational space.

The competence approach in higher education strengthens integrative tendencies in the educational process. Realizing competence-oriented programs will require the creative interaction between the teachers not only at the chair but at the inter-chair level. There are necessary the agreed actions of the staff aimed for the united team result.

Now it is important to understand that the increase of the higher education budget funding is a factor of the economic growth and labor productivity increase. There are needed urgent actions for the cardinal increasing of the level of the teachers' wages. Otherwise the steam will be spent for the beep, and the locomotive with innovations and quality will stay on the side track.

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*Materials of Conferences***KNOWLEDGE AND CRISIS, TOLERANCE AND COMPETITIVENESS: WHAT ARE THE POINTS OF INTERSECTION?**

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Tendencies-challenges belong to the current trends in the world and Russian education. The increasing *gap between quality of education and growth of requirements to competences of the professional* became one of them. The second tendency is *commercialization* of education. The third tendency having powerful impact on the sphere of the higher education around the world is the *information transformation*. The content of education will be focused not only on assimilation of existing specialized knowledge, but also on formation of creative and social adequacy, and also on formation of readiness for retraining.

In a post-crisis era there are many questions. They include: how could so powerful crises happen if the world economy is based on knowledge and anticipation of crises or their reasons go beyond the world and society knowledge? The answer, obviously, can't be given here and now. At the same time, it doesn't mean that it is impossible to think of the civilization future hoping only for modernization, innovative development of education. It is necessary to hope and imagine the ways, means, high-quality changes in the system of the world and Russian education which analysis is a subject of this article.

The economy of post-industrial type need people who can work with modern technologies in changing external conditions, can independently estimate a situation, and make optimum decisions. Global crisis in education consists in that it continues training people for needs of leaving economy.

By the end of the XX century the whole branch of the world economy – *the international market of educational services* with annual sales volume in several tens of billions dollars and with the volume of consumers in several millions of trainees – was created. There was new article of export, i.e. receiving the higher education by foreign students. By World Trade Organization estimates, the capacity of the world market of education makes 50-60 bln. dollars. The steady leader in this area is the USA controlling nearly a quarter of a world financial educational turn. On the second place on volumes of educational sales is Great Britain (15%). Germany and France follow: the first holds slightly more than 10% of the world market, the second - is slightly less. The leader list is finished by Australia, Canada and Spain mastered by 7-8% of the market.

The modest place of the Russian higher education in this row (the tenth shares of percent of the world market) is one of testimonies of noncompetitiveness of our higher school.

Herewith the globalization goes through standards and diplomas. More and more educational programs follow international and not national quality standards. *Those education systems which don't participate in the international competition for foreign students and, as a result, in the competition of the quality standards of education, eventually, make their countries non-competitive not only in education, but also in the economy sphere.*

Explosive development of digital technologies and means of the Internet led to that the content of education in general and the content of subject knowledge in particular aren't unique property of a certain professor any more, and recently - of the certain higher education institution. It forces us to reconsider, at least, forms of delivery and assessment of knowledge in educational process.

The situation in Russia, except described above problems, is characterized by special tendencies. Demographic processes have serious impact on the situation in Russian education at all levels. *Demographic recession* touched the comprehensive school to the fullest extent: the number of pupils decreased from 22 to 14 million in 10 years. In the next years the reduction of total number of pupils will begin at all levels of professional education: the number of entrants in 2010 - in comparison with 2006 - will be cut by half.

The significant age of the higher-education teaching personnel and managers is characteristic for the Russian higher education: 36.6% of workers are older than 65 years. In recent years the inflow of youth to higher education institutions quickened, but rates of natural are still higher than dynamics of renewal of the higher-education teaching personnel, and actually we have a *generational gap*. Herewith, incredible as it may seem, the growth of the fiscal capacity doesn't promote the renewal of staff in education: the better a financial situation in the system is, the less those who wish to clear places giving opportunity of career growth to the young people.

Today the higher education is not a social ladder or elevator, but the peculiar social institute of the *conservation* which is not adapted for the competition in the environment.

The list of tendencies can be continued with their short enumeration as they worry each Russian patriot: *external tendencies* - decrease in competitiveness in the global market, the higher school doesn't form the innovators and gives a small amount of innovative ideas, decrease in quality of

education proceeds, etc.; *internal tendencies* - 60% of young men and girls enter the higher education institutions, but there are not more than 30% of subject matter experts in Russia; training of the qualified *executives* weakened, the Russian technical training colleges and *technical schools don't give modern qualifications*; school, overloading the children with knowledge, is still unable to provide the *teaching of useful abilities*; there are a lot of obstacles destroying the formation of values, social competence and tolerance in youth.

What are the key hopes? It is known that Russia quite often revives "through challenges"; however it is more difficult to build its development and development of the necessary, competitive, qualitative and innovative education as a result of nonsystem measures, in the absence of complexity and prospects, anticipation and the long-term analysis.

*The goals for next seven-ten years* are the following. The share of the Russian higher education institutions in the world market of education has to grow to 10%. In monetary terms it means that the revenue from training of foreign students in the Russian higher education institutions has to make not less than 5 bln. US dollars and to become comparable with the budgetary financing of this sphere (today in Russia the number of foreigners from total number of students is less than 1% that provides a revenue about 100 mln. dollars). Even more important is that the export of education provides for the country not only a straight line economic benefits but also expansion of the social, economic and technological standards. *The professoriate revenue* at the leading universities of Russia can become partially comparable with the income of colleagues in the advanced states (the average income of professor in Europe is 60-80 thousand dollars a year, in the USA - 80-120 thousand). However, it is impossible to make education a perspective branch for career and self-realization of young researchers and teachers if non-competitive social conditions remain.

Not less than 25% of the amount of financing of education has to be carried out *from the economy sector* (now this share is less than 5%). It is a question of target preparation of specialists, financing of certain programs of professional education, funds of the target capital and other ways of manifestation of investment interest of business in activity of educational institutions.

The R&D share in structure of the income of leading universities has to make not less than 25%. Only in unity with real scientific researches and development the training of the high quality experts adequate to modern life can be carried out. Those who don't conduct own research work and/or aren't involved in implementation of Social and economic projects can't be considered as mature professors and teachers. New decisions, strategy and tactics are necessary for this. Such attempts to find and es-

timate them in relation to Russian education are being made. Educational experience of the countries which are actively building innovative economy is investigated. But direct adoption can turn back for Russia with a retardment conservation as there is a danger to lean not on the latest but on the becoming mass practices. Secondly, some "foreign" decisions can be badly applicable in the conditions of the Russian society and economy. For example, in Mexico and other countries of Latin America there were huge universities which actively use the unified Remote methods of training. But it is obvious that it doesn't match as the main way of development of the higher school of Russia where cultural and educational level of the population is higher and there is a broad tradition of seminars and schools of sciences at universities.

On the other hand, in Russia - both inside the developed education system, and out of it - there are already the practices meeting the new requirements. Origins of these practices lie in innovative boom of the beginning of the 1990th. In recent years the significant positive role in this process was played by the National priority project "Education" supported the innovative practices at schools and higher education institutions.

*Some innovative practices* appear as a reaction of progressive elements of educational system to changes in the Russian economy and society. These are the experimental schools, embedding of training centres of corporations in universities, faculties of pre-university preparation, university districts and the Internet schools filling the methodical and substantial gaps between schools and higher education institutions. *Other practices* are the result of attempts of clients of educational system to fill "education gaps" by own efforts. So, in recent years inside the corporations the considerable sector of training centres which gradually began to work not only for internal requirements but also for a foreign market was created. On the Internet there is a big massif of the reference and educational resources supplementing an official set of training materials.

One of obstacles in high-quality and progressive development of the education system is formation of the case of managers of the system ready to consecutive and laborious work which results will be noticeable in 5-10 years.

One of topical issues of the agenda is change of the contents, method, pedagogical technologies in the modern education which technological platform (lecture and seminar model) didn't change more than 250 years since appearance of Humboldt model of university.

This model was successfully realized in the best Soviet scientific and engineering higher education institutions, however, in the conditions of mass higher education the ideology of transfer of "ready tasks" has to be replaced gradually by

ideology of formation of competences, and *the activity paradigm has to succeed a paradigm of transfer of knowledge*. Problems of identification and transfer of modern ways of the organization and management of cognitive (educational, scientific) work of the person come to the forefront. Methods have also to be changed: projective approach, case-study, for example, in administrative education it is convincingly showed the efficiency of active methods in comparison with passivity of lecture and seminar model.

Focus and orientation to education during the life has to become not additional training but to give the chance to individualize educational trajectories providing by that the tolerance of an education system.

A number of fundamental consequences is connected with it:

- sharp increase in a choice, formation of the open market of educational programs and modules instead of in advance established standard;
- system of recognition of results of education in each module, transparent and clear for everybody;
- new regulation of the educational market; the state can't control quality of educational programs anymore;
- focus of regulation moves to ensuring completeness and reliability of information provided by participants of the market;
- herewith the organizational borders of the education system are smeared as the updating of adequacies and receiving the academic credits can take place also in real production of goods, knowledge, and technologies. It can be realized only in that case.

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#### FORMING KEY COMPETENCES OF JUNIOR PUPILS AT THE NATIVE LANGUAGE LESSONS

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One of the priority tasks of the modern school is to create the necessary and full-fledged conditions for individual development of each child, formation of an active position of subjectivity students in the learning process. The teacher should create conditions for formation and development of key competences of pupils. The article reveals the importance of the competence-based approach and the formation of key competencies for younger school-children, represents the ways and methods of formation of key competencies at the Russian lessons.

The main goal of the 12 - year general secondary education in the Republic of Kazakhstan are formation and development of an educated, creative and competitive personality, capable to live in a dynamic developing environment ready to self-actualization in their own interests and in the interests of society. Students at the same time with knowledge must obtain practical experience, the ability to use this knowledge in real life.

Competence becomes a sphere of the relations existing between knowledge and action in the practice of life. Defining the term «competence» and «competency» A.V. Khutorskoy offers the following definitions. Competence includes a set of inter-related qualities of the person (knowledge, abilities, skills, methods of activity), asked in relation to a specific group of objects and processes, and necessary for quality productive activities. Competence is possession of a person by corresponding competent, including his personal attitude to it and the object of activity. Competence should be understood as a given requirement, the standard of education and training for students and competence is as it actually formed personal qualities and experience activities [1]. Guided by the theory of key competences, we have chosen the main, in our opinion, competence, which forms the teacher in primary school: educational-cognitive, informational and communicative competence.

Educational and cognitive competence supposes to have the ability to set a goal and to organize its achievement, ability to explain its purpose; organization of planning, analysis, reflection, self-evaluation of their educational and cognitive activity; ask questions to the observed facts, find the causes of phenomena, to mark their understanding or misunderstanding in relation to the investigated problem; put cognitive tasks and propose a hypothesis, to choose the conditions of observation or experience, to describe the results, draw conclusions.

Information competence provides skills in working with various information sources: books,

textbooks, reference books; the ability to independently search for, retrieve, organize, analyze and select the necessary information, to organize, to convert, store, and transmit it; possession of skill navigate the information flows, the ability to allocate them in the most important and necessary.

Communicative competence supposes to have the ability to present themselves orally and in writing, write the questionnaire, letter, congratulations; possession by the ways of interaction with others; the ability to speak with oral presentation, to ask a question correctly, to conduct training dialogue; possession of different types of speech activity (monologue, dialogue, reading, letter); possession with the methods of joint activities in the group, methods of action in the situations; the ability to search for and find compromises [2].

The new paradigm of pedagogy moves the centre of problems from the formation of knowledge and skills on the holistic development of the individual. Introduction of a competence approach modifies the contents of education, implementation of the educational process and practice of the teacher. The learning purpose is becoming not a process but by the pupils' achievement of the certain result. Changing the form and methods of conducting the classes training acquires activities, the emphasis is on learning through practice, productive, with students working in small groups, forming of individual educational trajectories, the use of interdisciplinary connections. Through the activity approach more fully to manifest and develop the ability of the person, closely linked to the personality-oriented approach, which focuses on accounting and development of the capabilities of a student which is achieved by using various programs, differentiated tasks, out of classes forms of activities, which will much fully solve the problems of individual educational trajectory. Application of modern methods of teaching of the native language enables the formation of key competencies of young learners.

Our students are just starting their way into the mysterious world of linguistics. The teacher's aim is to light the flame of curiosity and thirst for knowledge in the child. It is possible if a teacher approaches to the teaching of the native language creatively, taking into account the age peculiarities of the children. The child often cannot «take» that that the teacher wants to «give» him. It occurs because the student does not know why he needs these skills and where they can be useful, i.e. there is no motive. The teacher should help the child to determine what material he needs to study at the lesson and where he can apply to his life. Children also learn to communicate with each other, with the teacher, they acquire the ability to conduct debates, to defend their opinion, to prove the correctness of his answer. They formed communicative competence.

At the lessons of native language the younger students often face with the problem of misunderstanding with complicated scientific names of stud-

ied spellings and linguistic concepts. To solve this problem, the children themselves can formulate the topic of the lesson, based on the contents of educational material. Pupils do the proposed teacher mental operations (comparison, finding a common and differences, grouping, classification) and come to the right conclusion. They have to carry out related intellectual operations in the form of different tasks coming one by one. [3].

For example: the establishment of semantic communication in words find common, the implementation of the grouping, the exclusion of odd words, the construction of the conclusions. This is the example of an exercise while studying the theme «The first declination of nouns». There are words written on the blackboard: carr...t, seam...n, bi...d, pot...to, b...ll, wri...er and so on. The task: read the written words on the blackboard, and write them on spellings. Insert the missing letters. Look for common in data words (these nouns, a common noun in the singular). Find the odd words among these words and tell me what declination of nouns will be devoted to the topic of today's lesson. (Among these words one noun is in the first declination singular, others are in the second and third declension. Therefore, the topic of today's lesson is «The first declination of nouns».)

All the exercises have an element of entertaining, it creates interest at the lessons of the Russian language, causes positive emotions and mobilizes psychological qualities of students for productive work at all subsequent stages of the lesson. There is carried intensification of knowledge by asking questions: «Where have you met with this object, phenomenon, reception etc? Where do you think in life you will need that knowledge?». Answering these questions students focus their attention on independent cognitive activity. There is occurred the process of obtaining the reality knowledge and mastering the methods of cognitive problems. The conclusions according to their observations and research children make themselves. During such work at the lesson the students in the primary grades are forming a number of the key educational competencies, which are: educational-cognitive, informational, communicative.

It is very convenient to use a problem situation at the lessons of the native language in primary school. If the lesson begins with the situation based on the real life of a child, all children will involve to the work without any exception, even the most passive will be interested, and they will receive good knowledge. For example: The subject of the lesson is «Greeting»: The task is to write a greeting card, a letter, a message to a friend. The theme is «The Spelling of Ü at the end of nouns after sibilant consonants» - You are sellers at the store. Write the labels to toys and books: mya..., me..., obpu..., re... and etc.

An important indicator of formation of cognitive competence in children is the availability of developed spelling. The student should be able to find

the location of the hard writing, determine the type of spelling and apply the rules of writing in practice. Each spelling we denote (by agreement) as a signal light of a particular colour. Soft vowel tested accented with a red signal light, unaccented vowels excluded accented with yellow, paired voiced and voiceless consonants - blue, consonants green etc. This technique develops the pupils spelling vigilance, forms the educational-cognitive competence. In order to deliver the signal light of the desired colour, you need to not only find a dangerous place, but remember the view spelling.

The degree of understanding of the learning material is increasing, its memorization is improving and intellectual development of students is growing with the drafting of generalizing schemes, tables. Students start to work on them after the formulation of verbal output when the material is mainly understood, accepted, generalized, and its processing deepens and systematizes the acquired knowledge. This activity can initially be collective, then it has a group and individual character. The effectiveness of the schemes and tables is that that the signs and communications were allocated by the children themselves in their own actions. Tables with elements of modelling allow to give children difficult linguistic concepts by more accessible form.

Application of game techniques allows the transition to unusual for children scientific names spelling rules make smooth and affordable, promotes the formation of key competencies of young learners. The game elements are not a substitute for a fully scientific names spelling, and accompany them, facilitating children's perceptions of spelling rules, and their application in practice. But the main achievement live a genuine interest in the lessons of the Russian language manages to cause not only motivated students, but also the so-called «satisfactory» students. They like that dry spelling rules came to action and took a curious nature. For example: the theme «Spelling audited unstressed vowel in the root of the words» we with the children presented as a game of «Find the parent of the word with doubtful vowel in the root». First, we find out that in the world of people, children tend to resemble their parents or grandparents. Students with interest are beginning to remember that the eyes of the same colour as someone from their relatives. Then there is association with the world of words. Words like people are related and similar with their «eyes» - vowel letters. Checking words we call «father» or «mother», and checked words by their «babies». Children enthusiastically start to search for «parents» for the words «children». This work is carried out simultaneously with calling of scientific name of this spelling, and is not a complete replacement of the terminology used in the tutorial. This technique facilitates the transition from the world of children's games in the world of scientific linguistic terms, and helps to realize the principle of humanization of training.

This method of studying material increases motivation of learners: «Correct - incorrect approval». Students are offered several statements from not studied themes, children should select true statements, relying on their own experience or just guessing. At the stage of reflection you need to go back to the reception, to determine whether any of the claims were correct and what was incorrect.

Younger school age is the initial stage of entering into research and development, laying solid foundation for further mastering it. In their work with students, we use the method of projects and scientific research, which frees the child, increases the level of cognitive activity, learning motivation, promotes emotional balance and confidence. In the project activity should include pupils gradually, starting from the first grade. At first they are available collective creative matters: «33 sisters», «Bouquet of polite words», «Visiting grandfather Kornei», and in the third and fourth grades, students with great interest carry out quite complex projects.

The active use of the design and research method allows to form and progressively develop at the students all kinds of key competences. A high level of cognitive interest of students is expressed in the ability to independently search for information, selecting a source of information, selection and classification of the received material; ability to cooperate in groups, in a team; adequate self-esteem of students, to the quest for creativity, self-realization.

Modern lesson is impossible without using of information and communication technologies. Use a computer and an interactive whiteboard can be in the group, steam room and individual work: individually, developing self-control and research skills; in pairs, developing skills of cooperation, mutual assistance; design and presentation of creative projects, alternative homework; as a source of educational information when working in groups and individually; writing the material for self-examination and discussion.

All these methods of work with the computer at the lesson are used with the purpose of intensification of self-educational activity of the students. Students are gaining new knowledge from different sources of information: educational literature, encyclopaedias, dictionaries, reference books, mass media, Internet resources. It is important to teach children, finding the right information when working with different sources, critically evaluate it, revealing reliability. Getting new information from various sources, students use different methods: observation, reading and writing, listening. Then they process the information received: analyze, generalize, classify, compare, and distinguish causes, effects to get the desired result. An important component for the information competence of students is the conversion of information from one form to another and selection the most convenient form. They may be texts, tables, diagrams, illustrations [5].

Thus, for the formation of key competencies we need modern methods and techniques of the organization the educational process. Including the lessons job competence-oriented nature of the job, involving a student's ability to be creative activities, we form the competences of the younger students. Pupils increase creative activity, internal motivation, intellectual development, level of independence, the cohesion of the team, all this can improve the efficiency, quality training and education of the younger students. Work with the use of new forms and methods, which aimed at forming key competences of pupils, allows the teachers to improve and increase their competence.

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#### ABOUT INFLUENCE OF GEOLOGICAL FACTORS ON HEALTH OF SCHOOLCHILDREN AND HEALTH-SAVING TECHNOLOGIES

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Formation of different geo-ecological situations as a result of action of geological processes and technogenic factors happens in the urbanized territories in the cities where lives the main population [1-4]. Complex influence of geodynamic active zones and geochemical anomalies on environment and incidence (especially – children of primary school age) is established in the territory of the city of Perm by the medico-geoecological analysis. Integrated geodynamic active area (high density of tectonic lineaments) and geochemical anomaly (Pb, Ni, Zn, Mn, Cr – in soil, groundwater, snow cover, bioenvironment children) placed in the center of the Industrial District. The school building is located within this zone has experienced subsidence, cracks on the walls; local

geopathic plots (biological discomfort zones) were marked inside the building. It was important to establish the most adverse health abnormal points and avoid being in their children for a long time.

The Program «Healthy Kids» was designed (teacher T.A. Kopylova and author) to positive change in the school environment through a special system of measures. The main goal of the program – the creation of the educational process of primary school (grades 1-4) conditions for the preservation and strengthening of the physical, mental, and spiritual health of children, prevention of disease and the acquisition of skills for a healthy lifestyle conducive to the formation of children attitude to their own health. New technologies aimed at improving the health of schoolchildren have been developed. The program includes four areas: 1) building and maintaining emotional state (through success), 2) the inclusion of health-saving technologies in the educational process, and 3) vitageny training (accumulation of life experience) and 4) work with parents to ensure the continued health of children. Positive experience of the program for 12 years on the examples of three entire issues of primary school was obtained. Physical and mental health of all children in the period of study has not deteriorated, the momentum of improvement in visual acuity and posture, as well as resistance to various diseases has been established.

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#### PRACTICAL ASPECTS OF COMPETENCE-BASED TEACHING APPROACH REALIZATION IN HIGHER EDUCATIONAL ESTABLISHMENTS

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This paper presents the analysis of the competence-based teaching approach to scientific cycle disciplines, as well as methodology of competences forming.

Basic idea of the Bologna process is a competence-based teaching approach. Transition to this type of educational process due to controversial concepts and ambiguous categories of competences requires systematization [1]. European project "Tuning Educational Structures" (TUNING) offered 30 competences in three categories: instrumental, interpersonal and systemic [2]. The structure of the competences is complemented with one more component, which is general scientific competence, in the programs developed by the federal component of the natural and scientific cycle for the State Educational Standards (SES) of the third generation [3]:

#### 1. General scientific competences:

- ability to scientifically analyse problems, processes and phenomena, ability to use basic knowledge and research methods in practice;
- ability to acquire new knowledge, including the use of modern educational and information technologies;
- ability to use the knowledge of the modern physical world view and evolution of the Universe, space and time patterns, structure of matter in order to understand processes and phenomena of the nature;
- understanding the role of physical laws for the environmental protection, environmental management, development and preservation of the civilization.

#### 2. Instrumental competences:

- ability to apply the knowledge about objects and phenomena in practice, including making hypotheses, theoretical models, analysing the limits of their applicability;
- ability to use the fundamental physical theories knowledge to solve emerging fundamental and practical problems, self-learning;
- readiness to apply analytical and numerical methods of problems solving using programming languages and systems, computer modelling tools.

#### 3. Social, individual and general cultural competences:

- mathematical and scientific literacy as a part of professional and human culture;
- ability to prove allegations, as well as performance of other cognitive and communicative functions;
- ability to define and realize perspective directions of intellectual, cultural, moral, physical and professional self-development and self-improvement;
- persistence in achievement of purposes, endurance, ability to critically reconsider the accumulated experience, if necessary to modify their professional activity profile;
- ability to comply with ethical and legal standards, tolerance, social adaptability, ability to work in teams, manage people and to obey management instructions;

– possession of socially significant ideas about healthy life style, ability to written and oral communication in the mother tongue, knowledge of a foreign language.

#### 4. Professional competences:

- to understand the difference between empirical and theoretical methods of investigation of processes and phenomena, necessity to verify theoretical conclusions, analysis of their application field;
- to show the ability to abstract thinking, to manifest and develop intuition;
- to have the ability to read and analyse educational and scientific literature, including the one in foreign language;
- ability to make representations, provide evidence, issues, research findings clearly and accurately using terms understandable to the professional audience both in written and oral form.

Teaching techniques enabling formation of a specialist's professional competence are not revolutionary. Some techniques have existed for a long time and are widely recognized in pedagogy and teaching methodology of academic disciplines. But nowadays the approach to the well-known techniques is different, it requires a new combination of them, optimization with the purpose of their use (i.e. development and forming specific competences, and even better - the integrated competence, as they are difficult, and perhaps unnecessary to differentiate). Analysing the contents of the competences as a set of skills, we can draw a conclusion that the new term "building competences" reflects the eternal and the old: education is knowledge plus upbringing. Another question is: what kind of upbringing? But any kind of upbringing is important, which means that "building competences" should be carried out not only during the student's study period, but much earlier, i.e. during their school or even pre-school period. Methods and techniques of building competences vary depending on the stage of learning and goals in life. It is widely known that results of the Unified State Exam, at best, only show "knowledge" component, while a considerable set of abilities required from university applicants is not determined. Good results at Unified State Exam allow to enter a higher educational establishment, but not always allow to study there successfully. "Concepts of modern natural science" course like no other subject, having certain structure and teaching technique, is a course which allows to develop both a number of skills among junior students, increasing the overall level of their spiritual education, and background knowledge, that constitute intellectual integrity of the person gaining higher education. "Concepts of modern natural science" course cannot be turned into a list of encyclopaedic information on the subjects of natural and scientific cycle of school curriculum. This course should be built with the idea of a systematic transdisciplinary approach, finding similarities in different [4-5].



The systematic approach is one of the most important ways to address methodological and theoretical teaching ways. The systematic approach should penetrate deep into the sense of pedagogical events. The main advantages of this approach in the field of pedagogical events are in the fact that due to them new problems, new challenges, search directions are born to improve the quality of teaching. The authors have developed a methodological handbook with the program of "Concepts of modern natural science" course and teaching methods which comprises two cycles:

**I Cycle** - lectures, reflecting a new concept of evolutionary development of any systems including the achievements of modern science, highlighting universal, fundamental laws of their development. These laws operate and manage the processes in physical, biological, chemical, economic and other complex systems. The complex systems being various according to their nature, consisting of a large number of interacting subsystems, are capable of self-organization (synergetic processes) and evolving under certain conditions.

**II Cycle** - seminars held in the form of a conference after the full course of lectures. Prior to the conferences, each student hands in the report on 25-35 pages, designed according to all contemporary requirements for publication: 1) title page; 2) abstract at least in two languages (Russian and English, or Russian and German are compulsory); 3) contents of the report; 4) introduction where it is necessary to present the connection between the topic being studied and the theory of the chosen system evolution; 5) contents of the chapters with illustrations; 6) conclusion; 7) references; 8) tests on the report topic designed by the author; 9) glossary of terms used in the report.

At the conferences students make presentations on the topic of their reports, using various means of illustrations: mathematical conclusions, drawings, diagrams and flow charts, both on the board and using modern means for presentations, colourful posters, and even movies. Much attention is attracted by the reports presented in the form of a dialogue in the problematic style with co-authors of the report. The reports made in foreign language are of great interest too. The translation shall be distributed beforehand or read aloud by a co-author during the presentation. Such form of seminars encourages students' mental activity and develops competences in all four directions.

The exclusion of "Concepts of modern natural science" course out of the Bachelor's degree curriculum in specialty "Mathematics" with the supposed reference to the presence of a natural and scientific discipline component within the course "Theoretical Mechanics" is unjustified. Knowledge of the world cannot be limited by the same kind of matter – "substance". Mechanics does not deal with "substance-field". Modern civilization development is based on use of the field form of sub-

stance: electromagnetic field, gravitational field. All forms and types of information links on the Earth and in the Space are based on the latest information and innovative technologies that will evolve and grow. Modern biotechnology is being created at the intersection of sciences. Energy technologies require different specialists having high mathematical literacy, and mathematicians in their turn are required to have knowledge about processes of nature. The exclusion of "Concepts of modern natural science" course from the curriculum may result in the increasing the gap between knowledge itself and its application. "Concepts of modern natural science" course improves the quality of educational technologies, and as a result, increases the level of mastering cognitive processes in all cognitive areas, including intellectual processes: algorithmic, heuristic, etc. In other words, the dynamics of interiorization increases, i.e. formation of mental actions and interior consciousness concept through a student's mastering of external links with objects and processes in technology and nature, forming competences in practice, that are necessary for a graduate in his practical activities.

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#### METHOD OF FORMING THE RECEPTION OF EDUCATIONAL ACTIVITIES OF STUDENTS

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Wielding methods of students of academic work depends on the methods used in the three levels of training. The first level corresponds to the explanatory and illustrative method of learning, a second - reproductive, finally, the third level corresponds to

the problematic methods of presentation, partially exploratory research and teaching methods.

Applying the learning process chosen for pedagogical essence methods of instruction, the teacher can deliberately lead students to assimilate their content at any particular level.

In modern didactics are the two interconnected aspects of the learning process: the activities of teachers and students' activity. In the learning activities of students that learning is informative, there are three interrelated components: 1) the acquisition of knowledge; 2) mastering the techniques (methods) educational work; 3) acquisition of skills.

Education students of learning methods combine both content knowledge and techniques of mental activity of students.

In school practice, according to E.N. Moeller-Kabanov [1], methods of mental activity are methods of academic work. Skillful execution of any human activity requires the use of one or more methods mental work, and together they constitute the method of operation, including both thought and action.

Learned methods characterized by the fact that a student takes him to new challenges, that it uses the new conditions. Receiving academic work can be formed at the level of the student ability or skill level. When teaching subjects of natural and mathematical cycle most of the techniques implemented at the level of skills that require thought and attention for their application. At the level of skill the students solve only a small number of educational problems. This is due to the fact that simple methods can only be formed at the level of skill of pupils.

Methods of academic work formed the lessons can be grouped into several groups such as:

1. Methods of academic work are typical for one academic subject (reading geometric drawing, recognition of the type of chemical reaction, reading wiring diagrams, etc.).

2. Common methods. These include techniques for working with a textbook, planning of academic work, self-control, note-taking, self-organization.

3. Methods of mental activity - a comparison, analysis, synthesis, generalization, specification, extraction of essential features, abstraction, establishing causal relationships, etc.

Each of these groups of methods have their own features for their formation. However, the formation of methods of academic works have several common features:

1. Basis of formation of methods of academic works are knowledge of theories, laws, facts, leading ideas, system concepts.

2. Methods are formed through a system of exercises and cognitive tasks.

3. Reliance on previously learned knowledge and methods of interdisciplinary nature of academic work. Transfer methods of academic works.

4. Management of cognitive activity and mental development of students by teachers. Self-governance in the process of learning student

5. Implementation of a gradual transition from work on the model to independent creative application methods.

Receiving of academic work formed after studying theoretical material, it is aimed at the process of digestion, binding, and then he can become a means of mastering new teaching material.

In the methods of organization of process of studying, aimed at assimilation of methods academic works with students, the teacher is supposed to work, and receive formative activities of students and assimilating them.

Methodologically is very important to organize activities for students receiving content comprehension and retention of knowledge about actions. This is facilitated by verbal or written instructions, memos, plans, as well as the system of independent works, the most rational selection of learning tasks of increasing difficulty to master the technique and the development of his ability to transfer, as well as the organization and synthesis methods.[2]

Quality of mastering of one way or another reception of academic work depends on a number of objective reasons: the level of previous training of students, their age level of mental development and individual differences, techniques and features formed by the reception, etc.

At formation of methods of academic work make special demands for the selection of tasks, didactic material. Aimed at the development of logical thinking system tasks and assignments can be grouped according to the methods of mental activity. For example, this job require:

1. Analysis, synthesis, abstraction, generalization and systematization of knowledge:

- Issue of the main and substantial in content to learn the academic material, visual aids, educational experiment;

- Determination of cause-effect relationships of the studied phenomena, processes, mathematical objects;

- Isolation (abstracting) of the essential features of the process, a mathematical object;

- Definition of natural and mathematical concepts, summarizing the facts, summarizing them under a general concept;

- Identify common patterns of development process, phenomenon;

- Detailed or brief description of the phenomenon, the law, a process task to prove or to build;

- Consideration of group of identical phenomena and processes, and facts in certain logic.

2. Matching, comparison, classification, generalization:

- assimilation of similarities and differences, general and specific;

- establishment of the changes occurring at different stages of the same phenomenon, process;

- the establishment of similar patterns of development processes and phenomena.

3. Reasoning and conclusions:

- clarification of the essence of processes and phenomena;

- the correlation of certain facts with the general course of events in the process of action with certain regularity;

- summarizing repeated facts and dependency under law.

4. Proof of correctness of the conclusions:

- confirmation of the facts output;

- justification or refutation of the hypothesis;

- playback progress proof theoretical conclusion;

- implementation of knowledge of the laws to substantiate proxy conclusions, to refute proxy assumptions.

5. Localization of events and processes in time:

- to establish the duration and sequence of events, processes, phenomena, to determine their synchronicity;

- the ratio of history of the discovery of phenomena, processes the historical period;

- read drawing, graphics, tables, and use their content as a source of knowledge.

In academic work methods perform several functions:

1. Methods of academic work contribute to the formation of theoretical knowledge as welcome in this case is the communication method of practical actions of students with their knowledge assimilated; On the other hand, the acquisition of knowledge is achieved by repeated application of its students for the solution of various cognitive tasks, which is possible only under the condition of ownership of students methods of academic work.

2. Formation of methods academic work contributes not only to give students the methods of cognition and the ability to work with the literature, but also to prepare students for future independent practice, to continue self-education.

3. Methods plays a great role in developing training, which is based on the development of pupils' thinking. Forming methods equips students with the natural cycle of the general methods of mathematical self-cognitive work with the active use of reception of mental activity.

4. Mastering the methods promotes the formation of students scientific worldview - dialectical method of cognition, which is characterized by the study of natural objects and phenomena in the development, historical approach, establishing relationships and contradictions.

We proceeded from the fact that one of the main indicators of developing education in the implementation process is a qualitative shift in student

mental activity, the emergence of new parties in its activities.

We relied on three main levels of quality changes of mental activity of students:

- the level of the transposition of methods of educational activities, which is accompanied by their restructuring and finding new ways to solve;

- level determined by the transition from unconscious use of techniques - to conscious, on this basis, the emergence of a qualitatively new feature - a shift in mental activity;

- the level of qualitative changes in the motivational sphere of the individual student, the emergence of new cognitive interests, motives and goals.

Dedicated levels, in our opinion, should be associated with different levels of implementation of interdisciplinary connections with the activities of teachers and, consequently, with different levels of formation of interdisciplinary links in student learning activities.

Basis for isolation levels is the idea that the content side of disciplines includes the experience of scientific thinking (scientific methods) that must be learned in one form or another student[3].

In this case the content side can be mastered by students depending on the training methods used at one of three levels[4]:

1. Level consciously perceived and recorded in the memory of knowledge (it is characterized by the possibility of students to use ready intersubject knowledge);

2. Level of readiness to use knowledge in similar conditions, modeled;

3. The level of preparedness for the creative use of interdisciplinary knowledge in new learning situations.

The considered levels achieved with the appropriate teaching methods. The first level corresponds to the explanatory and illustrative method of learning a second reproductive, finally, the third level corresponds to the problematic methods of presentation, partially exploratory research and teaching methods.

In the learning process of any teaching method is implemented with his usual training methods and their combination.

So, for explanatory and illustrative method intrinsic forms of submission are any ready-made knowledge. Consequently, teaching techniques aimed at mastering students study material filed in the form of ready knowledge will be teaching the essence due to boundaries explanatory and illustrative method. Therefore, for the organization to achieve the first level of students mastering the content can be used, such as teaching techniques intonational emphasizing important points logically teacher present material; instructing students (by drafting tables, diagrams, work with text tutorial); hint - hint containing information ready;

presentation of students reformulated questions, text assignments to facilitate their understanding of the meaning, etc.

Reproductive method intrinsic advocate any forms of single or repeated playback students studied under standard or easily identifiable proximity to the sample. Therefore, any training techniques, this objective can be used to achieve the organization of the students of the second level of mastering content.

Intrinsic problem for presentation will be included in any form of disclosure teacher contradictory process of solving the problem of evidence.

For partially - search method as essential will be performing any form of student learning the individual steps of the creative search. Hence, teaching techniques aimed at mastering exploded students damn creative activities under the guidance of a teacher, will be linked to the achievement of the third level of learning.

For research method are intrinsic any form of holistic self-paced learners creative tasks. Therefore, all methods of training, aimed at organizing students mastering content subject to creative tasks

can be used to achieve full assimilation of the third level. This assimilation is accompanied by the formation of their methods work, mastery of which is a measure of mental development.

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*Materials of Conferences***COGNITIVE APPROACH IN  
COMPUTATIONAL AERODYNAMICS**

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The beginning of cognitive science was in 1960. Cognitive technology in computer science is combination of methods, algorithms and software for modeling the cognitive abilities of the human brain to solve specific application problems [1, 2]. Cognitive technologies based on the achievements of scientific disciplines (mathematics, artificial intelligence and data mining, information technology), and largely invariant with respect to the subject area. For example – recognition; identifying patterns in the data; solving computer-aided design of complex systems; decision support systems with fuzzy input; etc. In the last century, the founders of cybernetics Alexander Bogdanov, Norbert Wiener, John Von Neumann formulated the idea of the combining a computer with human abilities. Cognitive technologies based on the achievements of scientific disciplines (mathematics, artificial intelligence and data mining, information technology), and largely invariant with respect to the subject area. This approach has been practically implemented for the development of nuclear energy for military and peaceful purposes (Los Alamos, Arzamas-16). To reduce project time and the number of expensive full-scale and experiments specialized the computer systems such as Knowledge Based Engineering, Computer Aided Engineering. The models are based on the “Physics” [3].

Numerical methods have considerable complexity. These reasons are complicated the possibility of preliminary design stage, which is considered a lot of options. Therefore, models based on a cognitive approach become natural. They are built on the basis of scientific and intuitive analysis of data obtained by means of theoretical, experimental, numerical studies. In addition, the specialist should have a basic knowledge of the construction and analysis of numerical algorithms, the planning computational experiments and at least one programming language.

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**MATHEMATICAL MODELING  
OF AEROTHERMODYNAMIC  
CHARACTERISTICS FOR HYPERSONIC  
VEHICLES**

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The modeling of high-speed flows stipulates also the compliance with other similarity criteria, which includes first of all the criteria of Mach numbers (M) and Reynolds numbers (Re), as well as ensuring the low level of turbulence and flow homogeneity in the facility working section. The method of model fixation also influences significantly the accuracy of the experiment. The simultaneous solution of these problems within one experimental facility seems to be impossible. In the extreme case of free-molecular flow, the integral of collisions in the Boltzmann equation becomes zero, and its general solution is a boundary function of distribution, which remains constant along the paths of particles [1]. In the transitional regime, the most suitable method to compute heat transfer coefficient of hypersonic vehicle relies on bridging formulae [2]. In order to determine the force action and heat action of the gas on the body, it is sufficient to know local exchange coefficients of impulse and energy.

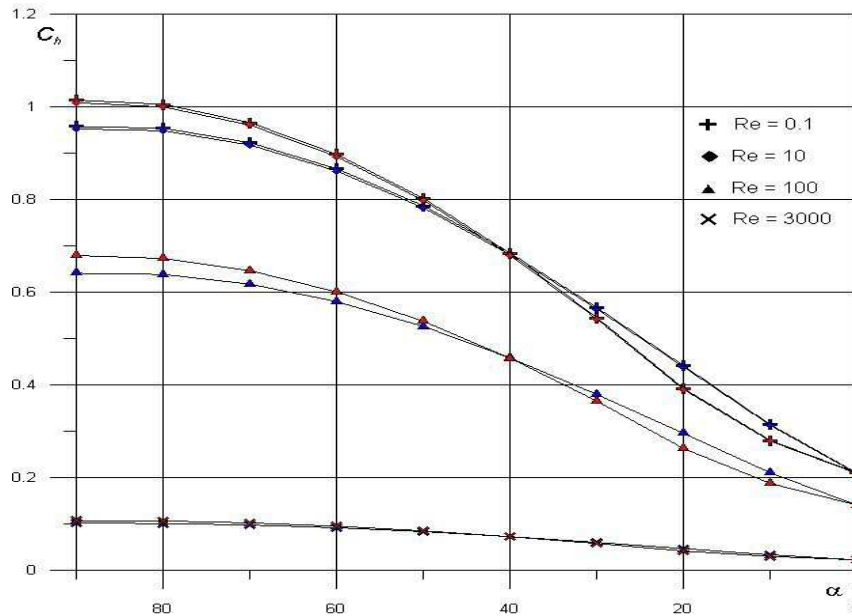


Fig. 1. Heat transfer coefficients  $C_h(\alpha)$  for “Clipper” (blue) and “Falcon HTV-2” (red) [2]

The reported study was partially supported by the Russian Foundation for Basic Research (Research project No. 14-07-00564-a).

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### THE DEVELOPMENT WATER – SUPPLY WELLS CLEANING BY THE MECHANICAL, HYDRAULIC AND ELECTROCONTACT METHODS

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The mechanical methods of the decolmatation, which are widely used in the water – supply wells construction and exploitation practice, are very simple in the presence of the appropriate adaptations, and, moreover, they are easily to be carried out.

For the filters decolmatation of the development wells, and the various metal scrapers, grabs and spears are mainly used, which are mixed along the filter or are rotated in it, and they are allowed to be removed the colmatant from its inner surfaces. [4].

So, only the soft deposits are usually responded to such mechanical cleaning, moreover, due to the nature of the surface exposure, the unaffected main bulk of the colmatant is remained, having concentrated beyond the inner loop of the filter and within the filter zone (e.g. the depressive funnel).

The decolmatation hydraulic methods are mainly included such traditional technological and processing methods, as the wells filters washing with the water, and the air – lift pumpings out under the various schemes, as well as the water injection into the filters, using the packers and the hydro-grabs, and hydro-spears.

So, they often resort to the direct flushing water of the of the filtered space through the drill pipes into the working surface of the filter, in the course of exploration and the development of the drilled wells to be removed the washing solution and the clay cake erosion on the mine’s shaft walls.

It is practiced the interval standardized water filters flushing, having pumped under the pressure through the various parker devices for deeper decolmatation of the exploited and development wells.

This technology disadvantage is that having ousted from the shaft bridging and colmatating material is remained in the pore space, that it can be re – clogged within the filtered zone during the subsequent operation. [3].

So, the hydraulic impact effectiveness, along with the disabilities, is significantly increased, when the erosion of the bridging and colmatating crust on the inner surfaces of the filter by the water artesian water jets is combined with the mechanical treatment.

The electro-hydro-contact impact upon the filters and within the filtered zone of the wells has

practically been based on the impulse action of the electric energy between the spark ball electrodes, having installed inside the filter.

When high voltage current impulses applying to the spark ball electrodes, having immersed into the water, the fluid sample is occurred in the interelectrode space, which is accompanied by the significant amount of the energy release, having previously accumulated in the capacitor bank. So, the intensive heating of the plasma produced by the discharge current is resulted in the pressure increase in the discharge channel and its further extension with the strong compression of the adjacent layers of the fluid, in which the shock wave is arisen. So, for all this, the discharge channel is transformed into the rapidly increasing in the size – vapor cavity, which is caused the ripple series following one another compression – low pressure acoustic waves, and the alternating hydro-streams. The decolmatation filter and the sprinkled coating adjacent layers with the electrohydraulic impact is mainly achieved by the acoustic waves and hydro-streams shock force. [2].

The filters decolmatation efficiency by the electrocontact method is depended on the pressure at the shock wave front, the duration of its effect upon the filter, the generated pulses quality.

The various types of the plants are used to be performed electrocontact treatments, but the disk – shaped spark gap base of the negative electrode is particularly distinguished by the highest reliability when it is operated under the various conditions.

Thus, electrocontact method is allowed the parameters control possibility, and it is accessible for the development under the production organizations conditions. [1].

Its main drawback is in the incomplete cleaning of the filter channels from the destroyed colmanant remnants, that is brought the filter plugging point and he filtered zone.

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### THE ROCKS FLUID DESTRUCTION APPLICATION IN THE STRIPPINGS PRODUCTION TECHNOLOGY AT OPENCAST MINING OF ORNAMENTAL ROCK DEPOSITS

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The stripping operations are practically produced at the different stages of the development of the mineral resources deposits. The ongoing removal of the alluvium, out-weathered, and the contained host rocks in the temporary or the permanent piles and dumps are laid in the basis of the capital mining and the current stripping operations. So, this process is preceded by the preparatory works, having consisted in their previous loosening, which is practically produced by the mechanical, blast – hole drilling, hydraulic, physical or chemical methods. The extraction, excavation and the loading of the loosed overburden rocks are practically fulfilled by the excavators, earth – moving or loading and transporting cargo machines and vehicles, and the haulage – by the different types of the technological careers strength and pit – run transport.

The natural quality preserving of the mineral resource in the extraction mining process is one of the main challenges in the open pits and the quarries of the ornamental rock. It may be significantly altered, depending on the rocks destruction method, having used at the stripping operations production. So, the explosion is practically used on a number of the open pits and the quarries of the ornamental rock for the preliminary preparation of the stripping and overburden mining rocks. So, the multi-directional network of the cracks and fractures in the marble and marbled limestone, having resulted from the explosion, can be extended up to 50 – 60 m, and in the granites – up to 100 m from the place of its execution. One of the ways to be reduced the artificial fracturing of the ornamental rock is the production development of the stripping operations technology, having provided the layer cutting of the alluvial, and out-weathered mining rocks from the indigenous useful mineral resource the cracks, having filled the viscous fluid. So, across the whole area of this layer, at the day surface layer, by the stripping mining rocks are impacted by the hammers, having mounted on the chassis of the crawler excavators, or of the incident of the large mass of the goods, having held in the place using the ropes by the same technical means. So, this is practically achieved the required quality of the pre – crushing, and the necessary prerequisites are being created for their subsequent cleaning with the smooth mining area, by the excavation and transporting equipment. The comparative studies of the efficiency of the

crushing layer of the alluvial and out-weathered mining rocks, for the case of the absence of its sweeps, as well as for its sweeps of the hydraulic destruction of the mining rocks and the fracture, having formed, using the viscous fluid are presented in the paper.

At the experiments execution, the «Sibit» – the cellular aerated concrete has been used, as the stone material, having characterized by the high level porosity, and low level density and strength. So, the twelve prismatic models with measures  $100 \times 125 \times 200$  mm have been made from it. The metal load of 100 mm diameter, 200 mm height, with the central through the vertical inner bore diameter of 20 mm and the weight of 11,9 kg has been used, as the means of the impact fracture models. It could freely be moved by the metal rod with the diameter of 15 mm, and the length of 2,000 mm, and the weight of 2,8 kg. This rod has been mounted on the metal fence in diameter and 100 mm height, with the internal dead-end hole of diameter and 20 mm in height, and also weighing 6,2 kg. So, the requited impact energy load of the model has been achieved, by changing the length of its slip by the metal guide rod. The shock destruction of the three types of the models has been considered in this paper. In all of them, the horizontal exterior incisions have been passed along the perimeter at the distance of 50 mm from the top. To this depth, it has been resettled by five vertical cuts, which are mimic natural fracturing of the mining rocks massif, which is scheduled to the impact fracture. The first of them have not been violated, the second at the distance of 80 mm from the top hook in the crack, having formed, using the fluid, the third at the same distance from the top – the crack, having formed by the viscous fluid. The surface cracks in the models, having simulated the pre – slicing of the mining rocks massif by the fracture, having formed liquid, were moistened with the water, and the viscous fluid – sealant layer thickness of 5 mm.

For the hacked crack formation can beset to be used the special discharge equipment. So, the operations are began from the fact, that on the day surface the barrel is mounted with the viscous fluid, having pasty consistency, which is practically pumped through the pipeline by the handle pump at the initial pressure of 350–400 bar (e.g. 35 – 40 MPa) into the special prepared holes. The estuaries parts of these holes are sealed by the packer devices. In the case of the big length of the holes, in the bottom the casings are driven into them. With the lack of the pressure, the pimp pressure – improvers are practically used in the system additionally to the main pump. As a result of it, the separate hacked cracks are formed in the convergence in general, and the subjected to be deleted the layer of the alluvium and out-weathered mining rocks is cut of the indigenous useful fossil.

It can be practically used the crawler excavators, which are capable of holding the large mass loads, for the preliminary loosening layer of the alluvium and the out-weathered mining rocks. After the hacked crack formation, at the day surface the falling loads blows are produced, which are held on the arrows of the tracked excavators, using ropes. As a result of this, the loosening of the alluvial and out-weathered mining rocks is made, having facilitated its further cleaning.

So, the scraping and the subsequent haulage of the preliminarily loosened layer of the alluvial and out-weathered mining rocks can be made, by the earth-transporting, loading and transporting cars, and dump trucks. On the preliminary crushing layer of the alluvial and out-weathered mining rocks the excavators are embarked, having transported it to the reception trench. The crawler excavators, having equipped by the direct mechanical shovels, are conducted the mining mass loading into the dump trucks, with the purpose of its further transportation and storage in the dumps.

According to the results of the previously conducted scientific researches and studies, for the formation of  $1 \text{ m}^2$  cracks in the rocks of the medium strength (e.g. marble, marbled limestone), it is quite necessary not to be exceeded  $100 - 126 \text{ cm}^3$  viscous fluid, having consisted of the «Litola 24» mixture and the graphite powder – like in the equal proportions. The price of  $100 \text{ cm}^3$  the «Litola 24» mixture and the graphite powder in 1:1 ratio is made up 8,15 roubles (e.g. Novosibirsk Region, 2013). From this it is followed, that the viscous fluid cost, required for the hacked crack area formation  $100 \times 100 \text{ m}$  will be made up no more, than 81,5 – 102,7 thousand roubles.

On the basis of the experimental researches and studies, the following scientific and practical conclusions have been obtained on the work done:

1. The reciprocates motions of the interburden layer from the viscous fluid, having caused by the incurring – strikes on the layer of alluvial and out-weathered mining rocks from the day surface, will be promoted the direction transformation of the destructive energy application. The main part of this destructive energy will be gone back in direction of this layer, as it is possessed quite less, in comparison with the indigenous minerals resource weight (e.g. the Law of Inertia Newton);

2. The increasing degree of the pre – crushing layer of the alluvial and out-weathered mining rocks at the stripping operations execution will be helped to be facilitated their cleaning from the mining lease area by using the earth – conveying and transporting equipment, and also further to be reduced the whole amount of the processing at the production the secondary products from them, in the form of the building crushed stone;

3. The interburden layer formation from the viscous fluid will be promoted to greater specific



power reduction of the artificial fracturing of the indigenous layers of the ornamental rock, in comparison with the absence of such activities and events, or the crossovers of the alluvial and out-weathered mining rocks of the hydraulic fracturing crack;

4. The blasting replacing of the alluvial and the out-weathered mining rocks by the interburden arrangement from the viscous fluid, having intercepted them from the indigenous useful mineral resource, will be promoted to be reduced the harmfulness of the stripping operation production, their safety improving, and also the cost – cutting companies and enterprises on the labor health and safety, as well as the environment protection;

5. The energy of the falling weight load is lost in the minimum degree, when shock fracture of the models previously pristine;

6. When the shock fracture models, having previously disturbed by the crack hydro-fracturing, the energy of the falling weight load is lost, in the collisions of their upper and lower parts, as well as their upper parts rebounding from the bottom ones, as less massive from more massive ones. As a result of the double energy loss of the falling weight load, the total number of the debris and their fragments at the shock fracture models, having previously disturbed by the crack hydro-fracturing is less, than at the previously pristine models. Due to the collisions of the upper and lower parts of the models, as well as the upper parts of the rebounds from the bottom ones, there is the energy redistribution of the falling weight load up, and as the consequence, the degree increase fragmentation of the upper parts, compared with the pre – intact models;

7. When the shock fracture models, having previously disturbed by the crack, which has already been formed, using the viscous fluid, the energy of the falling weight load is lost at the collisions of their upper and lower parts, the upper parts bounces from the lower ones, as less massive to more massive, and also it is distinguished in the layer of the viscous fluid. Due to the energy losses triple drop weight load, when the total number of the debris and fragments at the shock fracture models, previously broken crack, having formed, using the viscous fluid is less, than at that, which has been formed by means of the liquid. Due to the degree decrease of the upper and the lower parts collision, the degree reducing of the bounces of the upper parts from the bottom ones, as well as the disappearance of the energy part in the layer of the viscous fluid, there is the energy redistribution of the falling weight load up, but with the decrease in the degree of the fragmentation of the upper parts of these models, in comparison with those, that are pre-broken by the crack, having formed with the liquid;

8. The fluid-fracturing application in the technology of the stocks opening of the ornamental rock will be allowed to be reduced of the artificial fracturing of its indigenous reserves, due to the energy redistribution in the direction of the impact fracture,

which is subjected to be removed the layer of the alluvial and out-weathered mining rocks. For all this, the degree of its pre-crushing will be increased, that will be created the quite good conditions for the subsequent production the secondary production from it, in the form of the building crushed stone.

Thus, the scientific significance of these studies is to be applied the fundamental laws of the mining rocks failure in the solving of the urgent challenges of the mining production and industry. The scientific obtained results, in this direction, can be presented, in the form of the necessary recommendations for the production of the mining activities at the enterprises for the marble extraction, in the form of the special blocks in the open method and way.

Thus, some challenges are remained, the significance of which are quite substantially, which can be solved using the mining rocks fluid – fracturing:

1. The justification of the need for the prior hardening of the fractured massif of the ornamental rock by the polyester resins (e.g. they are used to be filled the cracks) from the holes, that later they will be used for the monolith separation. So, this separation can be performed by the dynamic or the static wedges, as well as using the fluid – fracturing or without it;

2. The justification of the destruction need of the strongly fractured (e.g. «springy») of the oversized ornamental rock through the drilled holes in them blind, having filled by the viscous fluid. So, this destruction can be done by the blow of the hydro – pneumatic hammer peak, and the destructible oversized one itself – can be clamped by piling on it other oversizes.

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#### **DISTRIBUTION OF RESOURCES IN HIERARCHICAL MULTIELEMENT SYSTEMS WITH PARALLEL STRUCTURE**

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The Majority of modern chemical manufactures are complicated technological complexes, each stage of processing of raw material on which is carried out by the several same technological operations forming systems with parallel structure. Here there is a problem of modeling and optimization of systems with parallel structure. This problem includes three basic aspects: the decision of distribution problems of the limited resources between parallel operations or elements on top level of management's system, a finding of local-optimum

decisions for its separate elements at the bottom level and by mutual coordination decisions of these problems among themselves. From here follows, that to one of questions defining a complex who are considered on the management information system the enterprises, problems of division distribution of the limited resources between separate subsystems. Here the concept resources is used in the most general sense and can accept various forms, such as financial, material, information, etc.

### Introduction

By virtue of parallelism and uniformity of technological operations the basic matrix of system of restrictions of a problem of resources distribution appears close to singular and leads to instability of the decision. In works [1, 2] for the of problems decision of resources distribution between parallel objects the method of expansion of admissible values set is offered. For the decision of resources distribution problems, forming parallel casual streams, generalization of the given method [3] is offered. In work [4] method of expansion is generalized for of accommodation problems of discrete objects which parameters are set by casual image. The given approach consists that the decision of an initial of optimization task is defined by the directed transition to its optimum decision from the point corresponding the decision of more simple problem with expanded area of admissible decisions. Computing procedure at use of this approach becomes not only tolerant to degeneracy matrixes of restrictions matrixes task, but because of specificity of model of systems with parallel structure provides a finding of exact problem decision.

#### 1. The elementary of resources distribution's problem in hierarchical systems.

Mathematically the resources distribution tasks in hierarchical multielement systems with parallel structure can be formulated as follows. The parallel structure of multielement system (figure 1) where each element carries out some identical kinds of activity is considered. The interrelation between these  $i$ -s subsystems happens through the general entrance parameter  $X = (x_1, x_2, \dots, x_n)$  which is the some resource, and through target parameters

$$Y = (y_1, y_2, \dots, y_n).$$

Here  $x_i$  – an entrance variable, a resource which is allocated for processing to  $i$ -th subsystem ( $i = 1, \dots, n$ );  $y_i$  – a product which can be races-считан on the basis of model of interrelation  $y_i$  с  $x_i$ ;  $u_i$  – some operating influence which is used for realization of economic processes in a subsystem;  $y_i = f(x_i, u_i)$  – mathematical model of  $i$ -th element.

$$\sum_{i=1}^n x_i \leq A,$$

where  $n$  – the general number of subsystems,  $A = (a_1, a_2, \dots, a_m)$  – a vector of the limited resources (a total resource) which is required to be distributed(allocated) between separate subsystems.

The total of a target product can be presented in the form of the sum

$$Y = \sum_{i=1}^n y_i.$$

There are various terms for definition of criterion of optimization: function of benefit, criterion of quality, function of the purpose, function of satisfaction and others. We shall use all these terms, including their unequivocal. The general problem of distribution of resources can be formulated as follows. It is required to find such vector  $X^* = (x_1^*, x_2^*, \dots, x_n^*)$ , satisfying to conditions

$$\sum_{i=1}^n x_i \leq A \quad (1)$$

at which function of the purpose reaches(achieves) the maximal value, that is.

$$\sum_{i=1}^n y_i \rightarrow \max \quad (2)$$

Operating influence  $u_i$  ( $i = 1, \dots, n$ ) enables the central body to influence a subsystem, considering its activity. A condition (1) generally are not strict inequality, however more often in considered problems strict equality as if the inequality there can be a undesirable rest of some resource is set is carried out.

The task in view concerns to a class of problems nonlinear about cramming static optimization as assumes, that  $X$  and  $Y$  or do not depend on time, or are considered on some interval of time  $[0, T]$  where it is possible to consider(count) these variables constant. For organizational-economic systems as the purposes various economic categories, such at least expenses or a maximum of the income of realization of production and (or) services can act. In chemical-technological systems criterion functions can be as well quantity parameters of a let out product. We shall consider the limited resource as scalar size that is one certain kind of a resource, for example, the finance, raw material, etc. In case of when it is necessary to distribute some kinds of resources, треба-NO to solve more complex vector problem. The elementary case of scalar problems arises, when functions  $y_i = f(x_i)$ ,  $i = 1, \dots, n$ , are linear functions. For a case when resource  $X$  is scalar size, this problem has the elementary decision which can be described by simple algorithm:

1. There is a subsystem in which the output is maximal at giving values  $X$ .

2. The following subsystem for which it is maximal you-courses from the remained subsystems gets out.

3. The following subsystem by the same rules gets out, etc. the Choice is carried out until there will be the most bad subsystem in sense of the chosen criterion.

This problem can be written down in terms of linear programming as follows. It is required to find non-negative values of variables  $x_1, x_2, \dots, x_n, x_n$ , which optimize criterion functions  $y_i = f_i(x)$ . Thus restrictions on used resources (1) should be carried out. Let  $f_i(x_i) = a_i x_i - b_i$ ,  $i = 1, \dots, n$ , and the general criterion of optimization is additive-separable function. Then the problem consists in definition of a maximum of global linear criterion function

$$F(X^0) = \max \left( \sum_{i=1}^n a_i x_i + \sum_{i=1}^n b_i \right) \quad (2)$$

at performance of restrictions on resources

$$\sum_{i=1}^n x_i - X^0 = 0 \quad (3)$$

and technological restrictions

$$x_{i\min} \leq x_i \leq x_{i\max}$$

or

$$x_{i\min} - x_i \leq 0, \quad x_i - x_{i\max} \leq 0.$$

the given problem can be solved by methods linear programming. However in Minsker's book more simple algorithm considering features of a problem is offered. For this purpose we shall appropiate to subsystems but-measure in ascending order factors  $a_1 \leq a_2 \leq a_3 \dots \leq a_n$  and we shall distribute resources as follows:

$$x_1 = x_{1\min}, \quad x_2 = x_{2\min}, \quad \dots, \quad x_{i-1} = x_{(i-1)\min} \quad (4)$$

$$x_i = X^0 - \sum_{j=1}^{i-1} x_{j\min} - \sum_{j=i+1}^n x_{j\max}, \quad x_{i+1} = x_{(i+1)\max}, \quad \dots, \quad x_n = x_{n\max}.$$

Thus performance of a condition (2) is obvious. It is possible to show, that the given distribution is optimum. Let  $k > i$  and  $l < i$ . We shall transfer a part of a resource  $x$  from  $k$ -th subsystem to  $l$ -th subsystem. It will lead to change of global criterion function  $F(x) = (a_l - a_k) x$ . As  $a_l < a_k$  value of criterion will decrease, i.e. distribution (8) is optimum. The algorithm of optimum distribution of resources can be presented as follows:

1. As much as possible to distribute resources between subsystems, that is to put  $x_j = x_{j\max}$  and to check up a condition 1.

2. To reduce quantity of resources for the first subsystem until will be satisfied a condition (1). Then or the condition  $x_{1\min} \leq x_1 \leq x_{1\max}$  is satisfied or the condition  $x_{1\min} - x_1 \leq 0$  is broken. We accept  $x_1 = x_{1\min}$  then the condition (1) is not executed yet.

3. To reduce quantity of resources for the second subsystem on rule, described in item2, etc. the Block diagram of the given algorithm is resulted in figure 2. More challenges of mathematical modeling when mathematical models are nonlinear functions. If even one of functions  $y_i = f(x_i)$ ,  $i = 1, \dots, n$ , describing object, is nonlinear then we have a problem of nonlinear programming. For the decision problems can be used as analytical methods, such both a method of uncertain multipliers Lagrange, and various numerical methods.

**2. Distribution of resources between parallel systems.**

In the event that parallel systems are same, the basic matrix of system of restrictions of a prob-

lem of distribution of resources appears close to вырожденной, that leads to greater(big) computing difficulties and instability of the received decision. In works [1-3] it is offered to use the approach which assumes, that the decision of a problem(task) of distribution of resources receive by the directed transition to its(her) optimum decision from the point corresponding the decision of more simple problem with expanded area of admissible decisions.

$$F = CX \rightarrow \max, \quad (5)$$

$$AX \leq S, \quad (6)$$

$$EX = X_0, \quad (7)$$

$$X_{\min} \leq X \leq X_{\max}. \quad (8)$$

For her will be this task:

$$F_\delta = CX \rightarrow \max, \quad (9)$$

$$EX = X_0, \quad (10)$$

$$X_{\min} \leq X \leq X_{\max}. \quad (11)$$

The general scheme of the decision of a linear problem of distribution of resources includes following steps:

1. The decision of the expanded problem (9) - (11).

2. Check of the received decision on an admissibility on restriction (6) initial problems. If the decision is admissible, it is optimum.

3. A choice of a direction and a step of descent.

4. Transition to the new decision. The new decision received as a result of descent, will be, obviously, optimum if descent in the chosen direction leads to the least change of value of criterion function in comparison with other directions. The algorithm of the decision of a linear problem of distribution of resources can be found in [10]

### 3. Modeling of system of the analysis of a problem of resource distribution.

By optimization of various chemical-technological processes up to-is free often there is a problem of revealing of conditions or parameters, at which stable work of system, and also the parameters constraining the further improvement of process and an establishment of areas of more favorable values of these parameters [1, 4, 6] is provided. With reference to problems of distribution of resources, us can interested in a question on in what limits it is possible to change factors  $c_i$  before the optimum decision will cease to be those; or on-how many it is possible to change the factors describing size of resource before the decision will cease to be admissible, or, at last, as change of restriction factors influences the optimum decision. We shall consider two cases:

1. possible change of a vector of the right restrictions (6) – resources  $S$  on some size

$$AX \leq S + \Delta S; \quad (12)$$

2. possible changing parameters of functions

$$F = (C + \Delta)X \rightarrow \max. \quad (13)$$

General scheme of computer system of the analysis of a problem of distribution of resources is presented in figure 3 [6]. The device of computer modeling will allow to carry out the analysis of parameters, using consecutive diagnostics of parameters of system. Identification of stochastic model of change of resources is one of essential tasks of imitating system. Casual character of change of some parameters, for example, volumes of a resource, is the reason of necessity of identification of laws of distribution of the random variables describing change of volumes of a resource. Thus it is necessary to use known methods and algorithms of identification. Then it is made имитирование under the received laws of distribution of actual changes of parameters by means of corresponding algorithms of modeling of casual laws [6]. Thus, applying offered and other methods, it is possible to simulate most often meeting continuous of distribution. Normal, or raycovo distribution is one of the most important and often used continuous distributions. Uniform distribution on frequency of application concedes to only normal law. Expo-

ponential distribution describes a lot of real processes where «time of occurrence» is examined. Many non-negative masks describing any casual phenomena, it is possible to describe by means of scale-distribution. As its parameters define scale and the form of the law of distribution at change of their values density the scale-distribution can accept the most various forms and, hence, does this law by one of the most universal and valuable in the applied attitude [6]

### The conclusion

Computer system of the task analysis of distribution of resources can be or is used as independent, or included in structure of the information system's management by the chemical - technological processes assuming presence of parallel objects with the purpose of optimization of technological processes, proceeding in parallel units.

The majority of modern chemical productions are the difficult technological complexes, each stage of processing of raw materials on which several technological operations of formation of systems with parallel structure are carried out. There is a problem of modeling and optimization of systems with parallel structure. This problem includes three main aspects: solution of the problem of distribution of limited resources between parallel operations or elements at the top level of a control system, in stay local optimum decisions for its separate elements at the bottom level and on mutual solutions of coordination of these of a problem among themselves. From this it follows that one of questions of definition of a complex which are considered in a control system of information of the enterprise, problems of division of distribution of limited resources between separate subsystems. Here the concept of resources is used in the broadest sense and can take various forms, such, as financial, material, information, etc.

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#### **SIMULATION OF HYDROGEN-AIR PEMFC**

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Nowadays it is increasingly important to search new energy systems based on the use of pure and inexhaustible energy sources. Attractiveness of hydrogen as a universal energy is caused by its environmental cleanliness, flexibility and efficiency of energy conversion processes with its participation.

The aim of this work is to simulate the low operating temperature hydrogen-air polymer electrolyte membrane fuel cell (PEMFC) for generation of electricity using as a fuel gas containing impurities of methane and carbon oxide. At creating a PEMFC the main attention is focusing on the development of catalysts with enhanced tolerance to methane and carbon oxide in the fuel.

PEMFC is a complex system, its characteristics are determined by parameters of each component. Developed mathematical model of the PEMFC is based on the basic equations of hydrodynamics, conservation equations of mass, energy and current. The model takes into account the influence of the catalyst layer active area, the platinum content of the catalyst in the active layer, its overall characteristics on the current and the power produced by the FC.

Mathematical model includes the following equation: potential equation, local surface over-potential equations at anode and cathode, the bound-

ary conditions for the potential and equations calculating current density at anode and cathode.

The model treats the following processes: transport of water and reagents in bipolar plate channels, gas diffusion and active layers, membrane; protons transfer in membrane and active layer of the catalyst; electron flow in the active, gas diffusion layers and electrodes collectors. These areas are described separately in the model and are connected with each by boundary conditions.

The main equations of processes in bipolar graphite plates channels at anode and cathode sides are the laws of components mass conservation and the Navier-Stokes equations for the calculation of gas flow movement. The laws of components mass conservation in the diffusion layers are similar to the previous one, with accounting of layers porosity. The laws of components mass conservation in catalyst layers are similar to laws in the diffusion layers, with the addition of reactions. The law of water mass conservation is in the zone of membrane.

The mathematical model has been tested by comparison with a series of experiments for two types of cathode catalysts: commercial catalyst 40 wt.% Pt/C (E-TEK) -0.4 mgPt/cm<sup>2</sup> and synthesized catalyst.

In the result of simulation the dependences of components concentrations and gas concentration distribution along MEA thickness, the current-voltage characteristics are obtained. Aging of electrochemical active surface due to Pt catalyst poisoning has been simulated.

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*Short Reports***METHODOLOGY OF IT-BASED MATHEMATICAL MODELLING IN ARCHITECTURE AND TOWN PLANNING**<sup>1</sup>Kremlev A.G., <sup>2</sup>Babich V.N.<sup>1</sup>*Ural Federal University;*<sup>2</sup>*Ural State Academy of Architecture and Arts*

The modern practice of task solution in architecture and town planning is characterized by high level of an application of mathematical modeling methods which are based on the system analysis of social, economic, technological and other processes and objects of an urban environment in combination with an extensional and high-quality information support including the use of developed specialized information technologies, high-performance computing means and effective telecommunication. Such a combined process of IT-based mathematical modeling includes necessary information acquisition (according to aim), which defines the information model of the studied object, processing of the obtained data (its structuring) and the algorithm of this data transformation (encapsulation), formation of the object's mathematical model, model geometrization (computer visualization), performance of geometrical building (transformations), carrying out of searching and calculation researches (for the model optimization, variability and validity).

Any architectural or town-planning object (a public building, a construction, a buildings ensemble, a transport network, an industrial complex, etc.) can be considered as a difficult system possessing certain morphology, a functional orientation, system integrity, an environmental characteristic, etc. Studying of such multielement systems is connected with a need to consider and estimate a set of various factors in the conditions of the uncertainty and insufficient knowledge. That's why it is necessary to carry out the qualitative data analysis, identification of essential characteristics (for investigated or designed project), definition of the structure (configuration, topology), of communications, of relations (internal and external), of functionality and procedural features in order to create a model of the object. Further it is necessary to express (to reflect) the revealed characteristics through parameters of the model. Exactly the methodology of the system analysis includes identification of all backbone communications, relations, factors, structures [1].

IT-based mathematical modeling of the architecture objects includes three interconnected basic components:

- mathematical formalization of the description of the studied (projected) object, which allows to execute a calculation of the geometrical characteristics defining a form of an object (volume and three dimensional indicators), calculation of bases and foundations, calculation of load-carrying structures

- of buildings and constructions, definition of limit states, loadings (operational, wind, natural, etc.), calculation of stability of a construction, optimization of materials choice, economic calculations, design of engineering systems and many other things;
- the information support including information technologies and algorithmic means, allowing to create data bases with the information description of an object, their processing (the organization or structuring) and the analysis, computing operations, computer visualization;

- geometrization – geometrical interpretation and visualization of working data bases.

Geometrical representation of the object is the most important part of an architectural design. For example, geometrization of the building shape allows to realize the volume and three dimensional characteristics of the object (composition, the three dimensional organization, an art expression), to reveal the geometry features of the object in the view of aerodynamics, environmental friendliness, profitability, to define optimum placement of constructive elements, to estimate building volume (and, therefore, the materials consumption), to choose rational technologies of construction (to plan construction works), etc.

A main feature of IT-based mathematical modeling of the architecture objects is the formation and the use of coordinated, internally coordinated, calculated information about a designed project, a compliance of created models and construction documentation. IT-based mathematical modeling provides maintenance in the whole process of an architectural plan realization by the following chain:

composition – design – working  
documentation – construction.

Thus, IT-based mathematical modeling of the architecture object is a process of creation of visualized model of the object on the basis of the mathematical description of dependences characterizing the object and the relations, geometrization of the object and the information cover which is realized in the corresponding program environment of applied hardware-software means.

Designing of architectural object, town-planning complex (planning structure) is carried out on the basis of the developed conceptual composition of a certain architectural space characterizing an author's plan concerning used forms, elements, designs, their interrelation (considering the principles of proportionality and scale), intended for realization of a certain functional purpose and a semantic artistic image. A conceptual model is defined as volume and three dimensional composition in which the functional, constructive and esthetic qualities of architecture reflecting technological effectiveness, environmental friendliness, reliability and the figurative decision (i.e. a combination of benefit, durability, beauty), are interconnected. The possibility

of technical realization of an architectural composition is defined by the level of existing (applied) construction technologies, by a set of materials with the properties providing a form and a design with given parameters (qualities, characteristics).

The current condition of scientific and technical base significantly expands possibilities of the architecture. The proposed solutions which nowadays define the architectural compositions (and a search of new conceptual representations), are carried out according to an evolutionary formula:

materials → technologies → forms.

New construction technologies in combination with the materials possessing more perfect form-building and plastic properties stimulate the development of the architectural objects having an exterior with unusual esthetic qualities.

At the same time the form and a design are interconnected. The design is the carrier of esthetic information. The form has to correspond to the purposes of the object (within conceptual composition), to the constructive scheme defining its structure, to correspond to applied materials.

The form and product design significantly depend on a material. The design follows logic of a material (its construction properties). As a whole many constructive schemes are in a direct connection with concrete materials (though there are also rather universal constructive schemes which can be made of various materials).

Constructive elements, carrying out certain functions and providing a necessary stability, rigidity and object durability (as a whole and of separate parts), have the typology and are made of the corresponding construction materials. At the same time there is certain autonomy of constructive elements. For example, for the same constructive frame of the building the external cover from various materials is selected, the various decor and the constructive solution of details is applied. Or, on the contrary, while keeping the form and design of an external cover of the building, its internal three dimensional structure and a design are significantly changed.

Projection in the conditions of the developed city environment (of the concrete architectural space) demands the careful considering of all factors of an existing context, including town-planning continuity, visual analysis, ecological safety, economic sufficiency, a historical and cultural binding that has to find a reflection in a conceptual statement of the project and defines a validity of offered architectural composition. Unfairly rough change of volume and three dimensional characteristics (for example, construction of high-rise buildings in the historical centers, destruction of composite and three dimensional integrity of the developed architectural environment) lead to change of morphology of a historical place, of a city panorama, to a breaking of planning structure that defines a dissonance and a mismatch of the architectural environment components.

Any constructive decisions in architecture compositions have to be mathematically proved. The mathematical solution of an architecture composition defines not only design and technological parameters of a designed project, but also its esthetics.

For example, the choice of a form and a design of a 30 StMaryAxeskyscraper in London (its geometrical features) were defined, first of all, by technological, ecological and economic aspects [2]. This is an optimization (in a combination) of such factors, as building stability, the most natural air ventilation (conditioners economization) and sunlight inflow (heating and lighting economization). The heliciform design (the plan of one floor is turned by some degrees against the underlying floor) allows improving ventilating properties. As a result the building possesses a considerable energy saving feature in comparison with other objects having the comparable sizes.

Designed project visualization is an evident representation of architecture composition in perspective and panoramic images, models, three-dimensional computer models (3D models). Information technologies and computer graphics software allow making the process of the architecture object visualization quicker, substantial and convincing. Computer visualization of the architecture object, providing its representation, is a tool of search, analysis and decision making of functional, esthetic and constructive tasks in architecture and town-planning practice.

The technology of «the virtual building», connected with the information database, is built on the concept of parametrical modeling of the object – on the ability to coordinate (to consider) all made changes and to provide constant co-ordination of all elements of the model. Thus, the parametrical model of the building actually unites a 3D model and external data, at the same time the model is correctly updated at its separate elements changes, providing the corresponding visual image. Changing any of its parameters leads to an automatic change of other related parameters and elements of designed structure, even drawings, visualization, specifications, working documentation.

Improvement of application methodology of IT-based mathematical modeling in architectural tasks allows to expand a range of the directions of conscious search of new architectural forms, to extend the research of forming aspects (from positions of modern volume and three dimensional approaches, including a fractal morphogenesis), to make the analysis of a three dimensional configuration of the city with higher quality and to develop a perspective town-planning model.

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## Materials of Conferences

**KINETIC EQUATIONS FOR THE TRIPLE COLLISIONS OF MOLECULES**

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State of gas determined by interaction of molecules each other and with the boundaries of the solid or liquid bodies. The concept of elastic collisions play an important role in physics, as collisions often have to deal with physical experiment in the field of atomic phenomena. The interaction of particles may be a variety of processes. The process of collision is to change the properties of the particles as a result of interaction. Conservation laws provide an easy way to set the ratio between the various physical quantities in the collision of particles [1]. In this

paper we consider the interaction of molecules with potential for pair and triple elastic collisions of particles. Gas properties with noticeable influence of triple collisions will differ from the usual properties due to the collision of the particles each other and with the solid surface. In accordance to Gibbs formalism considers not a single system, but the ensemble of them in  $6-N$  dimensional  $G$ -space, with system's distributed according to the  $N$ -particle distribution function. Such an ensemble is described by the famous *Liouville* equation. The statistical independence of three particles before collision, solution of equation is  $f_3(t, \tau_1, \tau_2, \tau_3) = f_1(t_0, \tau_{10}) f_1(t_0, \tau_{20}) f_1(t_0, \tau_{30})$ ,  $\tau_{a0} = \tau_{a0}(t, t_0, \tau_1, \tau_2, \tau_3)$  - coordinate and impulse values which particles at the moment  $t_0$  for that at the time  $t$  get into given points  $\tau_1, \tau_2, \tau_3$  of the phase space. Now, let's move from  $f_1$  to  $f = N f_1$ , and find kinetic equation in the form of

$$\frac{\partial f}{\partial t} + \bar{\xi} \nabla f = S_{t_2} f + S_{t_3} f, \quad S_{t_2} f(t, \tau_1) = \int \frac{\partial F_{12}}{m} \frac{\partial}{\partial \xi} \{ S_{12} f(t, \tau_1) f(t, \tau_2) \} d\tau_2 - \text{Integral for pair collisions}$$

$$S_{t_3} f(t, \tau_1) = \frac{1}{N} \int \frac{F_{12}}{m} \frac{\partial}{\partial \xi} \{ R_{123} f(t, \tau_1) f(t, \tau_2) f(t, \tau_3) \} d\tau_2 d\tau_3 - \text{Integral for triple collision}$$

As processes for  $R_{123} \neq 0$  which are including not only the triple collisions, but also combination of several pair of molecules [2].

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**PARALLEL COMPUTING SYSTEM OF MONTE CARLO METHODS**

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The parallelization of computations for the high-productive supercomputer systems appears to be one of the main ways of development of the

modern computational mathematics. The supercomputers are the more and more widely used for a solution of the fundamental and applied problems in the areas of nuclear physics, climatology, economics, pharmacology, modeling of the training devices, and of the virtual reality, computational aerodynamics. Due to those specific features of the Monte Carlo methods, which were repeatedly stressed in the present paper, the statistical modeling begins to play the more and more noticeable role in all, indicated above areas of science and techniques. For these reasons, the actuality of the problems mentioned is growing very considerably, taking into account the fact that the computational aerodynamics is the most promoted area of the elaboration, development, and application of the Monte Carlo methods [1]. As the mentioned above features of these methods permit to state, that the numerical schemes of a statistical modeling might be, in quite a natural way, transferred onto the parallel processors. Clearly, the successive modeling of the independent trajectories should be entrusted to the individual processors, while the information for the averaging will be gathered by a server [2]. In this case, the productivity of the method is growing in direct proportionality to the number of parallel processors.

Nowadays, as computer processors become cheaper and more plentiful, there is great potential for having them compute together in a coordinated application. A major point of parallel computing is how to coordinate communication between the



various processors; indeed, some parallel computing techniques require specialized programming to permit the processors to work together in parallel. It can be seen that on Monte Carlo simulations, algorithms proceed by averaging large numbers of computed values. It is sometimes straightforward to have different processors compute different values, and then use an appropriate average of these values to produce a final answer.

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#### THE MATHEMATICAL MODELING OF CHANGES DYNAMICS IN NUMERICAL INDICATORS TO DESCRIBE THE LEARNING PROCESS

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The mathematical modeling, as one of their methods of the scientific knowledge and cognition is provided the opportunity to be explored the surrounding reality phenomena and the processes, by means of the symbolic expressions transformations, having displayed the significant interconnections and associations. So, the analogies establishment between the explored and the already studied objects, as one of the mathematical modeling methods, is allowed us to be studied the general system – wide laws and the regularities, having governed the quite inherent complex structural formations of the different nature [8]. The methodology development of the systems general theory under the modern information society conditions has already been led to the mathematical modeling using in the research – diversity of the didactic systems in the pedagogy.

The special model to be described the didactic systems functioning can be acted the differential equations. The example of the logistic parabolic equation use for the quality of the education modeling in the Institute of the Higher Education, the College, the University has been presented in the paper [9]. E.A. Solodova and Yu.P. Antonov, on the basis of the study results analysis of the mathematical model, have already revealed the main tendencies of the further improvement of the educational activity. So, the mastering quality development of

the academic subject and the discipline [4] is one of the component of the quality of the education, so it is seemed appropriate to be studied its changes dynamics also the logistic parabolic equation to be applied.

Thus, the differential equation (DE), having called the logistic one, has been suggested in 1848 by the Belgian mathematician P.F. Verhulst (1804–1849) [7]. So, it has been allowed, for the first time, in modeling the special systemic factor, having limited the population growth. The population has been considered, as the opened developing system of the coverage in this presented model. Its number size change had been rushed to the certain limit, which was intended to be characterized the resources capacity of the habitable ecological niche. In this study, the fixed number mastering of the training elements (TE) [2] can be spoken the analogue of the growth restriction of the population quantity, within the framework of the program of some academic subject and the discipline. The set of the TE – this is the system of the theoretical knowledge and the practical skills, having formed in the learning process. So, the mathematical model, in this case, is as it is followed:

$$\frac{dn(t)}{dt} = kn(t) \left(1 - \frac{n(t)}{N}\right), \quad (1)$$

where:  $dn(t)/dt$  – the rate of the mastering of the TE;  $k$  – the coefficient of the proportionality;  $n(t)$  – the amount of the TE, which have been mastered by the students at the time moment  $t$ ;  $(1 - n(t)/N)$  – the relative magnitude of the mastering completion of the TE;  $N$  – the TE number, which are necessary to be mastered, in the framework of the program.

The Equation (1) is presented itself the DE with the multiple variables, so its general solution is by the integral calculus methods [3]. So, the particular solution for the initial condition,  $n(0) = n_0$ , will be taken the following expression:

$$n(t) = \frac{Nn_0 e^{kt}}{N - n_0 + n_0 e^{kt}}, \quad (2)$$

where  $n_0$  – the number of the TE, which are necessary to be mastered at the previous stage of the learning, to be understood the theme material, the chapters, or the academic subjects, or the disciplines.

The functional dependence study (2) has become quite possible, when the parameters values defining of the mathematical model ( $k$ ,  $n_0$ ,  $N$ ). The coefficient  $k$  may be assigned, for example, the value of one, if the student performs the control and training activities for the standard time. If the execution time is quite more, than the normative one, then, in this case,  $k$  can be considered less, than one. If the execution time is quite less, than the normative one, then  $k$  should be taken more, than one. All these values of  $k$  are allowed to be distinguished three groups of the students. Thus, the First group

( $A_1$ ) – are the students, who are managed to be solved all the learning tasks and their activities for the time, scheduled by the teacher ( $k = 1$ ). The Second group ( $A_2$ ) – are the students, who are planned over the time to be coped only with only the part of the prescribed academic work ( $k < 1$ ). The Third group ( $A_3$ ) – are the students, who are spent less time to be successfully completed the planned learning activities ( $k > 1$ ). Thus, the parameters values  $n_0$  and  $N$  are set on the basis of the results summarizing of the educational material analysis.

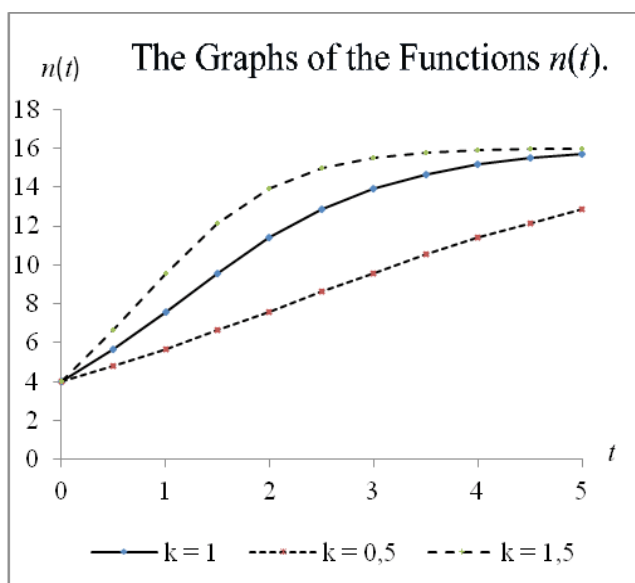
Some theme, topic, academic subject or discipline content can be presented, as the set of the TE. For example, «The Probability Theory» (PT) theme, having taught in the framework of the «Mathematics» academic subject and the discipline for the students of the technical specialties and the areas of the training, may be quite included twelve TE [1]. Thus, the TE content is the following: 1) the probability of the elementary event; 2) the actions with the events; 3) the sum probability of the incompatible and the joint events; 4) the product probability of the independent and dependent events; 5) the rules of the combinatorics, combination, arrangement, and permutations; 6) the independent replicated trials; 7) the total probability formula and the

Bayes' formula; 8) the Poisson theorem, the locally and integral theorem of de Moivre and Laplace; 9) the distribution law of the discrete random variable and its characteristics; 10) the binomial law distribution and the Poisson law; 11) the probability density function of the continuous random variable and its characteristics; 12) the normal, uniform and exponential distribution laws of the non – continuous random variable.

The success of the PT students' studying is based on the system of the previously mastered TE at the previous stages of the learning: 1) the graphs of the main elementary functions; 2) the derivative of the function finding; 3) the calculation of the definite integral; 4) the improper integral finding. So, the presented TE are determined the parameters values  $n_0 = 4$ ,  $N = 12 + 4 = 16$ , and their substitution in the Equation (2) is allowed to be obtained the of the dynamics mathematic model of the TE quantitative indicators mastering of the probability theory ( $k = 1$ ,  $n_0 = 4$ ,  $N = 16$ ).

$$n(t) = \frac{16 \cdot 4e^t}{16 - 4 + 4e^t} = \frac{16e^t}{3 + e^t}. \quad (3)$$

So, the graphical model of the functional dependence (3) has been presented in Fig. 1.



The Graphs of the Functions  $n(t)$ .

Fig. 1. The Particular Solution so the Logistic Equation.

The analysis of the functional dependence (3) is shown, that if  $t \rightarrow \infty$ , then  $n(\infty) = 16$ . This tendency is held and performed for all three graphs (Fig. 1), and it, moreover, is illustrated the fact, that the whole learning and the cognitive process are not completed by the PT studying. For the computational experiment carrying out, the values of 0.5, 1.0, 1.5 have

been assigned to the coefficient  $k$ . The already selected gradation is created possibility to be visually seen the divergence curves degree in the graphs for the quite different speed of the TE mastering. Thus, the number counting of the TE mastered at the PT studying in each of five distinguished time intervals (Fig.1) has been shown in the Table No.1.

**The Table No.1.**

The Number Distribution of the TE by the Intervals  $t$ .

The Interval $t$	$k$		
	0.5	1.0	1.5
[0; 1]	2	4	6
[1; 2]	2	3	4
[2; 3]	2	3	1
[3; 4]	1	1	1
[4; 5]	2	1	0
$\Sigma$	9	12	12
$\Sigma/(N - n_0)$	0.75	1.0	1.0

Having depended on teacher's design of the PT students studying, in accordance with the main requirements of the educational program, the presented time intervals formula (e.g. Table No.1) are equated to the specified number of the credit units  $q$ (c.u.), where  $q$  is shown their multiplicity. For example, if seventy two academic hours or two c.u. are given for the PT studying, then, in this case, 14,4 hours or 0.4 c.u. will be corresponded one interval  $t$ .

The PT mastering by the students of the technical specialties and the areas of the training can be distributed by two, three, or four stages of the learning activity (LA). So, the *First Stage* of LA – is the knowledge system formation on the laws of the probability. *The Second Stage* of LA – is the skills formation to be used the laws of the probability for the standard mathematical problems solution. *The Third Stage* of LA – is the research skills development to be applied the probability laws at the laboratory and the practical tasks and fulfillment. *The Fourth Stage* of LA – is the culture thinking and the creative skills and abilities development in solving the unusual mathematical problems [5] to be established the laws of the probability.

The LA stage duration is determined by the expert assessment method, having taken into account the level of the students' mathematical preparation and the amount of the instructional and the training time, having expressed in the  $q$ (c.u.). So, the possible option of the LA stages passing at the PT studying by the students of three selected groups has already been presented in the Table No.2.

**The Table No.2.**

The LA Stages Duration.

The Group of the Students	The LA Stage			
	I	II	III	IV
	$q$ (c.u.)	$q$ (c.u.)	$q$ (c.u.)	$q$ (c.u.)
$A_-(k < 1)$	0.6	0.4	–	–
$A(k = 1)$	0.4	0.4	0.2	–
$A_+(k > 1)$	0.4	0.2	0.2	0.2

The mathematical modeling application of the TE mastering dynamics is allowed the teacher to be formed the special information field of the numerical data for the students' educational activities planning. The determination of the effectiveness of the statistical significance of the educational process organization, on the basis of the presented mathematical modeling here, is required the mathematical statistics methods involvement [6]. Thus, the mathematical modeling inclusion into the instructional and educational design is quite enabled to be created the favorable special conditions for the further improvement of the educational process.

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*Materials of Conferences***SCIENTIFIC THEORIES AND PRACTICE OF COMMUNICATIVE ADAPTATION TO A NEW LINGUISTIC ENVIRONMENT AND EDUCATIONAL SPACE**

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A cause and direct motive to select and study a certain language are: prevalence of a language in the world; a desire to familiarize with culture, appreciated by the world society, including artistic heritage; linguistic-aesthetic value of a language; possibility to use it in practical activity; one's ideas on "simplicity/complication" of a language.

Innovativeness and openness are typical characteristics of modern linguistic education that accumulates experience, qualities, possibilities that are presented by methodic of teaching Russian as non-native, new language, and its basic subjects. In their "society" key positions are still occupied by theoretical-applied researches of psychological-pedagogic area and a number of other humanist areas that are no less urgent for dynamic improvement in practice of teaching Russian. Let us study: such contribution to one of the most demanded theoretical-applied field of science, methodic, is made by its key subjects.

**Sociology** is a subject on society as integral system. Economic and social development of a society significantly defines development of a language and **motives** of mastering it. Increase in mobility of population, development of the idea of tolerance, mutual understanding and collaboration, trends to overcome prejudices and discrimination have become the leading reasons to study modern languages as new and unknown ones. European Council is developing concept of **multilinguality** actively. The essence of this concept is not in declared knowledge of several languages, but in increase in number of languages, suggested for mastering, in encouraging an ability to study several languages, thus limiting the dominating role of English in international communication.

At the same time, it is critical for a person not to "keep" new languages and cultures in separation, but to form a multilingual communicative competence, and here one is assisted by the system of formal and informal education.

Regarding to the latter position of choice, we should outline that experts in field of language description construct scales that place languages according to their complication degree. The first place in one of such scales is occupied by Spanish and Italian as most simple ones, the second place belongs to English, French, and German, Russian,

as well as Hungarian and Turkish, is placed on the third place, and the fourth, most complicated place is given to Arab and hieroglyphic languages (other language hierarchies exist as well, for example, model of Swedish polyglot Eric Gunnemark that evaluates complication of languages from the position of bearer of Sweden [Art of studying languages, 2002]).

Let us underline that data of sociology isn't used directly in methodic, particularly, it is studied through **sociolinguistic** that studies problems in complex: for example, mechanisms of influencing language by social factors, part that is played by language in life of society, special features of language culture. Sociolinguistic also investigates reasons of loss, damage, alteration of a language under the influence of another one (**attrition**) at individual and social levels. It has been established that the following reasons can result in the mentioned "distortions":

- insufficient volume of a speaker's memory; role and functions of native and non-native languages in society; their social status;
- degree of language civilization or acculturation: its facilitation in mass media, prospects of its implementation in education, business, possibilities to gain profit from knowledge of a language;
- distance between a speaker and initial environment of a language;
- cultural prestige or deficit of using language in international scale, etc.

Let us list some mistakes that reflect trends to losing one's native language: a) lexical replacements (*a successful person*); b) expansions (*We had a walk in trees. TREES* begin to indicate *FOREST, PARK, GARDEN, etc.*); c) contraction (usage of word *friend* implying *female friend* in case the latter implies "a woman in civil marriage"); d) generalization (*I read many of book's pages*. Transiting expression of belonging into passive constructions); e) simplifications (*Whatever a baby cries*); f) false rejection of exceptions (*Ja shela* instead of *Ja shla* -impossible to translate-); g) structural replacements (*It was I, who finished first*) etc. [Protasova. 89-90].

Studying a non-native language always draws attention to **gender** side of **Russian language**. There are not many of such works, but, for example, E.A. Zemskaya outlines that differences between male and female speech are notices on phonetic level while a person expresses emotions in stretching vowels that is typical for women, duplicates consonants that is used among men (*c-come on!*); plentifulness of diminutive-hypocoristic words and adjectives in diminutive form.

Sensual "universum" of modern Russian language is mostly formed under the influence of not

only self-realization (mentality) of Russian people, but also social factors. Researches testify for prevalence of 4 tendencies in speech usage: expression of emotions, anti-rationality, tendency towards passiveness and fatalism, love to morality (A. Vezhbit-skaya). Thus, while emotions are mostly expressed by adjectives in English, they are expressed through verbs in Russian (*miss someone, etc.*); irrationality is expressed in wide usage of impersonal constructions, adjective “*perhaps*”, etc. Russian language expresses moral justifications in a wider specter (*noble, wonderful, etc.*).

Detailed researches in this area allow us to make certain conclusions that are critical for teaching foreign languages. For example, cultural features of a specific language are not mostly related to general-human characteristics, but special features of a nation's life. Thus, the word *sun* carries negative connotations for Middle-Asian nations (contrary to positive Russian expression *my little sun*), and word *moon* as a symbol of coolness contains a positive meaning - “something kind, nice, and beautiful” (women in Middle-Asian poetry are described as *moon-faced, moonlike*). While staging the tale by I.A. Krylov “A wolf and a lamb”, Kazakh children prefer to perform part of the wolf, as wolf is a traditionally positive symbol among Turk nations. Cultural synonyms that have connotations (*esquire – landowner; samurai – knight*), forms and means of expressing verbal etiquette (*you* in English and a whole system of linguistic units and grammatical forms of addressing a person in Japanese, Korean; official, informal, neutral, male among friends, simple female, bookish, etc.), cultural connotations, words with no direct equivalents in other languages – these are all phenomena, description and systematization of which from the position of linguistic culturology can allow one to form **intercultural competence** from the point of cultural contest of his native language and in comparison between his native and foreign cultures.

Sociology, social linguistic, linguistic culturology, and methodic of teaching a foreign language are united by one of urgent problems of a modern society – the problem of **acculturation of a person** – process of borrowing components of foreign culture by a person who grew up in a certain cultural environment, **subcultures** (*totality of norms, values, stereotypes of age and social groups of population, informal unities and movements*), **world outlooks** (*totality of knowledge and skills of a subject on actual and imagined reality that are formed by a language and means of linguistic nomination*), **precedent texts** (*quotes, references, allusions, etc.*) are understandable for all speakers of a given language or culture; “precedency” of a text points to the fact it is included into speech practice, the ‘list’ of texts that are typical for literature background of

an “average” speaker, and it is regularly referred to in a direct or indirect form [Y.N. Karaulov].

Indulgent attitude of state and society to the problem of acculturation of new citizens can result in ethnopsychological gap between people who live in one country.

**Communicative adaptation** of people in a new society has not always testified for spiritual and moral adaptation to a new culture. Linguistic-didactic solution of this problem consists in developing a methodic of linguistic training for children and adults according to linguistic-culturological approach towards the problem of linguistic socialization of new citizens.

**Linguistic**, being a basic science for methodic of teaching a foreign language, studies general laws of constructing and functioning of human language. Linguistic composition of studying a foreign language is realized in aspects of language (phonetics, graphic and orthography, lexis, grammatics), structures and genres of speech (verbal dialogue, verbal or typed monologue, discussion).

Various directions that present a certain interest for methodic, have obtained an independent status in modern linguistic. **Communicative linguistic studies speech aspects** (*speech acts that possess the following characteristics: purposefulness, controllability via rules of speech behavior, addressness, emergence in a specific speech situation*) as units of communication.

Pragmatic side of speech act that forms modal frame of a statement, is formed of the following components: 1) **intention of speech** (*intention of a speaker to express a specific communicative sense via verbal means*, can be **statement-forming**, or leading to a communicative result with one statement: *promise, gratitude, apology*, or **text-forming**, leading to a result through a line of statements within a dialogue, argument, or reasoning monologue, description); 2) **objective** of a statement; 3) **participants** of speech process; 4) **setting** of communication. Methodic that teaches verbal communication in foreign language, typically divides speech acts into: 1) informative; 2) motivational; 3) modal or obligatory; 4) contact-setting that establish performances, support, termination of speech contact, formulas of social etiquette refer to this group; 5) evaluative that express emotional reaction to a situation or addressing.

Communicative linguistic studies communicative significance of structural elements of speech acts (words, word combinations, sentences) that is expressed in a **discourse** (*discourse – Fr. discourse speech* – connected text, in other words, while a text represents mostly abstract, formal construction, discourse is a certain form of actualizing a text, taken in a real situation; discourse includes verbal and non-verbal elements).

The following ideas of communicative linguistic are considered as most significant ones for the methodic:

- speech acts are studied as units of communication and training;
- speech intention of a speaker serves as a criterion of selecting speech acts, it regulates speech behavior and organizes its contents;
- mastering a language implies formation of communicative competence among students;
- forming communicative competence takes place in the selected situations of communications that serve as a stimulus for emergence of speech intention and realization of a speech act.

The following elements are linked to methodic of teaching a foreign language: **contrastive linguistic** that studies two or more languages in comparison between their structures revealing their common features and differences, **linguistic of text** studies legislations of constructing a connected text and contents of a text that establish communication. Describing different genres and types of text (narrative, description, reasoning) with outlining so-called **foreign types** that have a clear composition, and also **non-constructed, adapted, and unadapted**.

Modern methodic of teaching a language, native or foreign, uses a rich baggage of **rhetoric** – the science of the art of speech and oratory. Rhetoric generalizes the experience of masters of word, sets rules of speech behavior, defines ways to optimize oral communication. A person who studies a new language, should know certain information on means of forming connected speech, stylistic and rhetorical speech tools. Thus, “inaccuracy” in diction (*Rus. pod arku – podarku, cheloveck – [check], [de'ushka]*) can be understood as both *devushka* and *dedushka*). In order to train one's organs of articulation, tongue twisters and specking “with pebble” in the mouth is used. Intonation, melody of speech, its volume, phase accentuation, etc. are all means that express communicative intentions. People often trust these means more than words. Abul-Farage (XIII century) wrote: “One, who speaks lowering his voice steadily, is, no doubt, sad about something; one, who speaks in a weak voice, is shy like a lamb; one, who speaks loudly and incoherently, is stupid as a goat.”

Perfection of speech is proved not only by its phonetic and grammatical correctness, but also its lexical diversity. One, who studies a new language, tries to use and acknowledge synonyms, antonyms, paronyms, but rarely points out context transposability of these means. It is hard to speak of mastering a language if a student doesn't know and has not met means of “coloring” speech, for example *chiasmuses* – expressions that place the second part in an indirect order. A chiasmus by Socrates “*We eat to live, but we don't live to eat*” allows us to

construct other bright expressions according to this scheme. Oxymorons as combinations of incongruous elements (“*a bad good person*”, A. Chekhov; “*I love luxuriant withering of nature*”, A. Pushkin), linguistic paradox, puns are also interesting. These and many other elements should become a postponed, but not forgotten perspective for a learner of foreign language.

It has been established that up to 55% of total oral sense information can be transferred through **paralinguistic means** [A. Piz]: intonation, gesticulation, mimicry. Studying non-verbal means of speech communication is referred to a specific division of linguistic – **paralinguistic**, and speech loading testifies for a necessity to possess there means. Studying paralinguistic means implies a number of stages:

Selection of frequency, commonly-used non-verbal means of communication in native language and comparing them to non-verbal means of a new, foreign language;

Conscious imitation of non-verbal means of the studied language;

Activation and facilitation in speech.

Definite standards of body motions and norms that they should correspond to are developed in **linguistic culturology and paralinguistic**. These norms imply: correspondence to a given situation; moderate, not distracting variety; physical coordination of gestures, mimicry, body motions; verbal coordination of the latter listed elements, synchronization with words, that are strengthened with them; dynamics, spontaneity, naturalness.

Some non-verbal means of communication, for example, **distance**, should also be considered. A. Piz outlines 4 spatial areas in communication: 1) intimate (15-46 cm) – for people in close emotional contact: children, relatives, close friends; 2) personal (4cm – 1,2 m) – communication space for friendly meetings, official receptions; 3) social (1,2m – 3,6m) – distance of communicating with strangers, new employees; 4) public (over 3,6m) – distance of communicating with a group of people, audience.

Comparative analysis of non-verbal means in different languages is interesting for the methodic, besides, their traditions and customs differ frequently. Thus, a gesture, shown in Russian in case of loss or failure, demonstrates pleasure and success in Croatia. If one spins his index finger in front of Dutch person, he will face an opposite effect: someone said a very witty phrase. Laughter is not a sign of fun for people in Africa, but an indication of confusion. It doesn't matter for the European what hand they are given a book with: left or right. In Middle East, where left hand is considered unclean, will take neither money, nor present, and feel insulted.

In late 80ies a transition of scientific and practical interests towards culture took place. A new

direction in teaching languages was defined as *culture-objective, language – means* in works by Y.N. Karaulov “Russian language and linguistic person” (1987), V.V. Vorobiev “Linguistic culturology (theory and methods)” (1997), E.I. Passov “Communicative foreign language study: conception of developing individuality in dialogue between cultures” (2000).

**Linguistic culturology** is a scientific discipline of a synthesizing type as it is placed in a circle of adjoining sciences: social linguistic, ethic linguistic, psycholinguistics, country-specific study, culturology. It has selected interaction and mutual influence between culture and language as an object of their functioning. General direction of linguistic-culturological researches is human as a linguistic person, language as a system of realizing cultural values, culture as the highest level of language, speech behavior, speech etiquette, text as the most important unit of a language.

Thus, methodic has obtained waypoints that allow one to construct **teaching as a dialogue of cultures**, though comparing facts from the area of art and way of life of language speakers. Moral reference points in life of nations, society, and the existing differences between them are considered with an educational purpose. It is important in terms of forming a stable motivation to study a new language and new culture in dialogue with one’s native one.

**Intercultural communication in teaching bilingual children in Russian.** Unlike adults who have life experience in adapting to new social-cultural conditions, children have certain complications while studying elements of culture. But, it is impossible to master a vocabulary that proves one’s real speech practice in the country of a new language without familiarizing with culture.

If under “childlike” mastering culture we understand not only reading poems and singing songs wearing national costumes, etc., but also mastering means of reasoning, types of personal relations, ways to express friendship, sympathy, that are linked to speech behavior of a person, it requires specially-organized work among children, pedagogues, and tutors.

Elements of Russian culture should be organically included into diverse traditional measures of preschool and school institution, thus enriching them with communicative and emotional contents.

Mastering a new language, values, household settings is provided by traditions, linked to a yearly circle: national social, confessional holidays, customs that demonstrate a new culture (singing and games in a circle, round dance, stories on customs and drawing elements of a story, sculpture, preparing simple recipes, etc.).

Learning poems by heart has a special significance. Even if not everything is clear in a poem, children are always proud to tell something “long” in a new language. It is a reason of self-affirma-

tion. It is important that selection of poems, songs should correspond to everyday situations. Pedagogic uniqueness of poems is defined by the fact they stimulate an interest towards rhythm, temper, intonation, and helps a student to find new information especially in case training is linked to an active game, accompanied by music, and has a plot.

We can suggest the following order of working a text: a) a pedagogue, tutor reads a text, poem, comments it and translates contents; b) students repeat it in chorus and individually; c) text is played in parts, accompanied with motion; d) text are put down into an illustrated card, it helps a student to guess a text and retell it, etc.

Fairy tales and theatre (shadow, finger, puppet, magnet, or drawn type of it) provide for a tolerant mastering of Russian literature.

Pedagogues and tutors should realize that results of their activity are defined by themselves, their creative and patient attitude towards uniqueness of children development. They must know how to analyze demands of small students, level of their speech formation; have knowledge on all cultures, involved into the educational process, be able to correspond their acts with other pedagogues and parents.

Sciences that supply methodic of teaching Russian as a foreign language with information on stages of forming knowledge, skills, individual psychological features of students are: **psychology, pedagogic psychology**, particularly **psychology of training**, scientific-applicatory objectives of these branches of science are linked to studying the process of forming socially-significant features of a person, basic features of morality; **psychology of training**: this branch of science concentrates on studying process of mastering knowledge, formation of skills. **Social psychology** and its branches (**psychology of nations, psychology of family, group**) study psychic phenomena that refer to a certain group of people or a person within a group; psychological compatibility, communicative abilities, linked to a need for communication, setting for communication, way one feels in communication. **Experimental psychology** enriches methodic with data on memory volume, legislations of free and conditioned memorizing, features of perception, etc. **Psychosemantics** studies various forms of indexes within individual consciousness (pictures, symbols, verbal forms, etc.). **Psychology of a person** and its branches (**age psychology, differential psychology, defectopsychology**) are used in methodic during explanation of means of individualizing training and constructing various models of training considering age features of students. **Ethnic psychology** studies nationally-defined nature of psychic.

Thus, it has been established that uniqueness of psychic of the Japanese is defined by historical isolation, over-population of Japan. Being

concentrated in mass agglomerations in big cities, the Japanese have developed complex social-psychological skills that resulted in emergence of such phenomenon as “web-society”. It is a society, all members of which are linked in a strict hierarchy of moral and social obligations in both vertical and horizontal direction. Ethno-psychological features of the Japanese do not allow them to initiate a conversation, rush with making decisions that are discussed in a collective and delayed manner. In learning, including languages, the Japanese value moral and ethnic basic features, for example, they prefer description of nature and historical places to plot texts.

Non-linear thinking is typical for representatives of South-East Asia (linear thinking is related to making decisions “quickly”) as well as “round way” of making decisions after a careful analysis.

Psychology provides methodic with the most valuable information on **memory** that is one of the most necessary conditions of mastering a language, psychological or personal development of a man. As it is known, memory can carry out conflicting functions: **remembering and reproducing** on the one hand, and **forgetting** - on the other hand. It has been registered that forgetting process begins straight after apprehending educational material and, if it is not supported by reproduction, only 25% of the information remains memorized 5 days later. Remembering can prove successful in case a new material is included into the system of conscious relations, and if a person sets an objective for himself to memorize certain information (free memorizing) and facilitates such methods as composing a plan and grouping material.

While studying a foreign language one should develop and use various types of memory. Depending on what is memorized and reproduced and how it is done, memory is divided into **motoric** (memory for moves and acts), **figurative** (memory for visual and acoustic images), **word-logical** (memory for ideas), and **emotional** (memory for feelings). Memory types should always be used in education according to their period of action: **instant** (acts at the moment of apprehending information), **short-term** (information of volume 7 +/- 2 units remains memorized for 30 seconds), **operative** (able to store information until the set objective is solved; acts if setting for memorizing is active, period of action varies from several minutes to several days), **long-term** (characterized by a great volume, for many years of the whole lifetime of a person it can store sensual interpretation of a statement), **genetic** (transmits experience, emotions, associations through generations).

Psychology provide a foreign language tutor with information on individual-personal features of students, and it allows him refer the latter to either **communicative type** (extraverts who get involved into communication easily and tend to participate in group activities, collective work, take part in role

games, are able use prediction and linguistic guess in learning process) or **non-communicative type** (introverts who tend to analyze linguistic material, learn rules consciously, unwillingly get involved into communication also because they are afraid to make a mistake, prefer reading, writing activities, explanation over speech practice).

**Age psychology** and its rich specter of branches – from **infant psychology** to **psychology of the elderly** (gerontopsychology) that study age features of psychic processes, comprehension of knowledge, age factors of personal development, assist methodic of teaching a foreign language to define contents, methods, means of work with consideration of students’ age. Its recommendations are used in organizing linguistic education for persons of so-called third age in Japan. The researches, carried out within this branch of science, prove that verbal functions of a person progress in the most intensive manner and achieve their highest level after 40-45 years of age. D. Peltz, F. Andrews have discovered peaks of the highest intellectual achievements at age of 47 and older.

Regarding the process of verbal communication between an adult and a child in foreign language, psychologists suggest the following sequence of involving a child into verbal interaction: stage of listening and familiarizing, then comprehending and repeating spontaneously, the next stage implies reproducing words in a repeated situation, (generalization of a word usage), repeating after an adult in order of question-answer, independent repetition of words and word combinations, varying and combining them, selection of a word form, independent construction of sentences. Thus, communication development takes place among children in result of generalization, approbation, and inspection of communication laws, revealed by a child. It has been established that children rarely fail when they identify a color, because this component of education can be imagined and compared to their native language easily. Children experience less trouble when they answer alternative questions, make up synonyms, antonyms, word variations with diminutive or augmentative suffix, etc.

**Psycholinguistics** is a relatively new scientific discipline that steadily draws more interest towards itself nowadays. Its formation as an independent science in Russia is related to the following scientists: A. A. Leontiev [Psycholinguistic, 1967], A. R. Lurin, I. A. Zimniaya, and others. Views of Russian and foreign scientists [C. Osgood, J. Miller] regarding the complex structure of relations between language and consciousness, speech and thinking are important for the methodic. It is well known that brain is the organ of thinking. Left, or speech hemisphere, is responsible for speech, its connectivity, abstract and logical thinking, comprehension of abstract lexis, it manages the right hand. This verbal hemisphere always dominates. It “establishes” energetics, enthusiasm, optimism of a person. The



right hemisphere is related to imaginative thinking and objective meaning of words. This hemisphere is non-verbal and responsible for apprehension of space, manages gestures. It is a source of intuition, allows one to distinguish people's voices, gender of speakers, melody, rhythm, accents in words and sentences, it is "pessimistic". This data plays an important part in defining personal type of a student and influence efficiency of the process of mastering a foreign language. Apart from the types, described above – introvert and extravert, there is also a typology that considers one's typical method of making conclusions: deductive (from general to specific) and inductive (from specific to general);

inert (defined by a conscious approach towards learning, free attention, analysis of material) and labile (corresponds to intuitive-sensitive way of thinking, unconsciousness, usage of free attention, general comprehension of a given material). Data of psycholinguistics allow one to solve the problem of cognitive ways of mastering a foreign language in a scientific fashion.

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## Materials of Conferences

## EFFECT OF IONS ON THE ELECTRICAL CONDUCTIVITY OF ELECTROLYTE SOLUTIONS

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The article shows that the larger the size of the ions, the lower the electrostatic forces between

the cations anions, causing the decline of their association and the electrical conductivity of the solution.

Electrical conductivity - one of the most easily of measurable properties of the system, you can choose the optimum temperature and concentration process conditions. Dependences of electrical conductivity the nature of the ions is evident (Table 1).

Table 1.

Dependence of the electrical conductivity of the nature of the ions

anion kation	Cl <sup>-</sup>	Br <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	CO <sub>3</sub> <sup>2-</sup>	SO <sub>4</sub> <sup>2-</sup>	ClO <sub>4</sub> <sup>-</sup>	SiF <sub>6</sub> <sup>2-</sup>	P <sub>2</sub> O <sub>7</sub> <sup>4-</sup>	PO <sub>4</sub> <sup>3-</sup>	OH <sup>-</sup>
H <sup>+</sup>	-	-	0,471	-	0,395	0,326	0,38	0,13	0,064	-
Li <sup>+</sup>	-	0,0847	0,0896	-	0,0637	-	-	-	-	-
Na <sup>+</sup>	0,1317	0,0865	0,0871	0,08	0,07136	-	-	-	-	0,31
K <sup>+</sup>	0,128	0,0976	0,0874	0,105	0,0906	-	-	-	-	0,4
Rb <sup>+</sup>	0,102		0,0654	0,0628	0,0652	-	-	-	-	0,32
Cs <sup>+</sup>	0,071	0,0561	0,0515	0,0547	0,0492	-	-	-	-	-
Cu <sup>2+</sup>	-	-	-	-	0,0921	-	-	-	-	-
Zn <sup>2+</sup>	-	-	-	-	0,0636	-	-	-	-	-
Cd <sup>2+</sup>	-	-	-	-	0,0504	-	-	-	-	-

Similar ranks can construct for other temperatures and concentrations. They are similar [1].

General patterns: in the concentration dependences of alkali halides maximum conductivity (at  $c^*$ ) is shifted to high concentrations in the a number Na - K - Rb - Cs. The same is observed from carbonates and alkali metal nitrates. So, at LiCl  $c^* = 20\%$ , CsBr  $c^* = 40\%$ ; K<sub>2</sub>CO<sub>3</sub> at maximum corresponds to 40%, and Rb<sub>2</sub>SO<sub>3</sub> and Cs<sub>2</sub>SO<sub>3</sub> - 50%. At LiNO<sub>3</sub>  $c^* = 30\%$ , at Rb-

<sub>2</sub>SO<sub>4</sub> and Cs<sub>2</sub>SO<sub>4</sub>, as that of Na<sub>2</sub>WO<sub>4</sub> and Na<sub>2</sub>MoO<sub>4</sub> - no of maximum. At Na<sub>2</sub>CrO<sub>4</sub>  $c^* = 33\%$ , a maximum of specific electrical conductivity H<sub>4</sub>P<sub>2</sub>O<sub>7</sub> at 21%, and 60% at K<sub>4</sub>P<sub>2</sub>O<sub>7</sub>.

Thus, the larger the size ion the lower the electrostatic forces between the anions, cations, causing their association and downturn of the electrical conductivity of the solution. Different effects of anions on the electrical conductivity depend on the number of oxygen atoms in them (Fig. 1).

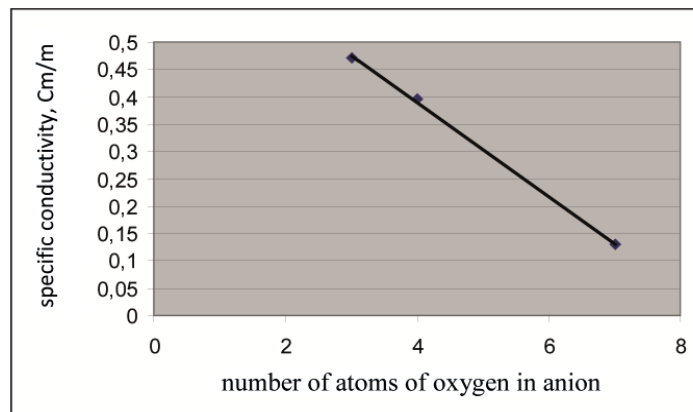


Fig. 1. the dependence of specific conductivity on the number of oxygen atoms in the anion

The more oxygen atoms, the less specific electrical conductivity, which is obviously associated with the formation of additional oxygen-hydrogen bonds. Can not but influence and the charge of the ion. But only spectral studies of systems can fully illuminate the influence of ions on the structure and the properties of solutions.

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## Short Reports

**THE SUBARCTIC PEAT POLYMER MATRIX STRUCTURAL ORGANIZATION (BY THE EXAMPLE OF THE ILASSKY BOG MASSIF PEAT)<sup>1</sup>**

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The paper has been devoted to the structural organization study of the peat polymer matrix, and its components at the different levels of the dimension hierarchy. The high-moor peat samples have been selected in the course of the field works carrying out on the Ilassky bog massif, where the experimental section of the Russia's single bog «Brusovnitza» Hydrometeorostation of the North Hydrometeorostation Control is situated.

The light microscopy in the transmitted light has been used to be investigated the peat microstructure; the atomic force microscopy and the dynamic light scattering method have been used to be measured the particles size and the polydispersity at the nanoscale. The high-moor peat samples micrographs and the AFM-images of its nanoscale components of the humic nature have been analyzed. Finally, it has been found, that the supramolecular particles conformation of the humic nature biopolymers, having extracted from the peat, is characterized by the asymmetry elements.

#### The Introduction

At present, the organization and the self – organizations, having studied by the synergy, are being acquired the interdisciplinary character. According to the modern concepts and its presentations, the natural objects may be presented themselves, as the ordered, structured, and hierarchically organized systems. The special significance is being acquired the natural objects structure study at the different hierarchical levels, the relationships disclosure between the structure peculiarities, special features, and the properties of the fundamental and its applied nature.

The peat – is the unique natural renewable organic raw materials, its physical and mechanical properties, the chemical properties are associated with the structure's peculiarities and its specific features.

<sup>1</sup> The studies have been performed with the support of the Inter-Regional, Interagency and Fundamental Researches Program, the Ural Branch RAS (The Project № 12-C-5-1017), the Russian Foundation for Basic Research (The Project RFFI № 12-03-90018-Bel\_a), the Programs, having orientated the Fundamental Research, the Ural Branch RAS 12-5-3-008-ARCTICA, the Programs of the Presidium RAS № 4 (The Project № 12-II-5-1021), using the equipment TsKP NO «Arctic» (SAFU) and TsKP KT RF-Arctica, (IEPS, IFPA, the Ural Branch RAS).

Thus, the main purpose of the present research is to be studied the peat polymer matrix structural organization study and its components at the different levels of the dimension hierarchy.

#### The Experimental Part

The high-moor peat samples have been selected in the course of the field works carrying out on the Ilassky bog massif, having located in the Primorsky district of the Arkhangelsk Region, where the experimental section of the Russia's single bog «Brusovnitza» Hydrometeorostation of the North Hydrometeorostation Control is situated. So, from the point of the view of the fundamental researches, the Ilassky bog massif is quite interested, because there are long – termed observations data on the hydrological regime, and, moreover, the peat deposit has not been subjected to the landreclamation.

The characteristic of the high-moor peat of the Ilassky bog massif, having selected from the different depth of its bedding, have been presented in the paper [1]. The component and the elemental composition of the peat have already been studied.

So, the peat – is the polydisperse, getero-porous system, in which the macro- and the microstructures are being distinguished [2,3,4].

The temporary aqueous preparations of the peat samples have already been examined and photographed, using the «Axio Scope A1 Zeiss» laboratory microscope, which is completed with the «Canon – G10» digital camera, to be investigated the structural organization at the micro – level. The necessary images editing has been produced, using the «AxioVison Rel.4.8» licensed program.

The humus nature biopolymers particle – size study at the nanoscale has been performed, using the «ACM Multimod 8 Bruker» atomic force microscope, and, moreover, in the liquid phase, using the «Horiba-LB – 550» particle size meter, by the dynamic light scattering method:

The peat polymer matrix macrostructure is presented itself the elastic and flexible frame, having formed the fibrous plants residues interlacing – e.g. the peat – forming plants;

The peat macrostructure is depended on the peat accumulation dynamics. Thus, the eight main types of the peat structures are being distinguished, depending on their origin, the peat – forming plants type, and the decomposition degree [2]. For the high-moor sphagnous peats of the medium and low decomposition degrees, which are the most representative in the boreal low – land ecosystems (see, Figure No.1), the spongy structure is the most characteristic for the upper minor puddled layers deposit with the further transition to the goffering and puckering structure with the bedding depth increasing;

The peat macrostructure is usually studied by the light microscopy method. The images, having obtained, using the «Axio Scope A1 Zeiss»

laboratory microscope, for the polymer matrices of the high-moor sphagnum peat, sampled at the different bedding depths, have been presented in the Figure No.2. So, the loose structure is clearly visible, where the minor – decomposing sphagnum fragments are practically contacted with the minor amount of the humus.

**The Figure No.1** – The Peat Deposit Section the Ilassky Bog Massif.

**The Figure No.2** – The Photomicrographs: a) sphagnum; bedding depth peat:

b) 0 – 20 cm; c) 20 – 50 cm; d) 50 – 70 cm.

The macrostructure cells of the peat polymer matrix are being filled with the peat particles of the aggregative nature, having formed on the basis of the humic substances and the peat carbohydrate complex. Then, the microstructure is characterized the aggregates (e.g. associates) inner structure, which are usually referred to the coagulation ones, i.e. the movable highly – elastic structures. The necessary interaction between the aggregates elements is practically carried out by the molecules and the water layers, and, mainly, due to the hydrogen bonds [2].

Thus, the image, which has been obtained by the AC-microscopy, having allowed to be fixed the nano-particles sizes of the individual macro-molecules of the aromatic biopolymers and their supra-molecular formations and the structures (see, the Figure No.3). So, the globular nature of the separate macro-molecules, whose dimensions are not practically exceeded 10 nm, has been already fixed, which it is comparable to the nano-particles sizes of the other biopolymers of the lingo-humic nature. Larger particles (e.g. 5 – 100 nm) with the asymmetry elements are, apparently belonged to the associative nature.

**The Figure No.3** – The AFM image of the biopolymers nano-particles of the humic nature of the high-moor peat.

The dynamic light scattering is practically used for the particles sizes measures and the polydispersity in the liquid solutions of the humic substances. The final results are usually explained in the framework of the intra-molecular compaction (e.g. the contraction), or the intra-molecular aggregation models [5,6].

The particles size distribution histograms in the water solutions of the peat humates, relatively on their contribution to the light scattering have been presented in the Figure No.4. Moreover, it has also been established, that the supra-molecular particles of the micellar nature are found themselves in the dynamic equilibrium with the individual macro-molecules, and for the both particles groups are characterized by the polydispersity.

**The Figure No. 4** – The Particles sizes distribution histogram in the diluted (a) and the concentrated (b) solutions of the biopolymers solutions of the humic nature, the high-moor peat allocated.

The mode, corresponding to the individual molecules with the particle sizes from 3 up to 11 nm, is being fixed only at the concentrations lower 0,1 g/l, at the concentration increasing, the inter – molecular aggregation is practically led to the particles formation, with their sizes from 60 up to 600 nm, with the polydispersity clearly expressed in the nanometer, as well as in the micrometer ranges. So, in the paper [5,6] such aggregates, which are prescribed the pseudo – micellar nature, have already been fixed and recorded in the humic substances solutions, having isolated from the soil, the lignite, and the river water. The pseudo – micellar nature particles absence in the peat humates solutions is explained their manifestation the surface and active properties. Thus, the comparative characteristic ability to be reduced the surface tension of the water by the aromatic biopolymers of the lignite and humic nature, having used, as well as the natural PAV surfactants, has been given in the earlier publications [7–9].

### The Conclusions

The structural organization of the peat polymer matrix at the quite different levels of the dimension hierarchy (e.g. macro-, micro-, and nanoscale) with using the light, AC-microscopy, and the dynamic light scattering methods has already been studied.

Moreover, it has been found, that the supra-molecular particles conformation of the biopolymers humic nature, having extracted just from the peat, is practically characterized by the asymmetry elements. The supra-molecular particles in the solutions are usually in the dynamic equilibrium with the individual globular macro-molecules, the sizes of which 3 – 10 nm are made up, which is comparable to the nano-particles sizes of the other biopolymers of the lingo – humic nature.

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*Materials of Conferences***BASIC ECOLOGICAL PROBLEMS OF SOUTH KAZAKHSTAN REGION**

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In article priority environmental problems of Kazakhstan and, in particular, the Southern Kazakhstan area which decision consists in new thinking and type of behavior of the person in environment are designated.

**Introduction**

In recent time aroused a problem of violation of a normal functioning of the ecosystem in consequence of intensifying antropogenic influences to a natural environment. The ecology problems started increase from the local to the regional and into interregional than to the global.

The priority character of ecological problems (connected with the growth) began to threaten to the human life in our planet. That why the task of modern ecology is to help to survive from these difficult conditions. Gradually the process of deserting is increasing happening degradation of plant conferring under the influence of the antropogenic factors and unnormal use of the nature resources[1].

The different types of soil degradation, which is, connected with the antropogenic factors represent large-scale losses. According to the given factors from 30% - to 80% the watering grounds suffer from the reserve salting and different kind of soil disease. The losses of fertility of soil and devastation is typical for all the Five Central – Asiatic governments. They are Kazakhstan, Uzbekistan, Kirgizia, Turkmenistan and Tadgikistan, which occupy the territory of 4-mln square km of Drainage basin of the Aral and Caspian seas.

Dry climate and a less precipitation's are typical to the Central Asia. These lead to desolating and salting of soil. Degradation of soil was aroused mainly by the unrationall use of water resources, overwatering, overuse of regetation on fuel and by industrial development[2].

In Kazakhstan in consequence of extensive development of agriculture and uneffective keeping of natural reserve and other nature protecting cares, violating of the correlation of square of fields and natural fodder war house, wood and water resources (natural landscapes of region). They lead to erosya of soil, salting and weaken the stability of natural landscapes of region. All this technogenetic loading on ecological systems, deformation between society and nature turned round to ecological crisis. The drying of the Aral Sea.

**Research objective**

Studying of the main environmental problems of the Southern Kazakhstan area.

**Materials and research methods**

As a result of poor planning of the top layers of sites, on poorly or not irrigated sites, territory mixing in the course of an irrigation, at the same time inflow of ground waters from irrigated territories finds reflection in changes to which irrigated lands are exposed as a result of salinization. In compliance with artificial distribution of the areas having large reserves of salts, distribution of the salted irrigated lands from upper courses to lower reaches of the rivers increases also. According to scientific proofs, levels of ground waters, their mineralization, a congestion of stocks of salts, in soil layers are показателями territory drenirovannost: during an irrigation of the top layers of earth loss of waters is inevitably formed, their outflow is provided by ground waters [1].

The fourth source of salinization of irrigated soils most powerful and not changing with a vremeniye in the conditions of an arid climate are easily soluble salts in waters of the rivers. With increase of extent of use of a superficial drain of the rivers on an irrigation, their share accumulation in soils and spreading deposits increases. On the ravinakh and steppes of a foot of mountains the area of irrigated lands increased, it served as the reason of gradual increase in the area of the salted lands (their top layer not salted, but on gentle layers relic stocks of salt of the considerable sizes accumulated) the areas of the salted lands (their top layer not salted, but on gentle layers relic stocks of salt of the considerable sizes accumulated) [2].

**Results of research and their discussion**

On table N1 given some facts about devastation of agricultural lands of the Central Kazakhstan district by "Kazgiprozem" the branch of Shymkent. Devastation leads to increase the fertility of soil, cutting down the productivity of plants and stockbreeding. Crop capacity in Kizil-Chum (Shardara) fodder plants cutted down till 30% territory till 50%. Researches showed the average crop capacity of dry mass wormwood turf careals of pastures formed in 1930 5 – 6 c/h, in 1950 4 – 5, in recent year 2 – 3 (Andreev, 1980). In recent year the stable development of society is a present problem. Under the stable development we understand the using of natural resources without any harm for our future generation. In older to protect the stable development of Kazakhstan we must preserve the biological species. It means amount of kinds which joined into ecosystem (plants, animals, microorganisms, etc)[1].

Table N1

The facts about devastation of soil (thousand /hectare) in the Southern Kazakhstan region:

Regions	Thousand /Hectare	Week degree	Middle degree	High degree
Bugun	8,8	-	8,8	-
Djetisai	101,4	-	-	108,4
Kirov	162,5	-	-	62,5
Kizil-Chum	792,6	5,0	787,6	-
Sari-Agach	10,6	10,6	-	-
Turkistan	268,2	218,4	4,4	35,4
Shardara	671,0	-	459,2	217,4
Total:	2015,1	234,0	1260,0	423,7

The “Read Book” of Kazakhstan includes rare and disappearing kinds of animals. It’s shown on the table N2.

Table N2

Variousness and conditions of kinds of spine animals on territory of the South-Kazakhstan regions:

N	Group of animals	N of famous kinds of animals in R/K	N of famous kinds of animals in S/K	N of rarely kinds of animals in R/K	N of rarely kinds of animals in S/K	The total percent of animals
1	Mammals	178	88	40	14	49,4
2	Birds	489	377	56	29	77,0
3	Reptiles	49	25	10	3	51,0
4	Amphibian	12	2	2	-	16,3
5	Fish	120	46	27	6	38,3

• Deficit of water resources sloughing soils. Degradation of pastures. Pollution of atmosphere air in urbanized territories. Pollution of environment in oil extraction regions. Pollution of environment by industry and everyday wasters. Rack of forest and especial defending territories. Pollution of water object by effluent waters.

The South-Kazakhstan region is characterized by an agricultural direction demanding the stable water supply. Here exdeficit for water resources, pollution of water by effluent waters, degradation of soil and destroyed monuments of nature and culture.

### Conclusions

Intensification of ecological problems, are all over the world and Kazakhstan in the zone of ecological crisis, it is necessary to find the way from it. Kazakhstan including to the global process movement to the stable development must take into consideration interests and needs of not only nowadays and also of the future generation. Entrance into new reality – epoch the stable development. The ecology formation is a new direction of pedagogic in conception of stable development acquires a system forming factor of formation in whole identifies its purpose and main direction. In order to overcome this ecological crisis with above – mentioned ecological problems. Its necessary a preparation of highly qualified specialists which have knowledge of world standard. Higher aducational institution

and school cant stop the pollution of environment, which carry a wide social character, different by meaning and difficult by consequence of antropogenic influence to the existence. But they can make perspective produce an ecological culture of association with nature, to form a mentality directed to prevent the negative influence of human being to the nature. To keep the nature clean the chairman of factories, institutions and enterprises workers and farmers, owners must carry out duties and must avoid to make any threat to the life and heals of human beings to support a process of normal life activities of vegetable and animal world.

Water acquatories, to threat the material values with care to preserve and increase the biological species.

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## Materials of Conferences

## TREND STUDIES OF MACROECONOMIC INDICATORS IN COMPARABLE PRICES

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The research of trends of economic growth in Russia's economy implies prolonged analysis of the dynamics of major macroeconomic indicators to study the transformations in the structure of indicators, ratios and proportions between them.

Economic growth is characterized by increasing the scale of aggregate production and consumption, defined as gross domestic product. GDP reflects the market value of all goods and services in all economic sectors for consumption, export and accumulation. GDP is an indicator of public welfare of the nation: the higher the production, the higher the welfare of the state population. Therefore, this indicator is the major macroeconomic indicator that reflects the results of the functioning of the economy. At the present stage of economic development of Russian society there is the task of ensuring sustainable economic growth through the accelerated renewal of fixed capital of the state. Therefore, the most important long-term factor of economic growth is investments.

The investment policy of the state is aimed at creating a favorable investment climate, allowing for all sources of funding to develop key areas of the economy.

Socio-economic development and the dynamics of economic growth are defined by the volume

and nature of investments. Growth in gross domestic product and the wealth of society are ultimately determined by investments. Declining investment is a key indicator of an economy in a state of crisis, and the investment recovery activity is the essential ingredient to achieve a sustainable path of economic growth. Falling investment in fixed assets completely contradicts the nature of the market economy, which is based on the laws of capital accumulation, and it does not meet the goals and objectives of economic reform.

Analysis of the main macroeconomic indicators of Russia's economy in current prices from 1990 - 2012 reveals a trend of exponential growth in virtually all areas. However, these processes cannot attest to economic growth. This confirms that the reproduction process is nominally extended character, because of the increase value of the studied parameters as a result of inflation.

Therefore, a realistic assessment of the Russian economy's dynamics, which directly characterizes trends by their growth or decline, should be carried out by calculating their volume indices at constant prices (Figures 1 and 2). Indices of changes in macroeconomic indicators in comparable prices show that the transition to a market economy has been accompanied by a critical decrease of all of the analyzed indicators. Thus, the GDP in 1998 amounted only 57,5% compared to 1990, but by 2007 from the previous level in 1990. However, thanks to the competent economic policy, by 2012, the GDP amounted to 116,3% of the level 1990.

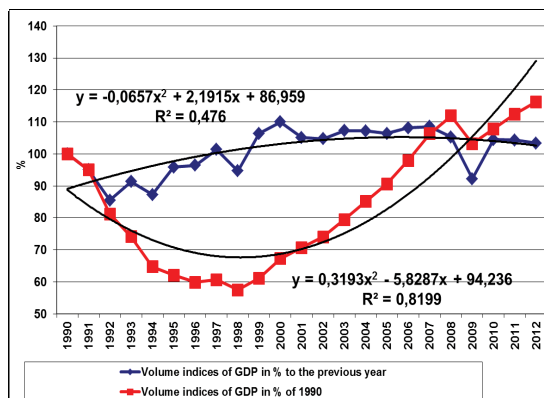


Figure 1. Volume indices of Russia's GDP in 1990 - 2012 years in% to the previous year, and 1990 year

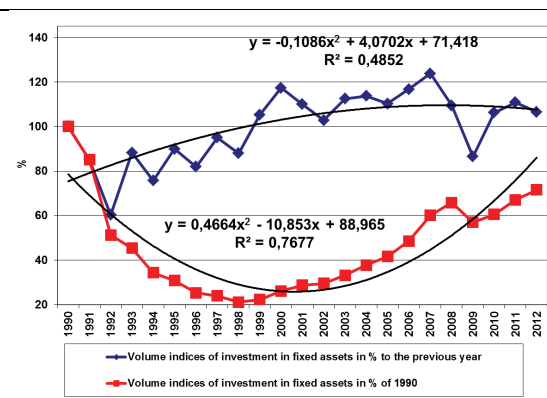


Figure 2. Volume indices of Russia's investment in fixed assets in 1990 - 2012 years in% to the previous year, and 1990 year

Economic crises in 1998 and 2008 had a negative impact on the volume of investment in fixed assets. At the end of 2012, investments in fixed assets amounted to only 71.5% from 1990 levels. To identify the main trends of the index change

in GDP and investment in fixed assets, an analytical alignment was made which shows a clear tendency of decrease and growth in the analyzed parameters, which are described by a polynomial trend (Table 1).

Table 1

Comparative analysis of the trend of volume indices of GDP and investment in fixed capital in comparable prices, %

Indicators	Trend	Equation	R <sup>2</sup>
Volume indices of GDP in % to the previous year	Polynomial	$Y_t = -0,066t^2 + 2,192t + 86,96$	0,476
Volume indices of GDP in % of 1990	Polynomial	$Y_t = 0,319t^2 - 5,829t + 94,24$	0,819
Volume indices of investment in fixed assets in % to the previous year	Polynomial	$Y_t = -0,109t^2 + 4,07t + 71,42$	0,485
Volume indices of investment in fixed assets in % of 1990	Polynomial	$Y_t = 0,466t^2 - 10,853t + 88,97$	0,768

Analysis of the identified trends showed that the characters have a common trend direction of development, but at the same time they are inherent differences expressed in the descending and ascending branches aligned trends, accelerating and decelerating growth levels. Studying the dynamics of the index change of the main macroeconomic indicators of Russia's economy that characterize economic growth allows the conclusion of serious structural changes over the last 22 years. Calculated indices of GDP and investment in fixed assets allow carrying out comparable analysis of real growth or decline in these indicators, allowing us to estimate the real change in the dynamics of long-term and on par with those at the level of different countries.

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#### FEATURES OF TECHNOLOGICAL PREPARATION OF CARRYING OUT MARKET RESEARCHES IN THE CONDITIONS OF THE SATURATED MARKET

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Any research on the structure is the organized cornerstone at the heart of which the certain tech-

nological scheme reflecting sequence and a combination of use of methods of research is. Modern technologies of market researches are based on introduction of the innovations borrowed from other fields of knowledge and sciences. Today there is no uniform standard definition and a type of technology of carrying out market researches that is explained by essential dependence of technology of market research on its purposes and tasks; continuous replenishment of receptions and methods of the organization of market researches by new advanced development, and also conscious simplification of the scheme of carrying out market researches.

Technological process of preparation of carrying out market research includes set of specific receptions and the methods united in complex process of research. It is directed on collecting, receiving, processing and formation of the marketing information distributed on four main stages of technological process of realization of research, such as: the initial stage of research connected with definition of problems, the purposes and the tasks, the subsequent development of the plan of research, its realization and preparation of the final reporting under results of implementation of the research project [1].

One of features of technological preparation of carrying out market researches in the conditions of a saturated market is increase of the importance of the analysis within a complex of marketing of sales channels of goods. Scrupulous research and the analysis of a state and tendencies of development of sales channels allows to create to the modern enterprises base for increase of profitability of the sales that in turn is an actual reference point of operating activities of trade enterprises.

Besides, for ensuring growth of profitability of sales it is necessary to consider requirements of the saturated market assuming transition from extensive growth at the expense of expansion of territories and new sales channels, to systematic dot work with each available trade enterprise within a network, an outlet [2].

The technology of carrying out market researches has to provide to trade enterprises information giving opportunity is thinner to adjust the

marketing policy and policy of sales: to change pricing concerning a number of commodity groups, to remove separate groups of goods of the range, to displace accents in advance between separate categories of outlets.

Other feature of technological process is need to consider level of depth and quality of the analytical researches connected with sales by preparation of carrying out market research. Transition from quantitative indices of sales as a key reference point to quality indicators assumes similar change of mentality of the experts who are carrying out functions of market researches and sales and as not all employees can quickly be reconstructed, there can be a need of change of the personnel for divisions of marketing and sales.

The successful technologies defining practice of preparation of carrying out market researches of the market further will make a basis for processes of pricing and optimization of structure of sales of trade enterprise, providing successful formation of the base in a uniform matrix of growth of sales of trade enterprise.

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### INNOVATIVE PERSON AS A WAY AND METHOD OF ACHIEVING GLOBAL COMPETITIVE EDUCATIONAL ADVANTAGE OF RUSSIA

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Innovative person is a subject of all innovative reformation, active initiator and realizer of them. His abilities, according to the strategy, should include: ability and readiness to study continuously, re-study, self-education, professional mobility; ability to think critically; creativity, initiative; skills of independent and team work in a competitive environment.

**Objectives of long-term development of Russia** are at least linked to solution of the following problems:

1) provision of high level of population welfare;

2) establishment of geopolitical role of the country as one of global leaders that define the world situation.

Strategy of Russian development up to 2020 confirms and outlines the necessity to form domestic economy of leadership and innovations. In this case some promising objectives are defined as:

- occupying a significant market share (5-10%) in the area of high-tech and intellectual services;
- increase in share of innovative products in total industrial output (5-6 times);
- increase in share of innovatively-active enterprises (from 9,4 to 50%).

As it is known, world economic crisis has complicated realization of the set objectives significantly and led to decrease in innovative costs among private enterprises, it has also intensified structural weaknesses of Russian innovative system.

#### Key challenges regarding innovative development in Russia.

Solving problems of post-crisis restoration takes place in conditions of internal and external challenges for Russia. Let us define key external challenges in regard to our state and its mechanisms. One of the most significant challenges is related to acceleration in technological development of the world economy.

Developing countries and countries of CIS become real competitors of Russia in the area of innovations as well as leading countries.

Uncertainty in development of Russia increases due to technological revolution in recourse-saving and alternative energetics. Export of traditional sources of energy still prevails at the world market. However, new economically-efficient technologies of prospecting hydrocarbons from non-traditional sources: shale, oil-bearing sands, etc.

Another significant challenge is "washing out" employees, technologies, ideas, and capitals from the country, while qualified working force and "clever" money (investments, technologies, competences) are required for strengthening the country.

The third group of challenges should include those that are faced by the humanity – change in climate, population aging, and also ones that influence Russian citizens the most – healthcare, food safety. All the mentioned factors define the need for intense scientific researches and technological developments in the area of:

- "clean" energetics;
- genome medicine;
- new technologies in agriculture, etc.

Russia does not possess significant foundations in these areas. The country should overcome the existing isolation and integrate into the world innovative system.

A different plan of actions implies narrowing "window of possibilities", transition of Russia into the system of imitating countries that serve as raw

material sources that are unable to produce a new knowledge and achieve global leadership in key directions.

**Innovative person.** Achieving the set perspectives and reality in transforming ideas into possibilities and specific activity is possible only in case personality of an innovative person is formed in Russia, and it is not a synonym of innovative businessman.

**Innovative nature of Russian education.** Forming competence of the “innovative person” begins before school and in primary school.

The following basics must be mastered during this preschool period:

- 1) critical apprehension of information;
- 2) ability to think independently;
- 3) creativity, inventiveness;
- 4) ability to work in a team;
- 5) socialization skills.

The quickest introduction of innovative tools into formation and constructive activity of a person requires:

- formation of institutions for pedagogues and managers that will help them master innovative programmes of developing preschool education (no less than 2 institutions with state support in each federal district within 5 years);

- paying utmost attention towards the role of family in training and education. This objective implies creation and development of various institutes of civil society, including socially-minded non-commercial organizations;

- establishing flexible and real facilitation of new technologies of education and methods in school. These methods include developing infrastructure of deep and profile education, integration of general and additional education, creating possibility for professional and pre-professional training. Real efficiency of the taken measures will define granting the most efficient schools with the status of presidential lyceums.

Connection between school and higher educational institution in the area of innovative development is established via mutual network, projective activity and professional training communication between young researchers, their introduction into projects, organized by institutions, grant support for certain projects and educational programmes, creation of probation grounds network for training employees of secondary education, improvement of accreditation, license, and other requirements.

**Formation of an integral continuous education system** that will correspond to requirements of innovative economy, has become urgent in its origin. It can be realized via:

- introducing international standards and credit-module organization of training process;
- developing system of interaction between institutions of education and high-tech production enterprises;

- altering principles of employing professors and tutors: positions of middle and higher rank (constant positions) will be occupied on competitive basis with a necessary consideration of international publication activity of a contender.

Formation of innovative person is linked to training professionals-innovators in all areas of economy, including education. This setting clarifies a number of internationally-oriented positions:

- participation of tutors in global competitive researches and projects, shutting down contracts with professors who don't take part in this activity;
- hiring foreign specialists on constant and temporal basics;

- creating new ratings of higher educational institutions in accordance to their international publication rate and patent activity of professor team;

- increasing requirements towards results of mastering educational programmes on foreign languages and Russian;

- considering efficiency of international and domestic academic mobility of students and pedagogues;

- participation of high-tech business representatives in forming and implementing educational programmes;

- creating departments on prior directions of science and production within institutions of education;

- measures on opening Russian market for foreign organization in terms of increase in staff qualification and certification;

- developing a system of educating adults and training pedagogues and specialists for this purpose;

- creating small enterprises and opening a) training programmes (e.g. in the area of digital projection of products); b) educational programmes for adults; c) training programmes for aged people – persons of the third age.

Development of mechanisms and network of continuous professional education is defined by development of internet, remote training, interactive, problem, and focus groups.

**Teaching innovative entrepreneurship** should be included into the number of urgent problems in the nearest future. At the same time:

- an accent on forming a complete circle of innovative developments is made, it includes selection of research thematics and selling innovative “startups”;

- a powerful commercialization of scientific developments is initiated;

- successful businessmen will be attracted to train the youth within the program “Tutorship”;

- formation of united teams of human science students and students of technical specialization will take place.

**The youth and innovations.** Formation of innovative persons is majorly related to a complex of measures, aimed to involve young men into the context of scientific developments, it implies:

- developing infrastructure of the “House of schoolchildren” in order to realize programmes of additional education of natural science and technological direction.

- developing system of scientific olympics, scientific summer camps and expeditions, contests and conferences.

- support of editions, internet, and other resources devoted to scientific-technical and innovative activity, etc.

**Ways of uniting efforts of state, education, science, business** are placed in the focus of strategists and initiators of large-scale domestic changes. They include creation of **technological platforms** – a communicative tool, aimed to activate efforts on creating perspective commercial technologies, services, products and carrying out researches. The following directions are defined as prior:

- informational technologies,
- aerospace technologies,
- biotechnologies, including industry and pharmaceuticals,
- composite materials,
- photonics, laser technologies,
- nuclear energetics.

A “breakthrough” at markets of high-tech products and intellectual services is planned on 8-10 positions: nuclear technologies, aircraft building, shipbuilding, software, arms and military technics, educational services, space services and output of space-rocket technics, and also leading positions in fundamental applicatory developments and technologies.

**Efficient science.** Innovations in developing out Motherland are linked to achieving efficient potential by Russian science. Nowadays Russia has 3,5 thousand of research organizations with staff over 750 thousand employees.

It is necessary to:

- carry out audit of quality of their activity;
- concentrate our efforts on prior directions;
- form a network of scientific-research centers, research universities, **centers of supremacy, and centers of competences** – national research centers on prior directions;
  - create integrated **university-academic complexes** that will realize practice of combining teaching and researching activity;
  - master and introduce new models of aspirant training, introduce specialized audit classes into them;
  - broaden probation programmes;
  - strengthen scientific schools, create positions of federal scientific consultants, federal professor (an age qualification will be introduced – 70 years for occupying leading positions in the area of science and education);
  - remove regulative limitations for employing foreign citizens for leading positions (incl. institution chancellor).

**Specific ways of leadership and survival for an institution.** Numbers of foreign students who receive education in universities of a country play the most significant part among various forms of education export.

Statistical collection “Export of Russian educational services” underlines that level of foreign students’ satisfaction with their residence and education in Russia is far from reassuring. The main complaints are linked to:

- quality of profile education;
- unsatisfactory content and outdated methods of education;
- lack of well-organized practices and practices at all;
- discrepancy between education cost and its quality;
- lack in classical and new methodical and training literature;
- presence of subjects that do not relate with a future specialty;
- other social problems, linked to personal safety;
- linguistic and intercultural barriers.

**Resume.** If Russia is to carry out technological breakthrough in optimal time period, consolidation of many scientific, professional, human, financial-economic, and political efforts is required. At the same time, truth is certain, and every person should start his own way to innovations.

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#### MUNICIPAL MANAGEMENT AND FOREIGN INSTITUTIONAL FORMS OF LOCAL SELF-GOVERNMENT

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More than one hundred years ago Russian scientists and state activists proved that development of local self-government is majorly defined by legislations in development of a state and society. In this case it is interesting to analyze condition and

forms of local self-government in other countries of the world that differ in “distance” between state government bodies and local authorities, institutional or territorial organization of power, financial provision, authorities, volume, etc.

*Local self-government*, being a general conception that reflects a process of forming and developing democracy on territories can be established according to different models and in various organization-legal forms. Some of them are acknowledged by modern scientists, and discussions still go on regarding certain municipal reforms nowadays.

*In modern foreign countries* local self-government usually represents: a) a system of decentralized organization that has been formed as a result of continuous evolutionary development; b) division of public power into state and municipal branches. At the foundation of interaction between these two types of public power an efficient management of social affairs should be established. For example, we would like to outline that in a number of countries, such as Vietnam, China, Cuba, Laos, etc. local authorities is involved into the system of state bodies. Its separation from the state is typical for Australia, Great Britain, India, Canada, USA, moreover, law allows government to delegate certain state functions to local authorities in Germany, Austria, Italy, Czech republic, Hungary, and some other countries. It is typical that, regardless of “distance” between local authority and state, numerous efficient forms of control and effective management of state bodies by local self-government. As *effective management we define achievement of goals in set time frame with minimum costs of social resources*.

*A number of methods of providing bodies of local self-government with authorities* is known. The greatest general volume of authorities, functions, and objectives is given to local bodies of Sweden, Demark, Switzerland, Norway. We should also outline that costs of these legal bodies form over 20% of GDP in these countries. This index does not exceed 10% in Italy or Netherlands, in Cyprus, Malta, and Greece it equals 5%.

In most countries of Asia, Africa, Latin America law regulates functions, objectives, rights, and responsibility of local authorities. In states of Anglo-Saxon law tradition (Great Britain, Australia, New Zealand ,USA) it is studied as a natural right of population that, at the same time, can be limited by law, broadened or altered. In most European countries legislation defines general limits of local self-government functions. Such approach, particularly, is based upon requirements of European charter of local self-government, and their essence can be expressed as: “Bodies of local self-government possess a complete freedom to act and realize their initiative on any problem that isn’t excluded from their area of competence and isn’t under jurisdiction of any other body of power” (part 2 of clause 4).

*Forms of organizing local self-government in foreign practice are diverse*. Thus, USA, Germany, and Great Britain do not have a unique system of local self-government, while in France, Spain, and Portugal the system is based upon origins that are same for all municipal authorities. Bodies of local authority are provide with a state of legal person, and in certain countries, such as Netherlands, Austria, Poland, Great Britain, France, local societies also have a status of legal person.

We should also underline that *international historical experience of realizing democratic ideas* represents a result of continuous search for optimal solutions, balance between regional self-government and statehood

Depending on interaction between bodies of state government and local self-government the following models of local self-government are outlined: 1) *continental* (French); 2) *Anglo-Saxon*; and 3) *combined* (German). Anglo-Saxon model that is adopted in Great Britain, Austria, USA, Canada, is defined as classical one The following distinctive features are typical for it:

- high autonomy;
- lack of direct submission between municipal bodies of different levels;
- selection of not only representative bodies, but also municipal authorities by population;
- combination of administrative and court control over legality of actions by municipal bodies.

*Continental model* – this model is adopted by continental Europe, French-speaking Africa, Near East, Latin America. It described by:

- combination of direct state management represented by state administration on territories of local self-government;
- bureaucratic subordination between different levels of bodies of authority;
- strict system of administrative control on territories and administrative impact of central authority, including preliminary control of decisions, ability to cancel decisions, their re-study, suspension, and also recall, resignation, dismissal bodies of local self-government.

*Combined model*, practice of which is widely-spread in Germany, Austria, Japan has certain specific features and adapts necessary experience in the mentioned models. Thus, interaction between local self-government with state leadership is provided by the system of relations between heads of governmental districts with leaders of administrations of regions – landrats (regional directors that are also state authorities) and heads of executive organs of communal self-government (cities of regional rank). Co-submission between higher and lower-standing municipal bodies exists; limited authority of local self-government takes place in certain governmental districts.

We shall outline that European charter of local self-government, signed and accepted in October

1985 testifies for lack of principle differences between the existing models and their convergence.

*Speaking of American continent*, we can say that local self-government isn't mentioned in Constitution of USA, though American federative system represents a totality of federal, state, local level of authority, in other words, from constitutional point of view, local government forms a part of state authority. As bodies of local self-government collect taxes, regulate life of population, establish other services, they actually carry out functions of a state that delegated these functions to them (ландратами Dye Th. Politics in State and Communities Cliffs.P.230).

Active alterations and conflicting trends are observed in the system of local self-government throughout the world. Some institutional forms of local self-government single out:

1) *municipal formations* that have obtained significant, financially-based authorities;

2) *inter-municipal formations* (e.g. in 2005 85% of population of France has been involved into various forms of inter-municipal self-government that provided for efficient solution to many territorial problems through consolidation of local resources of several municipal formations);

3) *informal institutions*, such as conferences, forums. During them local authorities discuss and solve problems of local development in collaboration with society.

We cannot neglect the fact that spatial borders are no longer the only criterion of outlining subjects of local self-government. Territories become a crossroad of legislative, physical, human, formal, and informal inter-dependences and strategies in terms of related social-economical subjects.

Being a relatively isolated part of constitutional mechanism of state authority, local self-government has the following key features in modern western democracies:

- it is based upon representative ideas;
- it does not depend on governmental bodies in solving problems of local nature;
- it acts in accordance with law and is limited by its directions;
- it has its own sources of income,
- it possesses independent property, etc.

*A trend towards extension of municipalities has been observed in Europe* during recent years. For example, since 2007 the number of local council has decreased from 271 to 98 in Denmark. Larger municipal societies exist in Great Britain and Germany. Through territorial reorganization central authority tries to increase efficiency of local government. Thus, territorial reformation of Germany has decreased number of regions (and societies) from 425 to 250 ( from over 24 thousand to 11 thousand correspondingly).

On the other hand, processes of breaking up local societies are observed in North America (Canada, USA), Asia (Turkey, Libya). These trends are

mostly intense in Latin America; for example, since 1990 till 2000 about 1,5 thousand of new municipalities have been formed in Brazil. In Mexico their number increased up to 2,5 thousand, and there are more than 1 thousand of them in Columbia. In other words, *improvement of local self-government system is not yet complete in different countries*.

Presence of outdated administrative-territorial forms complicates solution of social-economic problems and efficient activity of local governments. It is impossible to neglect the fact that spatial borders are no longer the only criterion of outlining subjects of local self-government. Territories become a crossroad of legislative, physical, human, formal, and informal inter-dependences and strategies in terms of related social-economical subjects.

An important condition of reforming local self-government in foreign countries is not only broadening its authorities, but mostly creation of optimal conditions for facilitation all potential of a territory, provision of an efficient interaction between interests of all subjects that want to participate in local development: small and medium business, informational areas, and areas of communication means. Thus, special *inter-communal formations*: syndicates, city districts, broadened city communes have become widely-spread in France. Resources (human, infrastructural, natural, cognitive, etc.) become a significant condition that defines attraction degree of local self-government subjects).

As we have already mentioned, the system of municipal bodies is defined by *administrative-territorial division* in most of foreign countries. Two- or three-link administrative-territorial organization is mostly spread. A more complicated four- or five-link administrative-territorial organization can be found, but it affects complexity of election system for bodies of local self-government.

Bottom level of the system is represented by city and village communes. Main characteristics, necessary to obtain the status of municipal formation are:

- historical significance;
- population;
- presence of economic premises;
- general level of development, etc.

For example, big cities of Europe – Paris, Brussels, and others have a two-level system of local self-government: city and district branches. Such cities as Berlin, Vienna, and others are authorized two have double status – subject of a federation and municipal formation.

Limits of municipal area of activity do not depend of territorial or local state of business significantly, but they are defined by ability of municipal bodies to participate in economic and social area of state activity. Such types of authorities are fixed by either special laws or laws on separate sectors of state development – healthcare, enlightenment, etc.

In countries of Anglo-Saxon model of local self-government authorities are stated in regulative

acts of their responsibility area, and therefore, their activity implies only those measures that are fixed by law, in other words it is called *the principle of positive regulation*.

In countries of continental or mixed model of local self-government territorial bodies can carry out any actions that are not forbidden by law, such system is called *principle of negative regulation* (at the same time, a great number of the existing prohibitions complicates independent activity of societies dramatically).

The following structures are under direct jurisdiction of local self-government:

- 1) municipal property;
- 2) finance;
- 3) all areas of communal affairs, municipal formation;
- 4) household maintenance;
- 5) charity organizations, etc.

Considering specific features of the whole social-economic area, within limits of which bodies of local self-government function in foreign countries allows us to alter the role of innovative and financial components among all factors of economic growth.

Let us outline that financial basis of foreign local self-government is defined by a great diversity. At the same time, financial basis of local self-government represents a relatively independent system that is established by presence of independent budgets, sources of income, authority to set and collect local taxes.

*Dualistic nature of financial basis*, in other words, a situation, when one part of municipal income is formed due to independent sources of income, and another part of it comes from subsidies, received from budgets of higher level, serves as a method to re-distribute national income and put municipal formations on one level, and also has a regulative impact upon municipal bodies. In USA such kind of governmental incomes form 23%, in France – 33,8%, in Japan – 40%, in Germany – 45,3%. Income is formed by subsidies, or unreturned sums, provided to municipalities, and *subventions*, in other words, funds aimed to finance specific objectives, usage of these funds is a subject of report, and also participation in realization of all-state programmes.

There are almost no existing countries where local self-government has a complete financial independence. Local authorities, budgets of which are mostly formed of their own taxes can be described as ones with the most stable financial basis. High tax incomes have local governments of such countries as Sweden (70%), USA (65%), England (50,4%), Belgium, Denmark, Finland, France (over 40%), and Germany (21%). In other countries of European continent amounts of tax incomes form about 30% of total budget funds. The highest tax incomes are provided by property tax, real estate tax (USA, Great Britain), enterprise and land taxes.

We shall underline that indexes of financial independence only reflect the global picture. Each country has successful and unfavourable local societies. For example, over half of Venezuela municipalities with population up to 50 thousand people receive 80% of their budget funds from money, transferred to them by the government as financial help.

Regardless of serious differences between formation and development of local self-government in different countries, we should point out existing general legislations, for example, development of democratic trends; tendency to limit administrative centralization; establishment of certain balance between centralism and decentralization trends in development of local authorities; transition from *decentralization*, in other words, expansion of functions and competences of local governmental bodies along with limitation in powers of state bodies, towards *deconcentration*, which consists in transition of authorities to lower levels of leadership in centralized systems of state governance. At the same time, a powerful mechanism of influencing local societies is being formed, and it encourages them to treat interests of society in a more “favourable” fashion: it implies legal regulation, certain financial dependence, controlling activity, delegation of jurisdictions, all-state programmes, etc.

Thus, local self-government represents one of the most important institutes of modern society. During many years extension of economic and governing independence of regional and local authorities has been carried out as a measure of decentralizing system of territorial governance. Reference to experience of different countries with consideration of specific historical features of specific states allows us to study, integrate, and introduce the most acceptable and necessary reformations into the practice of local self-government of Russia.

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### THE MANAGEMENT OF THE ACCELERATED DEVELOPMENT OF RURAL TERRITORIES

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In article considers the problems which are connected with improvement of strategic planning system for providing a sustainable development of rural territories.

The executed researches testify about the need of the system accounting of specifics of rural areas and factors of it sustainable development in developing concepts, strategy and programs of social and economic development of regions and municipalities, schemes of territorial planning and a budgetary tax policy.

Authors of the article claim that the developed system of territorial planning in the village is actually subordinated to interests of development of branches where the main attention is paid to agrarian production, instead of complex development of territories as the habitat of the villager which is in harmony with natural and working conditions that in practice leads to underestimation of social and economic and nature protection aspects of rural development.

By research it was established that diversification processes in the village are prerequisites of increase of stability of development of economy on the basis of complex and waste-free use of resources, a covering of losses of villagers during agrarian crises at the expense of the profit got in other branches, and also ensuring alternative employment of the population in nonagricultural kinds of activity.

Authors come to a conclusion about need of creation of multilevel complex system of social and economic development planning of the rural territories, including system of the organizational, economical and financial and legal measures which are defining the activity of federal and territorial authorities, the local governments directed on diversification and increase of efficiency of rural economy, level and quality of life of country people, and also rational use and reproduction of natural and resource capacity of rural territories.

In developed countries, since the 1980-s, territorial strategizing has become widely spread, which is understood as independent and volitional determination by the local community of goals and the main directions of a stable social and economic development in the dynamic competitive environment with the consolidated participation of the key economic entities of the territory. At that, local strategies are the basis for forming state plans and programs of territorial development.

One of the key questions of strategizing is the increase in the level and quality of life of the rural population, constituting about 30% of the Russian population, diversification and development of rural economy and infrastructure with the preservation of a considerable role of agricultural branch, providing 5% of GDP, in which approximately 10% of the population is engaged.

Creating conditions for stable development of rural areas is one of strategic goals of state regional policy, the achievement of which will permit to provide food security, to increase competitiveness of Russian economy and well-being of citizens [1,3].

The year of 2012 was the last in the system of strategizing the development of agricultural territories based on the realization of the first State program for the development of agriculture and the regulation of markets, raw materials and food for the years of 2008-2012. Since 2013, Russia has started realizing the second State program, which is to be fulfilled in 2013-2020, that is during 8 years.

Thus, the system of state management has settled down to a course of predicted development of agricultural economy with planned goals and tasks, the volumes of financial support. It is a positive factor, as 10-12 years ago it was practically impossible to predict even mid-term perspectives for the development of such a complicated segment of economy as agricultural territories.

The realization of the State program is going on in more complicated, crucially new economic conditions.

**Firstly**, it is connected with the accession of Russia to WTO.

**Secondly**, the progressive development of Customs Union of Byelorussia, Kazakhstan, Russia and transition to Common economic space, and further to Eurasian economic union.

And, **thirdly**, the system of strategizing the development of agricultural territories should be considered in the context of global changes in business climate in the world food market, the consequences of crisis processes in a number of leading world economies in the conditions of continued increase of the population in the world and the growth of demands in food resources.

With all positive results of the realization of the first State program on the whole, it is impossible to evaluate it unambiguously. Most of all it is connected with very serious miscalculations of the social development of rural areas.

The social sphere preserves an unjustified lagging of the level of payment of people engaged in agriculture compared to the average level throughout the economy of the country (53%), the social infrastructure of rural territories is developing slowly, in the majority of regions demographic problems have not been solved. According to the data of sociological surveys of All-Russia Scientific Research Institute of Economy and Agriculture, more than

25% of rural population have a disposition to leave their village, among the young people this figure is 50%.

To a large extent it is connected with the fact that in the process of the realization of the program of social development of rural areas there was carried out a so-called "optimization of expenses", in the result of which during 5 years they received from the federal budget approximately 68,8 billion rubles less than had been planned when the program was approved in 2007.

Speaking about **the development of rural areas**, one should admit that the accepted practice of discrimination of immediate interests of laborers, expressed in underfunding engineering and social infrastructure of the rural areas, has been transferred to the new State program.

Thus, by the year of 2020, huge "scissors" in the levels of salaries in the economy on the whole and in agriculture will practically be preserved – 100:55.

Construction building capacities in 2014-2020 will be reduced in comparison with 2012 by 47-26%, there will be also reduced the share of families improving their living conditions in the frame of the Program in the total number of families registered as needing housing. In 2011, the share of such families was 3,5%, for 2014 the planned figure is 2,5%, for 2015 – 2,4% with the following increase up to 3,7% in 2020.

The provision of the rural population with medical-obstetrics stations will increase from 9,4 per 10 thousand inhabitants in 2011 up to 10,6 in 2020, but it will not reach the level not only of 1990 (12,0), but also of 2000 (11,3).

The level of gas infrastructure development and water supply of rural houses will increase insignificantly: accordingly from 55,2% and 58% in 2011 up to 60,2 and 61,9% in 2020 [1,2].

It is evident that the support of the rural development on the federal level is insufficient and on a lot of points cannot provide even a return to the level existing 30 years ago. In this situation the role of regions' contribution to the solution of rural areas development grows greatly.

However, on the federal level there is no regulatory and legal framework to regulate, on a full scale, all aspects of stable development of rural areas. Because of insufficient preparation of this problem, it is necessary to carry out scientific research in the sphere of the development of rural areas in order to strengthen scientific and methodological support for managerial bodies on federal, regional and local levels. In this connection, corresponding changes are necessary in land, forest, water, city building, housing and budget law in the part of the provision and regulation of the stable development.

A program and goal approach in the sphere of territorial management is an important instrument of planning and regulating an economic development, creating conditions for increasing investment

attractiveness of regions. This policy is realized through the introduction of innovative technologies not only in the economic activity, but also by creating decent conditions for life and rest in rural areas.

To provide the stable development of rural settlements the regional policy includes a system of strategizing organizational, economic, financial and legal measures, determining the activity of federal and territorial bodies of power, bodies of local self-government, aimed at increasing the efficiency of rural economy, level and quality of life of the rural population, as well as the rational usage and rehabilitation of natural resources potential in rural areas.

Strategizing in the sphere of the stable development of rural areas is realized along the following directions:

- creating favorable social and economic conditions for the local rural population to fulfill socially useful functions, including a production function;

- increasing employment, level and quality of life of the rural population, its competitiveness compared to urban standards of comfortable living conditions;

- improving a demographic situation and increase in expected length of life;

- the rational use of natural resources and preservation of environment;

- the preservation and augmentation of historical and cultural potential of rural settlements.

Realization of a balanced regional social and economic policy on the development of rural areas determines the necessity to observe the following principles:

- the development of rural areas as an integrated territorial complex, fulfilling environmental, social and demographic, cultural, productive and economic, recreational and other functions;

- the provision of constitutional rights of rural citizens for labor, availability of quality education, medical service and other social services;

- the state support for rural territories and settlements to provide the rational use and development of their natural, social and demographic potential;

- partnership relations between regional power and bodies of local self-government, business and rural population for purposes of the stable development of rural settlements;

- considering territorial peculiarities to support depressed rural settlements;

- widening and deepening the integration and cooperation of urban and rural areas, adapting a settlement into an integrated economic system of the region on the basis of the development of road and transport infrastructure, modern means of communication, and creating unified systems of social service of the population;

- using the potential of development of all rural settlements with established centers for inter-settlement service;

- developing local self-government in settlements, all forms of cooperation, increasing the

participation of local population in making decisions, connected with perspective developments of rural settlements.

The main measures of state support for the development of rural areas were realized at the expense of the federal budget along five directions:

- the improvement of living conditions of the citizens living in rural areas, including young families and young specialists;
- gas infrastructure development in rural areas;
- the development of water supply in rural areas;
- the development of a network of general educational institutions in rural areas;
- the development of a network of institutions of primary medical care, physical culture and sports in rural areas.

With the purpose of creating conditions for the integrated development of rural areas and the improvement of the quality of life of the rural population it is desirable:

- to increase the volume of subsidies allotted to co-funding from the federal budget for: the realization of measures for constructing housing and the development of social and engineering infrastructure of rural territories and for the support of elite seed production and land fertility;
- to increase terms and time limits of investment crediting for the construction, reconstruction and modernization of stock buildings, purchasing of agricultural machines and equipment up to 15-20 years;
- to provide enterprises, realizing projects on the construction of stock breeding complexes, with an installment payment plan (restructuring) of credits obtained before 2008 up to 15 years;
- to work out additional compensating measures directed at the retention of labor resources in the rural areas [3].

To retain the population and preserve the rural way of life it is necessary to strengthen the economy at a fast pace, to build housing, to increase infrastructural possibilities. Therefore, rural districts must receive legal groundwork as growth areas, territories of an intensive and integrated development.

From the position of regional management, municipal programs on the integrated social and economic development of rural areas should be adopted and realized for the stable development of territories. They are directed, first of all, at increasing employment and incomes of the rural population, the development of rural self-government, the encouragement of the development of non-agricultural business in rural areas.

Considering rural areas not only as an object of management, but also as a specific complex which stable development should be directed at economically and ecologically grounded, socially oriented expanded reproduction, we will determine the following main conditions promoting this:

- creating an efficient system of the use of resource potential of rural areas, directed at the improvement of sustenance and social and engineering development of rural areas, also providing expanded reproduction of labor forces and preservation of moral, cultural, intellectual abilities of future generations of the rural population;

- providing a stable development of the economy of rural territories with the purpose of forming a reproduction potential for further economic development and increase of competitiveness of the main kinds of activity in rural areas;

- the preservation and efficient use of nature and resource potential of rural territories with the purpose of its further reproduction and improvement of the ecological situation in rural areas [4].

Insufficient consideration of the ecological factor, while evolving concepts, strategies and programs of social and economic development of rural areas, schemes of territorial planning, can produce a negative influence on the development of rural areas and lead to the reduction of efficiency in using their natural-resource potential. All the more so, that, in recent years, the environment management activity has been financed from the federal budget extremely unsatisfactorily. The volume of financing varies between 0,5 and -0,8% of the expenditure budget, which is approximately 5-10 times lower than in developed countries.

To solve this problem the whole complex of objectives for the ecological development, as well as necessary investments into the environment protection activity are included into the system of strategizing rural areas. It will allow to manage efficiently the use of natural resources of rural areas, thus providing a stable development of rural settlements and the rational use of the natural-resource potential.

One more long-range direction of strategizing the development of rural areas is regional marketing. Its use, together with a developed local self-government and the present system of cooperation and clusters, allows to increase considerably the investment attractiveness and financial independence of rural administrative-territorial entities. A particular role here is given to the development of small and medium-sized entrepreneurship and diversification of the rural economy.

Diversification processes in rural areas are preconditions of increasing the stability of the development of economy on the basis of integrated and non-waste use of natural resources, covering losses of rural people during agricultural crises at the expense of profits obtained in other branches, and also providing the population with alternative employment in non-agricultural kinds of activity.

In fact, the present system of territorial planning in rural areas is subjected to the interests of branch development where the main attention is paid to agricultural production but not to the integrated development of territories as life

environment of rural people, being in harmony with natural and productive conditions, which in practice leads to underestimating social, economic and environmental aspects of the rural development [5].

Thus, the practicality of creating a multi-level system of planning the social and economic development of rural areas in present day conditions acquires particular timeliness and must reflect the following tendencies:

- increasing the role of a social cluster in the development of the territory, where rural people are the main productive force, who can work in any branch of economy, but live permanently on this territory;

- increasing the significance of an integrated economic development of rural areas which have a different potential (natural resources, density and structure of the population, social and historical peculiarities, etc.);

- attaching more attention to problems of natural management and the ecological development of rural areas, the solution to which is only possible with using territorial inter-branch and inter-industry approach [6].

In accordance with the Federal Law № 131, the bodies of local self-government have the right to set long-term and medium-term goals of local development and determine the means of their achievement. Strategic plans for the social and economic development of municipal entities become long-term guideposts in this direction.

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