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PERSPECTIVES ON DEVELOPMENT OF INNOVATION ACTIVITIES AT HIGHER EDUCATIONAL INSTITUTIONS

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The article presents the main directions of development of innovation activities at universities, problems and perspectives of innovative clusters, the Kazakh experience of developing the knowledge-based economy.

Keywords: innovative development, innovation activities, university, technology, commercialization, transfer

The key role in modern economy belongs to innovations. A strategic goal for innovation activities and economic development in our country, is to make the national production and territories worldwide competitive in the nearest future. The main resource to achieve this goal is higher education, which is aimed at «... entering the ratings of the leading world universities», – as stated in the presidential Address «New decade – new economic growth – new possibilities for Kazakhstan». In this respect, better professional training, international relations of the Kazakh universities, as well as their effective integration into the world educational space are of a very important. Obviously, it depends on the potential of teaching and scientific personnel.

Today, education is regarded as one of the basic values, which deficiency make any further social development impossible. Nowadays, the growing role of educational system embraces not only its function of moral education, but also its ability to improve the quality and enrich the human capital as a part of production relations. University activities regardless of the branch of science, are aimed to improve the knowledge and professional skills. University educational policy is focused on training high-qualified specialists, who

are able to compete in the labor market, in popular branches of science, technology and techniques, basing on development and implementation of innovative educational programs amid integration into the world education system. Universities contribute to the innovative infrastructure of a region by educating staff and providing scientific support, and determine its future development [1, 2].

Interaction between research organizations and industry is one of the main problems, which should be solved through establishing a system of technology transfer. In other words, it is necessary to create conditions where scientific and educational organizations can share knowledge-intensive innovative products with consumers (companies). These conditions lay foundation for establishment of innovation belts around universities. Lack of a developed technology transfer system at universities leads to the absence of demand for the results of scientific and technical activities of university staff and students. In general, the process of creation and transformation of knowledge into commercial product should be supported by the state, including the use of new measures. For example, in France, the scientists are treated as state officials in order to stimulate and raise the status of this profession.

In Kazakhstan, like in some other dynamically developing countries, the role of universities changes as they must help develop a «clever economy», which not only follows the international progress, but could also allow to outrun in certain priority spheres. The state creates a competitive environment using the advantages of all property forms, and thus emphasizes the infrastructural development of the higher education. In Kazakhstan, 5 national laboratories and 15 university engineering laboratories were established and equipped, according to the instructions of Kazakh President N. Nazarbaev. This step, aimed at breakthrough discoveries in the national science and innovations, contributed to the revitalization of scientific researches in Kazakhstan [3, 4].

Analyses of condition and work of the laboratories showed that there is enough scientific potential in Kazakhstan to conduct fundamental and applied studies and train appropriate scientists and professionals, which will provide scientific support and human resources for country's innovative and accelerated industrial development. Since the laboratory equipment has been acquired, there are more innovation projects aimed at encouraging investments into scientific research, including the private ones. Moreover, the majority of laboratories widened the range of services they offer, as well as gained more customers, which proves that laboratory facilities are available for common use.

An effective management of innovative technology development in Kazakhstan, integrating business, science and engineering potential, requires a system of commercialization and introduction of technologies, developed by Kazakh specialists, on the basis of existing scientific and research centers and holdings. This will allow to increase Kazakhstan's share in the world production consider-

ably. Successful commercialization of scientific achievements and technologies transfer are only possible if scientific and educational organizations interact with companies via a innovation infrastructure. The latter should provide the choice and evaluation of projects with commercial potential; conduct patent research; protect intellectual property; estimate intellectual contribution to newly established joint ventures; search for and raise investments for financing the results of research and development.

It is important to take into account the experience of other centers, for example, the technological cluster at the East Kazakhstan State Technical University in Ust-Kamenogorsk and JSC «Fitochemistry» in Karaganda, which are integrated with the research institutes, universities and production through a syndicate agreement. In 2009, at our university, a National scientific laboratory on nuclear technologies and renewable energy technologies was opened. Along with solving fundamental and applied tasks, it is aimed at developing innovative technologies and training engineering staff. This process corresponds with modern world trends in organization of integrated system «science-education-production», which has recently gained a strong presence in the USA and Western Europe.

In Russia, there were also created numerous science-oriented universities. The best example is an integration of universities and research institutes of the Siberian department of the Russian Academy of sciences in Novosibirsk. The National research university is being established at the Novosibirsk state university. A large technological cluster is also in the works. It will focus on the development and implementation of technologies, similar to the cooperation cluster of universities, research institutes and industrial companies in Tomsk. Such integration of

science, education and production proved to be effective, according to the solid results already achieved.

Innovations today have become a prevailing factor of development for the higher education. Innovative development of a modern university is objectively determined, goal-oriented, temporal transformation of university from one condition into a qualitatively new one. The process involves directed introduction of essentially new elements, properties and characteristics to the university activities. Innovation strategy of university development is one of the most important success factors. Earlier, universities could function successfully focusing their attention mainly on the rational use of its internal potential. Nowadays, on the contrary, there is a long overdue necessity to switch from function to development modus. Development strategy of the university is an essential factor of successful work under modern conditions, answering the questions «what to change» and «how to change». The answers let project the mechanism of innovative development of university as a system. Innovative model of university development urges to integrate science, education and innovation activities, as well as to develop and apply mechanisms that make the university more competitive, thanks to an effective and qualitative development of all its activities. The international experience shows that innovations development requires highly qualified scientific and technical potential, good facilities, demand for the results of scientific innovative activities, protection system for intellectual property. On order to train professionals for innovative economy, one need to create an innovative environment at the university, and possess an appropriate teaching qualification.

The focus on a sustainable development of innovative activity has become

the main objective necessity for development and survival of modern higher educational institutions. Setting innovations as a prevailing factor of higher education development is one of the important signs of the contemporary world. This is determined by the fact that ability to accept innovations and the choice of innovative development let the higher education system survive and develop under conditions of rapid social changes and growing competition. Innovative type of university development determines its unique character. This reflects in its rating in the educational market, the quality of its scientific and educational activities, the level of intellectual potential and innovation culture, the development strategy. Innovation-based competition is a relatively new and a rather important factor of university's survival, and is a decisive factor of an advanced development and implementation of new scientific products.

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FORMATION OF THE LOGICAL COMPETENCE OF STUDENTS BY LEARNING MATHEMATICS AT THE UNIVERSITY

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Basing on the competence approach to education, the author reviews some aspects of teaching techniques for development of the logical competence of students, as a part of their professional competence, during their learning of mathematics at the university.

Keywords: outlook, logical competence, developing education

The current global social and economic changes urge people to broaden their minds, develop their creative abilities, learn to cope with the growing amount of information, master new technologies, make independent decisions and adapt quickly to constantly changing social and economic conditions. The above mentioned transformations totally changed the quality requirements to the higher professional education, focusing not on the knowledge of subject, but the development of professional competence. The modernization program of the Russian education determined the competence approach to the quality of education as the main goal of study. Nowadays, the issue of professional competence development has been sufficiently analyzed by science at the general psychological and educational level, but there are no specific methods for the competence training, applicable for university students who study different subjects, including mathematics.

The article reviews aspects of teaching techniques for logical competence development in humanities students who take a course in math: structure of logical competence of humanities students; didactical conditions of logical competence development in humanities students at university; requirements (principles) to the teaching

techniques for development of the logical competence in humanities students; educational goals, which help develop the logical competence of humanities students; choice of the mathematical content aimed at formation of the logical competence of humanities students; the concept of the point rating system for evaluation of students' knowledge, which contributes to formation of the logical competence.

So, we defined the logical competence as a part of the professional competence, which university students can develop through studying mathematics, and which is one of the general (key) competences. Let us introduce the structural elements of the logical competence [1]. Logical competence involves the following skills: a student knows certain notions and laws of logic, necessary for the further education, maintaining interpersonal relationships and solving life problems; a student can think logically, and use his knowledge of logic and logical thinking to study successfully and handle problems in the everyday life; knows the symbols of mathematical logic used for logical operations, understands the meaning of logical and mathematical symbols and mathematical formulas, used to describe general laws of science and practice, uses logical symbols appropriately and can explain the

meaning of notions and symbols; has an idea of mathematical research methods, peculiarities of mathematical language and can correlate it with the Russian language; can apply algorithmic orders and instructions on mathematical and non-mathematical matters; possess abilities of mathematical thinking, which requires to be abstract, conclusive and exact; can argue and draw logical conclusions; can differentiate the proven and not-proven statements, reasoned opinions and emotionally convincing ones; can summarize and discover laws via analysis of concrete examples and experiments, can hypothesize and understands they need to be proved; can build and study the mathematical models when solving applied and interdisciplinary tasks; knows the difference between the scientific and practical requirements to proofs in mathematics, natural and human sciences; can express his thoughts clearly and exactly, both orally and in writing, understands the logic of oral and written information; has a notion of axiomatic building of mathematical theories, logical status of axioms, defined and undefined notions, definitions and theorems; understands that the logic laws of mathematical inference are universal and applicable in all spheres of human activities; has experience in using the learned knowledge and skills in own activities: study, communication, social and etc.; has a personal and valuable attitude to the acquired knowledge, skills and experience. This educational construction of the logical competence includes all elements of competence: cognitive, active and value-oriented.

Didactical conditions of the logical competence development in humanities students are determined by the active approach to management of learning and cognitive activities of students [5] and goals of the developing education,

its requirements to the choice of content, methods and forms of education [3]. We have distinguished the following didactical conditions: the content of mathematical education should correspond with the Federal State Educational Standards of Higher Professional Education, the goals and principles of the logical competence development in humanities students of universities; students' educational aims should be clarified during studying mathematics, they should focus on development of personal traits; participation in learning cognitive activities, stimulation of internal study motives, including, self-learning; teachers should use special educational methods, which help students to value learning mathematics [1]. The revealed didactical conditions clearly determine the main requirements (principles) to techniques of the logical competence formation: principle of compliance with the aims of mathematical training of humanities students; principle of compliance with the structure of the logical competence of humanities students; principle of activation of self-control and self-evaluation of students' learning cognitive activities; comfort principle; principle of providing values and evaluation [1].

We believe that teaching logical competence to humanities students should focus on achieving the goals that are equally important for personality development: explain the humanities students notions and laws of logic that are necessary for the development of their logical thinking and further education; teach skills of using the knowledge of logic and logical thinking in solving mathematical and other tasks, problems in interpersonal relationships; motivate to study, including self-study, and to evaluate the study activities; teach to compare the job offers with the actual level of skills and personal values; teach to

value the acquired knowledge, skills, personality traits and personal experience [1].

The choice of mathematical program, forming logical competence of humanities students, is determined, first of all, by the state standards. The federal state standards for higher professional education for humanities majors are rather brief: «Axiomatic method, basic structures, compound structures, probabilities ...» [4]. The standard is a frame, which can be build up with mathematical content, resulting in the course program. Currently, the humanity has accumulated an immense amount of knowledge on mathematics. Therefore, determining the content, we followed the federal state standards for higher professional education, designed for different faculties and majors, as well as the aims and principles of the logical competence development in humanities students at university. Let us present the program of mathematical studies for humanities students as part of the techniques for the formation of their logical competence [2].

Topic 1. Axiomatic method of science development. History and philosophy of mathematics as part of human culture. The main periods and the most important discoveries. The main and composite mathematical structures, their development due to scientific and practical needs. Application of mathematics in human sciences.

Topic 2. Theory of sets. Set definition. Universe. Subsets. Set operations and their properties. Venn diagram. Boolean sets. Cartesian product. Notion of correspondence. Potency of set.

Topic 3. Relations. Basic definitions. Properties of relations. Equivalence and tolerance relations. Graphs as visual method of presenting finite anti-reflexive symmetric relations. Relation of order. Relation of strict order. Completely ordered

sets. Partially ordered sets. Hess diagrams showing relations of partial order.

Topic 4. Theory of graphs. The history of the graph theory and its applications. Graphs. Basic definitions. The main types of graphs. Degree of a node. Main theories. Subgraph. Path. Simple path. Cycle. Simple cycle. Directed graphs. Main types of orgraphs. Oriented path and its length. Paths and Euler's cycles. Euler theory. Hamiltonian path. Trees as graphs without cycles. Forest. Directed trees. Properties. The degree of a vertex. Tree depth. Rooted directed tree. Algorithms as tree of decisions or choices.

Topic 5. Logic, truth table and proof. Propositions. Types of propositions. Logical connectives. Value of a proposition. Proof or disproof of proposition's truth. Truth table. Conditional statements or implications. Implication truth table. Equivalent statements. Conversion. Inversion. Contraposition. Basic laws of logic. Proof using truth tables.

Topic 6. Axiomatic systems. Axiomatic systems: inference and proof. Inference rule. Proof of inference using truth table and proof by contradiction.

Topic 7. Elements of probability theory and mathematical statistics. Probabilities and their calculation. Some of the combinatorial formulas to calculate probabilities. Types of events. Classic definition of probability. Casual events. Full group of independent events. Addition and multiplication theorems for events. Generalized theorem of event addition. Distribution law for a discrete random variable. Normal distribution. Event frequency. Sample. Representativeness of sample. Numerical characteristics.

In order to understand the course, students need to have knowledge of the basic school math. After learning the above presented program on math, the students:

Will have an idea of: common human and cultural role of mathematics as science in the human history, and its role in the development of other sciences; main stages of the historic development of mathematics, fundamental mathematical discoveries and famous mathematicians; basic mathematical structures and their development due to the scientific and practical interests; mathematical language and application of math in human sciences; main laws of logic and inference rules; probability of accidental events and certain combinatorial formulas to determine probabilities;

will know: basic definitions of set theory; relations, their properties and types; key notions of the graph theory; the Euler theorem; main notions of statement logic; basic logical connectives and their truth table; axiomatic method of theory building; axiomatic systems of inference and proof; inference rules during proof; probability to win a lottery or make profit in a financial pyramid and etc.;

will be able to: perform operations on sets, including the use of the Venn diagram; visually present relation with the help of graphs and the Hess diagrams; determine the degree of a node, simple path and cycle; determine the Euler path in a graph; prove using the truth tables for logical connectives, the laws of logic and rules of inference; make conscious decisions on gambling or investing in financial pyramids and etc.

During several years, students have been achieving high results on the federal tests, proving that the content of mathematical education was chosen properly.

One of the most important parts of the competence approach to education is formation of an independent educational cognitive activity of students. Elements of such activities are [3]: study-cognitive in-

terest, definition of objectives, study activities, control and self-control, self-evaluation of own activities, reflection over own activities. While learning the subject, they should reach levels V and VI. Let review some of the aspects of students' abilities for self-evaluation of their learning and cognitive activities, which they develop through studying mathematics. The analysis is based on the point-rating system of knowledge evaluation.

The effectively used point rating system of knowledge evaluation should motivate students to take an active part in managing their educational-cognitive out-of-school activities. This could be definitely enhanced by development of evaluation skills of level VI («actual adequate forecast evaluation»). Modern educational science defines six levels of evaluation skills [3]. Work experience shows that the majority of school graduates entering the university have evaluation skills of the III level: students criticize grades given by teachers, but cannot and do not try to evaluate their own abilities before working on a new study project. And only the minority of students are able to estimate their own abilities freely and reasoned, and with teacher's help, can prove their ability or disability to solve a task, basing on analysis of the known plan. During studying mathematics at the university, students should learn to prove in advance whether they have enough knowledge to solve a task; they should develop an ability of self-reflection: what I know and what I do not know in order to solve the assigned task; learn to compensate the lack of knowledge and gain additional knowledge by themselves.

The above discussed aspects of the techniques for development of the logical competence of students, let us clearly determine that main rules of an effective use

of the point rating system for knowledge evaluation in the frameworks of the competence approach to education, follow the essential requirements to techniques for the logical competence development.

Principle of compliance with the aims of mathematical training of university students means that the goals of the effectively used point rating system of evaluation of students' knowledge on math should correspond with the aims of the mathematical education of university students, set by the current standards of higher professional education, including the subject programs.

Principle of openness. Students should have an open access to standards, program of subject, flow sheet. Each module of the flow sheet should contain reasoned criteria for giving minimal and maximal number of points.

Principle of continuity means such organization of study in classes and at home, when the results at every stage of activities are included in activities at the next stage.

Activation principle for self-control and self-evaluation of study and cognitive activities of students. Through learning mathematics, students develop ability, readiness and solid skills to control and evaluate own activities.

Comfort principle says to take into account the individual abilities of students. The given material is of high complexity, but students' success in learning is controlled basing on their individual abilities and requirements of standard; an ultimate focus is set on creative work at the university and at home, and on gaining own experience.

Principle of providing values and evaluation of activity. Students should learn to compare the offered algorithm of activities with their actual abilities and val-

ues; they should be permanently confronted with alternatives, develop an ability to analyze the possible options, evaluate them and make the best choice; develop positive personal needs, motives and values.

Diagnostics prove that the developed method provides the essential level of the logical competence in university humanities students through learning mathematics, and can be used to elaborate the methods of key competence development, during learning mathematical subjects at the university.

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CONTEMPORARY SAFETY: MYTH OR REALITY?

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Important questions of human being in the contemporary world and security of his safe life are opened in the article. Ideological suppositions of the contemporary society provide formation of the specific understanding of life phenomena and attitude to it which at specific stages of society development were interpreted and passed on from generation to generation as myths. However, contemporary complex of threats and dangers demands reconsidering traditional vision of the reality and complex approach in forming personal qualities of safe behavior. Every person needs skills of objective estimation of different life situations and to react appropriately from the point of view of safety.

Keywords: safety, myths, contemporary, dangers, threats, security systems, national interests, culture of safety, educational field of safety, personal qualities of safe behavior

Contemporary complicated process of creating conditions for man's being and development is connected with the environment and social reality. Natural and social factors influenced different traditional forms of co-operation. They appeared at different historical stages: stories, fables, legends (gods, legendary heroes, events and etc., myths on the whole), created in people's mind fantastic images, which were an attempt to generalize and explain different phenomena of nature and society. According to philosophy, a myth is a form of an entire mass experience and interpretation of reality with the help of sensual-visual images, considered independent appearances [1]. Myths touch wide range of main questions of the universe and are an attempt to find solutions of deep, meaningful for people problems.

Contemporary mythology is varied. Totality of all existing (objective reality), surrounding a man today is directed at wide use of scientific cognition of the world. However, various scientific theories reveal questions of human being, though explanations of science are quite moderate

and not always convincing. For example, many people compare contemporary ideas of global events in nature and in the world with myths (global warming, impendence of new Ice Age). Besides, myth elements as a way of world cognition still remain in contemporary mass consciousness (for example, social myths, myths in ideology, ceremonies of mass rallies and celebrations and etc.) [1].

Today there's an opinion that some people are disappointed in the main contemporary myth – "all might" of science-technical progress. Its further unlimited usage on the Earth constitutes direct, focused, constantly growing threat to Mankind's natural habitat and to Human being.

Simultaneously, the specific function of ideology keeps widely using in contemporary reality – formation of specific understanding of life phenomena and attitude to them.

A man of the XXI century goes on living in two interdependent worlds- in the world of nature, which is consistently compressing and decreasing under influence of anthropogenic activity and in the

world of social medium, people's community. Creating conditions for being, satisfying his needs a man constantly influences the environment, causing by this its counterstand (physical, chemical, biological, social and etc.). That's why we may state that any sphere of human life and activity is potentially dangerous as it is connected with interference into interdependent worlds and their not always predicted reaction at these interferences.

Achievement of science-technical progress, growth of population and decreasing of natural energy resources, worsening ecology- social situation in the world on the whole and in separate countries particularly- all this annual growth of tension in relations of a man with the created technosphere. Level of human activity increased so that every time with growing strength and speed change the environment and natural-social environment [2]. Besides, daily increasing mankind's needs in more new resources in order to provide its everyday activity lead to further rising capacity. This in its turn leads to more intensive consumption and spending of natural raw material, increasing of different types of releases into biosphere, damage of natural system of co-operation of all flesh. Such tension definitely finds release in the shape of appearing dangers for all inhabitants of the planet. With increasing speed of life, every minute race for satisfaction of your needs satisfaction a man forgets about dangers awaiting for him during all his life. Such "lack of knowledge" a man tries to explain with the help of a simple axiom or a myth that "it cannot happen with me because it can never happen".

Thus, trying to explain his often rash acts, a man and the majority of mankind admits a real and realized ability of appearing of accidents, catastrophes, and disasters. So, for example, during the last

several months due to the fault of notorious "human factor" more than a thousand of accidents and catastrophes occurred which resulted in deaths of a lot of people. Those are fires, connected with irregular running of highly inflammable matters, broken wiring, unqualified usage of fire and accidents at industrial factories and manufactures, and catastrophes of auto-, avia-, and railway transport- all these problems make say about the necessity to pay greater attention to questions of security in all spheres of life- as everyday common, so labor activity, during travel and leisure.

Nowadays, almost every day concept "safety" is used in mass media; a lot of TV programs inform Russia's population about a lot of nature, ecological, industrial and other accidents, catastrophes, fires and blasts, leading to deaths. And along with this TV masters ask a question "who is responsible for a human safety?" It seems that most people have a narrow-minded approach to the surrounding nature-social environment and have shallow idea about the essence and contents of concept "safety". Besides growing comfort is seen, people's flexibility to real and imaginary pressure from mass media, amenability to information influence. Penetration of special system of myths into mass conscience facilitates further manipulations with them. So how should a contemporary man regard a problem of safety in the period when concept "safety" turned into many-sided, touching almost all spheres of life and civilization activity category?

Every man needs special knowledge and ability to estimate objectively in which side a concrete ideology "turns his mind" and how the turn corresponds to native people's, society's and state's needs [3]. Russia's strengthening and consistent assertion of its national interests caused dis-

affection of some well-known foreign circles that would like to see our country as weak-willed servant of the West, its raw-material appendage. That's why myths about advantages of western standards and way of life has been actively standing in opposition to all other throwing back to Russia's history variants of organization of human existence. And the same situation in the world is everywhere.

In such conditions every man should think: who if not he himself should provide his safe life. Everyone can protect himself from soul depraving myths. Unfortunately, it is quite difficult for an everyman to triode his safety, his relatives' safety and safety of his environment as he almost doesn't know elementary mechanisms and cause-effect relations in a system "SUBJECT- OBJECT- SAFETY SYSTEM" [4]. In this case education has the leading role, which is responsible for effective formation of moral, intellectual, psycho and physically developed young generation in our country. Nowadays scientific knowledge has become essential part of material production and other fields of social life, important factor of safety control in the country. That's why an educated person is a trained and well-bred person. And in this case moral and spiritual upbringing based on Russian nation's traditions is especially important. A man cannot become a defender of his Motherland without such education.

Hence, contemporary reality, objective and subjective factors and needs of state, society and personal development are characterized by the necessity of growing readiness to perception of the contemporary world of dangers, successful application of personal and collective safety measures, perfection of mandefencing and nature protection and defending life activ-

ity and formation of worldview culture of life safety.

Educational field of life safety, covering different spheres of human life, society and state, all their safety space has become integrative, synthetic study, developing on the cross-curriculum complex basis. Life safety is smoothly connected with the contents of all subjects, studied at all stages of constant education system. That's why contents of this education field depends on the condition of education system on the whole, conducted reorganization in it and processes in all fields of life in the country.

Safety as phenomenon of contemporary reality conduced to that in politics, social ideology and education of different countries in the world and in Russia questions of personal and collective safety control, achievement and safe of high quality environment, clearance of global negative impacts on live and non-life reality are been run as prior objectives of development. The abovementioned allows saying about the necessity of formation of a single education space of life safety, in which it'll be possible to form worldview and safety culture, conduce to obtaining knowledge and skills necessary for a man to reach comfortable and long life, to create life environment of acceptable for a man quality.

A man, having knowledge and safety culture with vivid qualities of a person of safe behavior in living and work activity will be responsible for safety of each person, society and state.

Contemporary achievements of educational space in the sphere of life safety allowed compensating the misbalance of the fields of dangers and the used means, ways of defense and models of safe behavior. However, constant modification

of dangers demands corrections of educational activity, which means concurrence of different types of educational- discipline, educational- cognitive and other activity at all formation stages of a man as a person of safe type. Thereby, to determine main strategic objective of the development of life safety educational space it is necessary to coordinate activity of all subjects of safety control (represented by state and international power structures and non-governmental organizations), and also education space elements (represented by educational- discipline, educational- cognitive, scientific institutions of different types in a system of constant education and science and teaching staff) to create working groups and structures based on the existing or specially organized international organizations that will work out a unique concept on safety control. In the conditions of impact of permanent danger only realization of such structure, able to determine cause-and-effect relations in a system "a man- environment" and to apply the obtained knowledge to correct the existing and form new courses in educational field of safe living, will allow development of a man in harmony with his environment and activity, able to provide

enough level of security for himself, his relatives, society and biosphere generally.

Thus, development of a man as a person of a safe type in particular, having knowledge on safety, able to analyze world experience of safety and build his safe world view will allow saying about the age of harmony coexistence of Mankind with natural and artificially created life environments. Safety reality will be secured only by man's willing to take care of it and supported by the formed system of complex knowledge in the field of contemporary problems of safety.

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**«BASICS OF ADMINISTRATIVE COMPETENCE
OF A DOCTOR-HEAD AS A SUBJECT
IN A POST GRADUATE EDUCATION SYSTEM»**

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The article is the first of three planned publications devoted to organizational psychology of public health services, particularly to a problem of power, management and the person of the doctor-head as its subject. In the first part are considered essence of competence of the approach to modern HR-management and emotional intelligence as an organizational-psychological category.

In medicine experienced doctors usually become heads, people with the formed professional identity, professional position. Practice shows that change of professional status implies not only appearance of additional professional functions and responsibilities for a subject. Demands of administrative activity to a professional person are being changed. We should admit that a complex of administrative competence, consideration of which should be taken when recruiting and appointing personnel in such a specific sphere is little known. Scientific approaches to diagnostics of psychological, personal qualities, conditioning success of management, are not developed. Demand of research of organization-psychological aspects of management in a system of medical service, from one hand becomes more clear and working out of methods of their developing in the process of continuous medical education of doctor-head, from the other hand.

In the publication we aim to consider main aspects of competent approach in contemporary HR-management and also analyze the concept of emotional intellect, being a component of professional competences of organization head in medical sphere.

In human resources management competences are interpreted as a unity of knowledge, professional experience, ability of function and skills of individual behavior, determined with an aim, set course of situation and job position [5, c.134]. If we take as the basis of concept "competence" a number of objects, fulfilled by an employee, a number of main responsibilities which have a right and is obliged to fulfill a labour subject at specific job position, then we see that competences in this case are a product of organization projecting. Upon that professional objects can be concrete-specific or invariant-typical for the profession and specialty as its variety. Competence in this context can be considered as a characteristic of labour subject, meaning its ability and readiness to cope with professional objects (competences).

Review of works, dedicated to the research of a problem of competence-based approach in valuation of subject's readiness to complete professional tasks shows that various aspects of the problem are studied more intensively in the context of formation of contemporary concept

of general and professional education in Russia [for example., 2 and etc.]. Study of labour efficiency of an experienced professional, his readiness to changing job positions and conditions of professional activity, particularly in medicine and medical care service generally from the position of competence-based approach is few, and the importance of the study of this organization-psychological resource of the improvement of efficiency of medical service is doubtless. In this regard, the employer's and management subject's understanding of the specific character of invariants of basic management competences has special meaning. As it is marked in a number of researches in the field of organization psychology [1, 4 and etc.], awakening of initiative in employees, ambition to success, ability to attract and keep professionals, work at the level of high standards- this is doubt components of efficient management, which are at once basic competence of managing staff [4, p. 27]. Basic or general competences are those competences, determining organization demands to professionals, working in the conditions of a specific position; in this case it is management, corresponding to a position of a head of line or top levels. Moreover, professional knowledge and experience make so called threshold competence, specific for concrete professional spheres, in this case such sphere is medicine.

It is established that in invariant kernel of basic competence have such qualities, presence of which is unconditional demand to a head, regardless to what level of management his position corresponds. Those are in particular communicative qualities, ability to leadership, independence, psychological flexibility, general, social and emotional intellect [6, p. 251-252].

In several researches it was mentioned recently high importance, from ba-

sic managing competences point of view, of emotional intellect (EI) [4, 8]. In accordance with one of the most popular EI concepts, belonging to J.D. Mayer and P. Salovey, he considers it as obtained in person genesis cognitive ability to realize, understand and express human feelings and control emotions [7, p. 33]. These abilities are divided into four groups, where each group has four main abilities, separated by their suppositions [8]. So group I includes getting and recognition of emotional information and contains the most elementary skills, connected with emotional sphere: perception, estimation and expression of emotions. These elementary processes of perception are necessary suppositions to further processing of emotional information. Group II describes ways of using emotions for intellectual process stimulation ("emotional facilitation of thinking") and determines different emotional events, conducting intellectual processing of information. Group III includes abilities to understand and analyze emotions. It is presented with abilities that condition abstract understanding and thinking concerning emotions. They range from ability to name emotions and identify relations between words and emotions, to conscious ability to transfer from one emotions to another. We may suppose that this component of EI is the closest to management intellect, considering as "individual ability to the most rationally use the obtained as supposition to any idea or as guide to action" [3, p. 27].

Group IV combines individual abilities to manage his own and others emotions in order to stimulate emotional and intellectual growth. This integral quality supposes appearance of the most developed personal skills, starting with the ability to be open for feelings- as pleasant, so unpleasant- and concluding with ability

to manage emotions in himself and the surrounding people, strengthening pleasant emotions and extinguishing unpleasant. This group of abilities of high level presents a network of a lot of factors, including conative, emotional and cognitive, which should be recognized and balanced in order to successfully manage feelings.

Graduated diagnostics of these characteristics from the point of competence-based approach, based on scientifically grounded criteria, particularly those determining structure of emotional intellect, its relation with the most efficient styles of management, may allow an employer more purposefully forming management teams of line and top-management in health care institutions of various profiles and status.

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METHODS OF SELF-MANAGEMENT IN POST-GRADUATE EDUCATION OF HEALTH CARE MANAGERS

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Post-graduate study of health care management should not be restricted to the managerial competencies (MC). It is also important to learn the effective skills of self-management. Here, the manager acquires, first of all, the techniques of the MC analysis.

The managerial competencies are a system of interacting, inter-affecting and interdependent elements, which develop along with the personal professional genesis. Evaluation of the MCs is based, first of all, on the concept of their understanding and systematization. So, subjective theoretic activity frameworks determines the methods for the staff evaluation in general and the MCs in particular. It is being accepted that social and professional environment of work, which combines specific task-targeted activities and manipulations, determined by the job requirements and norms, plays a leading role in professional's development. In this respect, the MCs are regarded as a product of an organizational project, and the MC evaluation means to find out how good the manager suits his position, to determine his professional competence as well as the goals of the further professional development and self-actualization.

Theoretical approaches mentioned in the earlier publications, considered in terms of subjective activity, allow to distinguish two MCs of a health care manager as evaluation objectives: emotional intelligence and styles of management. One of the tools of this methodological approach is the diagnostics of emotional

intelligence (EI) of a manager and its relation to the significant subjective leadership styles. Let us turn our attention to some of the methods.

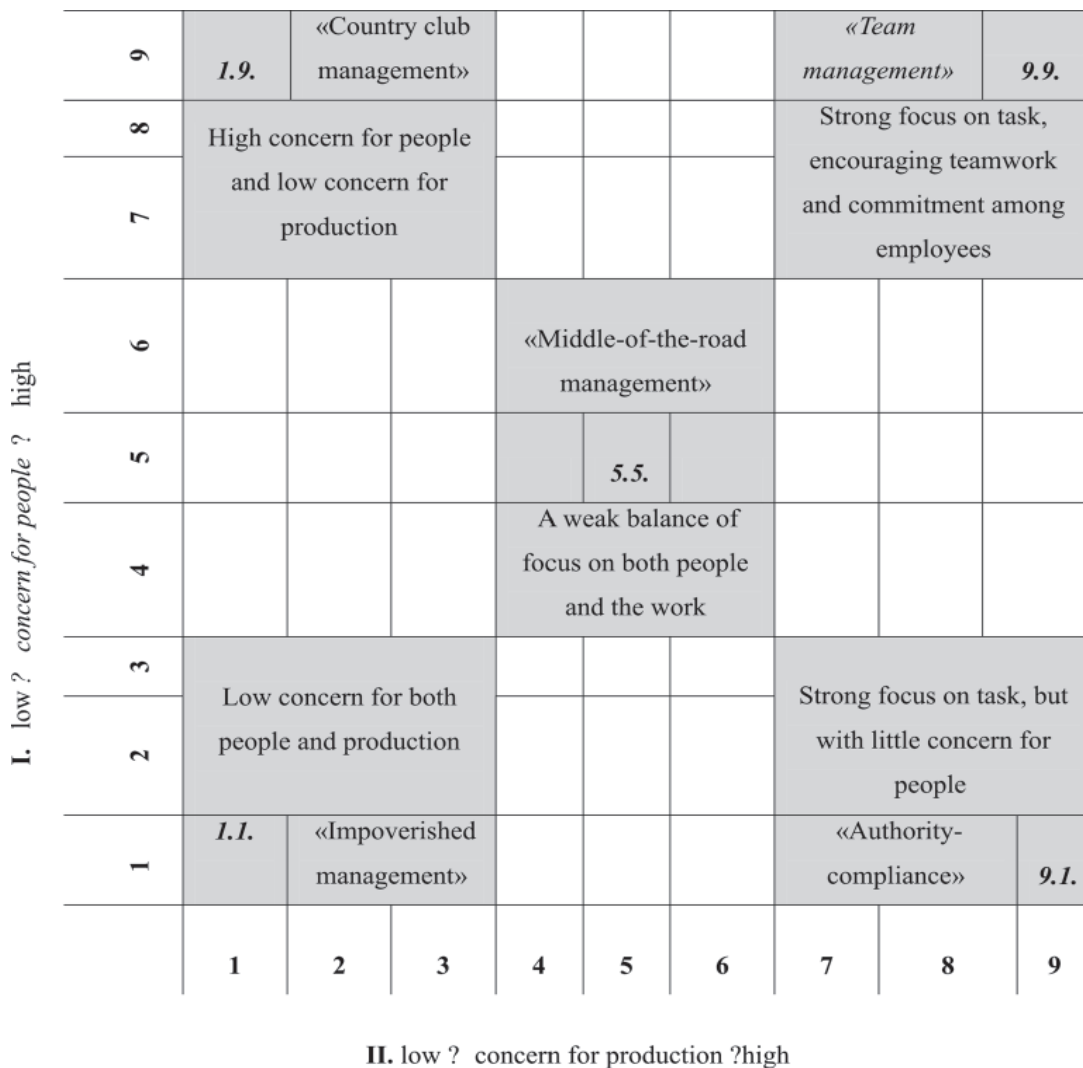
Diagnostics of EI, based on approaches by J.D. Mayer & P. Salovey, includes the Emotional Intelligence questionnaire by N. Hall, aimed at revealing the ability to perceive personal relations, represented by emotions, and control emotions by decisions [5, p. 57–59].

The questionnaire consists of 30 statements and 5 scales (of 6 statements each), which reflect partial elements of EI: «Emotional awareness»; «Control over own emotions»; «Self-motivation» (voluntary control over own emotions); «Empathy»; «Perception of emotions of others» (ability to influence the emotional condition of others). Respondents were offered to answer, whether they agree or disagree with each of the statements, using the 6-point scale: from –3 points («completely disagree») till +3 («completely agree»). Three development levels were determined for the EI and its components: high, middle and low [5, p. 59].

One of the modern methods to study the management styles was developed by R. Blake and J. Mouton [6]. It is based on the two-factorial model of leader behavior: factor 1 – «Focus on people»; factor 2 – «Goal orientation». R. Blake and J. Mouton operationalized the concept by creating «The managerial grid» [3, p. 233–236]. The above mentioned factors form the axes of the grid, which range from one to nine. So, the Managerial Grid consists of 81

cells, each of which characterizes a certain leadership style. Actually, the method provides not only a quantitative description of leader behavior, but, which is probably more important, determines the dominating factor of leader's thinking (manager)

in relation to the tasks that he faces as a manager [1, p. 228–229]. Semantically, we can distinguish five basic style groups, which occupy homogenous zones in the grid space (pic. 1).



Picture 1. Style zones of the Blake-Mouton managerial grid

Group 1. «Impoverished management». (Minimal attention to both people and work). Space: on axis I between 7 and 9; on axis II – 1-3.

Group 2. «Country club management». (High concern for people, low

concern for work). Space: on the both axis between 1 and 3;

Group 3. «Authority-compliance». (High concern for work, but little attention to people). Space: on axis I between 1 and 3; on axis II – 7–9.

Group 4. «Team style». (Strong focus on the work combined with trust and respect to people). Space: on both axis between 7 and 9.

Group 5. «Middle-of-the-road management». (Moderate concern for both people and task). Space: on both spaces between 4 and 6.

In order to widen the interpretational possibilities of the results of the MC self-diagnostics, it is worth offering the Tapping Test technique to the audience, which let observe the neural dynamic properties of personality: power/weakness, lability of nervous system [4]. Neural dynamic peculiarities of nervous system influence the working style of manager, making it individual. Formation of an individual style of professional activity (ISA) is related directly to development of one of the important mental work regulators – professional image and «Ego-concept» [2]. Development of ISA is an essential aspect of personal professional adaptation; it is directly connected with the development of the late personal new formation – professional individuality.

The described psycho-diagnostic methods are tools that let achieve the applied educational goals: acquiring of the self-management skills by doctors, in order to realize the current level of MC development and understand the develop-

ment direction of the personal management style. In our following article, we will focus on the analyzes of the applied aspects of this approach.

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TRAINING AND FORMATION OF THE CONTINGENT OF THE FOREIGN PUPILS IN REGION EDUCATIONAL INSTITUTIONS

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In job results 19 summer monitoring of the basic indicators characterizing a contingent of foreign pupils of educational institutions of a city of Krasnodar (quantity, distribution on educational institutions, preferences, etc.) are presented. Results introduced, since 1991, market model of formation of a contingent of the foreign citizens trained in educational institutions of a big city - the region centre are analyzed. The conclusion about necessity of purposeful activity of educational institutions on a set of pupils from abroad and about necessity of the state support of this activity becomes.

Keywords: the academic mobility, export of educational services, training of foreign citizens, long monitoring, a professional training for foreign countries

Educational establishments of Krasnodar krai and its center the city of Krasnodar for more than 50 years is a base for preparation of personnel for foreign countries. First foreign students (the citizens of Cuba) arrived to the krai (city of Slavyansk-on-Kuban) for studying of professions of mechanic of agriculture by the program "Cuba-Kuban" as far back as sixties of last century. Since then the krai and Krasnodar become, side by side with capitals and multi-million-strong cities, the center of preparation of foreign students [1]. This to the great extent was promoted by climatic and geo-graphical situation of region.

The krai is situated at the south-west part of Northern Caucasus, at the north-east the krai borders upon the Rostov Region, at the east upon the Stavropol krai, at the south upon Abkhazia. The territory of krai is washed by the Azov and Black sea. Krasnodar krai is the most southern region of Russia. In the krai there live more than five million people, besides near 53% live in cities, and 47% in the countryside. Climate at the biggest part of territory is moderately continental, at the Black sea cost the climate is subtropical. The average temperature of January at the plain is minus 3-5 degrees, of July – plus 22-24 degrees. Annual number of precipitation varies from 350 mm to 2500 mm. Climate at the krai is one of the most favourable for life in Russia for habitation and activity of human. Krasnodar krai is the warmest region of Russia, the average duration of time, when at the daytime at the territory of krai there is observed sunny weather, is 2300 hours a year.

Transport complex guarantees the realization of foreign-policy and economical interests of

Russia at the zone of Black sea cost and Mediterranean economic collaboration. Sea ports of krai guarantee the direct access through the Azov and Black seas to the international trade route. Across the territory of the krai there go important railway and automobile routes of federal meaning. Air transport of Krasnodar krai is represented by four airports, two of them are international (Krasnodar, Sochi).

The special place at the national economy complex is held by the establishments of science and culture, including institutions of higher education of krai, big educationally-scientific establishments, which carry out preparation of specialists practically at the all spheres of knowledge. At the krai there work 12 state establishments of higher education. Besides, in Kuban there were opened branches of leading HEIs of country such as Russian economic academy named after Plehanov (in Krasnodar), Moscow state university of commerce (in Krasnodar), Moscow state university of the friendship of nations (in Sochi).

All these factors became the reason of popularity of the city among the foreign citizens as the place of getting professional education.

In consideration of that fact that existing till 1991 year the scheme of intake and teaching of foreign citizens has broken up, and to replace the state system there appeared market mechanisms, with the aim of widening of export of educational services by the educational establishments of krai [3] there appeared a necessity to study the influence of this process to the forming of contingent of foreign students at the educational establishments of the city of Krasnodar.

As initial position for studying the questions of forming the contingent of foreign students of the city there served 1991 year, the last year, in which the intake and outtake of students were carried out by the rules that were settled by the Ministry of higher and middle special education of USSR. The research was completed in December of 2009 year.

For the comfort of tracking of results as the startpoints there were chosen markers with the interval of two calendar years between them (that means every third year). All used static facts were got by the results to the December of correspond-

ing year, that means till the beginning of winter examinal session, when the forming of the number of students is over, and the moving of contingent, which is connected with the appearance of academic problems of student, is still minimal.

In all during the 19 years in the city there were taught foreign citizens from 128 countries, the average annual number of foreign students in the educational establishments of city during this period was near 1400 persons. In the table 1 there are given facts by the quantity of foreign students, which were taught at the educational establishments of city.

Table 1

THE NUMBER OF FOREIGN STUDENTS AT THE EDUCATIONAL INSTITUTIONS OF CITY OF KRASNODAR (1991 – 2009 years)

REGIONS (groups of countries)	The quantity of foreign students (persons)						
	1991	1994	1997	2000	2003	2006	2009
Republics of former USSR	0	0	31	309	153	254	476
European countries	2	16	70	106	82	65	63
The countries of North, Center and South America	125	73	39	18	26	20	21
African countries (except North Africa)	770	338	130	101	161	337	245
Countries of North Africa	56	97	74	21	2	10	8
The countries of South, Center, and South-East Asia	412	429	628	509	461	526	212
Countries of Middle East	342	486	403	266	331	421	300
Other Countries	2	26	7	10	10	8	19
In all by the year	1709	1465	1382	1340	1226	1641	1344

The analysis of given facts allows to conclude, that after stop of functioning of existed at the former USSR system of intake and education of foreign students at the expense of country budget, their quantity in the city has constantly decreased, with the some increase in 2006 year, which was changed by the decrease in 2009.

And with it, there makes oneself conspicuous the essential increase of students from the countries of former USSR (countries of CIS), which reached comparative maximum in 2000 year, then,

after the decrease, essentially grew to the 2009 year, when citizens of these countries become the leading group that was represented among the students.

Stably high was a specific weight of citizens of countries of Middle East (mostly of Syria, Lebanon, Palestine, Jordan) and countries of South, Central and South-East Asia (India, Vietnam, Afghanistan), what we have already observed earlier [2].

Traditionally high was a part of citizens of Africa, which were taught at the HEIs of city till the 1991 year [1], what is

obvious from the facts of table 1, which characterize 1991 year, but by the finishing of training of this category of students, their part decreased and to the 2000 year they were less than 10% from the all-city quantity of foreign students. Starting from the 2006 year, their part is essentially increases, mainly at the expense of intake of citizens of Nigeria and Cameroon.

Part of students from the European countries (Greece) after the peak of 2000 decreases and last years it is at the stably low level.

Citizens of countries of North Africa, North, Central and South America after the 2000 year are more rarely taught at the educational establishments of city.

In common, more than 50% of foreign students that were taught in Krasnodar are citizens of: India, Vietnam, Lebanon, Syria, Jordan, Afghanistan and Palestine. Another 15% of students are representatives of Greece, Nigeria, Abkhazia, Sudan, Kazakhstan and Morocco. Only one person from the number of citizens of such countries as Gambia, Namibia, Serbia, Bosnia, New Zeland and Finland was trained in the city of Krasnodar during the whole researched period.

Are on interest the facts about number of countries, citizens of which were taught at Krasnodar educational establishments since 1991 till 2009 years (table 2).

Table 2

THE NUMBER OF COUNTRIES, CITIZENS
OF WHICH WERE TAUGHT IN THE CITY (1991-2009)

YEAR	1991	1994	1997	2000	2003	2006	2009
Number of countries	80	80	56	61	57	74	79

As we see from the facts of table, the contingent of foreign students of city in years that ingenuously followed the stopping of traditional for USSR scheme of education at the expense of country means of host country (when Russia assumed liabilities of USSR of teaching earlier intake foreign citizens), at the period of full absence of country order to the preparation of personnel for foreign countries (1995-2000 years) and after the restoration of country order to the teaching of foreign students at the expense of means of federal budget of Russian Federation was rather various and even at the years of full absence of state intake was represented by more than 50 countries (as compared with 80 countries at the period of primary education at the expense of means of host country). To the 2009 year

the number of countries, citizens of which were taught in city, practically returned to the level of the beginning of our research, although the process of forming of contingent has already been regulated by market mechanisms.

Is on interest such fact that (diagram 1) side by side with education in the state educational establishments of higher professional education (state HEIs), foreign students were also taught in the educational establishments of middle professional education (colleges and technical secondary schools) (from 10 to 18% of all students) and, starting from 200 year at the private educational establishments of higher professional education (from 1,5 to 3,6%) at different years. Relatively low part of students of private HEIs is connected with the problems of accreditation

of these educational institutions (and with the possibility to receive after the studying the diploma of state standard) on the one hand, and rather small, as compared

with traditional state educational establishments, the number of specialities, by which in these HEIs ones can pass out the education [4].

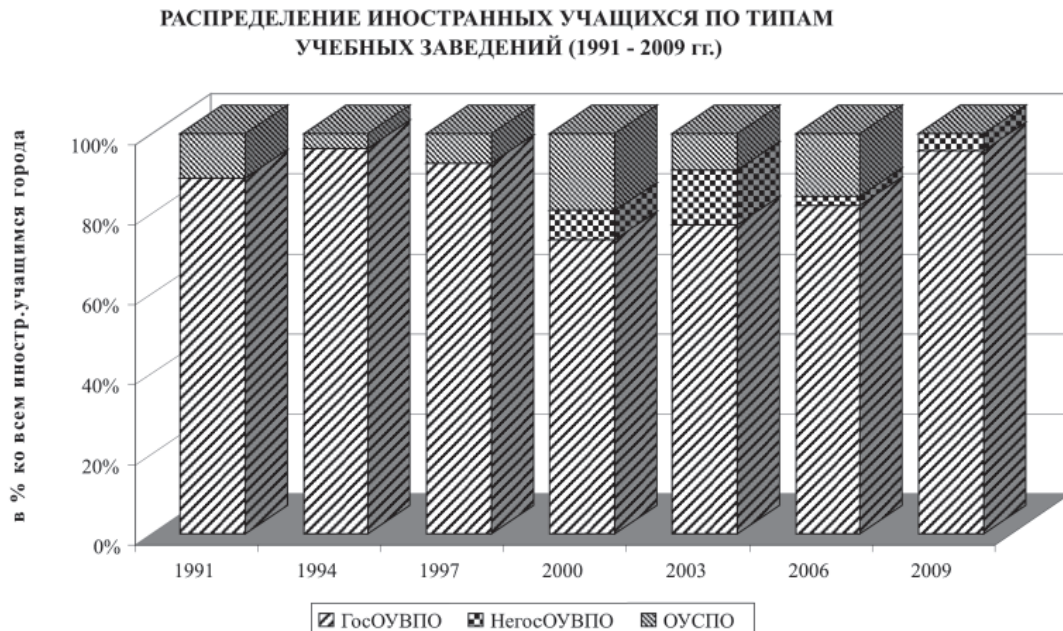


Diagram 1. The distribution of foreign students by the educational institutions

Thereby, during last 19 years there didn't occur spontaneous renewal of contingent of foreign students of the city, for its renewal to the initial (to the 1991 year) level at the educational establishments of territory there are necessary purposeful activities, which are realized at the frames of market attitudes, in combination with country support of export of educational services. Climate and geographical and economic possibilities of krai are the factor, which facilitates the solving of this problem.

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*Materials of Conferences***CHANGES IN VESSEL WALL RIGIDITY IN PATIENTS WITH STABLE ANGINA AND METABOLIC SYNDROME AFTER THE NEBIVOLOL THERAPY**

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Combination of stable angina with metabolic syndrome (MS) is an important medical and social problem due to its widespread in the world. Moreover, a close pathogenetic connection and mutual aggravation of the two diseases pose a threat of an early disability or death from numerous complications. The risk factors are: dislipidemia, obesity and hyperinsulinism that determine the occurrence and accelerate the development of vascular dysfunction, which declare themselves in endothelial dysfunction, higher rigidity and the MS. Currently, an increasing arterial rigidity is regarded as one of the factors of cardiovascular risk, associated with an unfavorable prognosis. That is why it is of interest at this time to research a possibility of a medicated correction of the vessel wall elasticity dysfunction, as it could let improve the therapy and the disease prognosis.

The aim of the study: to research on the effectiveness of nebovolol against the vessel bed rigidity in patients with stable effort angina with metabolic syndrome.

Materials and methods. We observed 62 patients with the stable effort angina II-III functional classes (cardiovascular insufficiency II-III functional classes) with the metabolic syndrome aged $56,2 \pm 3,1$ years old, 50 men and 12 women. A comparison group consisted of 32 patients with cardiovascular insufficiency II-III functional classes without any signs of the metabolic syndrome; a control group included 20 clinically healthy persons. All examined persons were matched in age and gender. Arterial mechanical properties were studied using a daily monitor for arterial blood pressure by «Petr Telegin» (Russia) and software system BPLab. A statistic evaluation was conducted using application software package Statistica.

Results and discussion. While evaluating the vessel wall elasticity in the observed patients, it was registered that, in comparison with the control ($168,3 \pm 1,8$ ms), the pulse wave transmission time (PTT) reliably reduced by 24% in patients with cardiovascular insufficiency II-III functional classes without dysfunction of carbohydrate metabolism, and by 39% – in IHD patients with metabolic syndrome. Maximal speed of rise of the arterial blood

pressure (dPdt)max, indirectly reflecting the strain of vessel walls during the pulse wave transmission, was 1,7 times smaller ($p < 0,01$) in IHD patients and 2,0 times smaller in IHD patients with the metabolic syndrome than in the control group. A rigidity index (ASI) was 24% above the control values in IHD patients, and 49% – in IHD patients with the metabolic syndrome. An augmentation index (growth) A/x rose 2,9 times ($p < 0,01$) in patients from the comparison group, and 4,2 times ($p < 0,01$) in patients with IHD and metabolic syndrome, compared with the control group. The revealed changes prove that the vessels become less elastic in the observed patients. The disorders were reliably stronger in patients with cardiovascular insufficiency II-III functional classes who also suffered from the metabolic syndrome. It was also registered that the stroke volume index (SSV) in IHD patients and in IHD patients with the metabolic syndrome increased by 17,5% and 29% correspondingly. Estimation of the pulse wave velocity (PWV), which is a criterion of the vessel wall rigidity, revealed that the PWV in patients with combined pathology was 38% ($p < 0,01$) higher than in the control group ($136,9 \pm 1,4$ m/s); in IHD patients without signs of metabolic syndrome – 18% higher ($p < 0,01$).

To sum up, it was established that the rigidity of the arterial bed increased while its elasticity reduced in the examined patients. The largest changes were observed in the group of patients with the combined pathology.

Two weeks before the conducted research, the therapy of the patients included reduced physical activity, hypoholesterinemic diet, nitroglycerin on demand, aspirin 75 mg/day, simvastatin 20 mg/day, zofenopril 15 mg/day. After the initial parameters had been determined, the therapy was added by nebovolol. We evaluated the effect of the nebovolol therapy on the studied parameters in IHD patients with metabolic syndrome. After 12 week therapy, we could observe a reliable PTT increase by 14,6%, as well as a considerable reduction of the rigidity index (ASI) by 22%, while the augmentation index (A/x) reduced 1,9 times ($p < 0,05$). It is worthy of mentioning a reliable reduction of PWV by 10% after taking nebovolol. The obtained data proved the reduction of rigidity and rise of elasticity of vessel wall in IHD patients with metabolic syndrome after the nebovolol therapy.

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**MECHANICAL CHARACTERISTICS
OF VESSELS AND PROINFLAMMATORY
CYTOKINES IN PATIENTS
WITH RHEUMATOID ARTHRITIS
AND ARTERIAL HYPERTENSION**

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The cardiovascular pathology develops much earlier in patients with the rheumatoid arthritis (RA) than in the population in general, which is determined to a large extent by an accelerated development of the atherosclerotic vascular disease. Nowadays, it is believed that the advance of atherosclerosis is caused mainly by the lipid metabolism disorders and the vessel wall inflammation, also due to chronic autoimmune disease. In this respect, it is worthy of analyzing how the level of proinflammatory cytokines correlates with disorders of the mechanical properties of the vascular bed under condition of RA associated with arterial hypertension (AH).

The aim of the study: to determine the serum level of proinflammatory cytokines (IL-1 β , TNF- α , IL-6) and the arterial elasticity in patients with the AH.

Materials and conclusions. During the study, 84 patients (female), who had AH stage 1-3 against the background of an advanced RA (seropositive, stage II), were observed. The arterial hypertension was diagnosed using criteria suggested by the Russian Scientific Society of Cardiologists, 2008. The average age of the patients was $51,3 \pm 4,5$ years old. In all the patients the AH was diagnosed after the RA development. The control group consisted of 18 healthy donors. The level of cytokines in blood serum was measured by the enzyme immunoassay method («Cytokines LLC», Russia). The mechanical properties of the vessel wall were assessed using arterial pressure monitor «Petr Telegin», Russia.

Results and discussion. In patients with the AH on the background of the RA, we could identify a reliable increase of the proinflammatory cytokine content compared with the control group. At the same time, it should be mentioned that the highest concentrations of IL-1 β ($241,5 \pm 14,3$ pg/ml, $p < 0,001$), IL-6 ($297,4 \pm 17,4$ pg/ml, $p < 0,001$), TNF- α ($321,8 \pm 16,4$ pg/ml, $p < 0,001$) was registered in patients with the AH stage 3, which reliably differed from the respective values of the RA patients with the AH stage 1 and 2. In patients with the RA accompanied by the AH, a higher rigidity of vessel wall was observed, which was evident through higher pulse wave velocity (PWV) and

augmentation index (A|x). The revealed disturbances in the mechanical characteristics of arterial wall were apparent at the most in the RA patients with the AH stage 3. Their PWV was 12,5% ($p < 0,05$) higher than in patients with the AH stage 2, and 28,6% ($p < 0,001$) higher than the respective value in the RA patients with the AH stage 1. The A|x was also higher, its maximal value ($-9,8 \pm 1,1$) was registered in the RA patients with the AH stage 3. We found a reliable direct correlation between the level of IL-1 β , IL-6, TNF- α and the PWV, A|x under condition of the RA-HA combination.

To sum up, the conducted research ascertained that the number of proinflammatory cytokines grows along with the AH severity under condition of RA. The revealed correlations prove indirectly the pathogenic role of proinflammatory cytokines in advance of disorders of the vessel wall mechanical properties in the RA patients with the AH.

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**MODERN NECHNOLOGIES
OF INFERTILITY TREATMENT
IN WOMEN WITH OPERATED OVARIES**

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Unfavorable demographic situation, which has been formed in Russia, is nowadays examined as serious problem for the public health, society and country. Nowadays in our country there were registered more than 5 million infertile married couples, from them the majority needs the cure with the methods of auxiliary reproductive technologies (ART).

The aim of research – defining of the effectiveness of ART methods of women of reproductive age with operative intervention at the ovaries.

Materials and methods. Into clinical research there were included 975 sick people with the new formations of ovaries, which are at the treatment in the department of VRT CCH RAS city of Moscow and gynaecological departments of city of Izhevsk UR. The average age of sick people was $32,33 \pm 9,73$ years (DI 95% 31,72; 32,04; $m=0,31$).

At the first stage all sick people were clinically-laboratory examined, there were defined their levels of CA-125, the estimation of ovarian reserve, ultrasonic research with Doppler velocimetry (by the indicators there was carried out the magnetically-resonance tomography). While the revelation of some new formations of ovaries (till 4–5 sm), low level CA-125, positive results of Doppler velocimetry there was carried out conservative treatment, which includes anti-inflammatory and hormonal therapy.

At the second stage to the 923 there was carried out surgery operation. Operative cure was carried out as laparoscopic – in 82,34%±0,01 (760/923 cases), and also laparotomic access – in 17,66%±0,01 (163/923 cases). Practically all operations were carried out by plan – 75,84%±0,01 (700/923 cases). Exceptions were extraordinary situations, which appeared at the stage of examination and preparation to the operative treatment – 24,16%±0,01 (223/923 cases). These are disruptions of the cysts of ovary – 143 cases out of 923 (15,49%±0,01) and abnormalities of blood supply of the tumors of ovary while the distortion of last – 30 from 923 (3,25%±0,005). Indication to the carrying out the plan operative cure of the patients with cysts and benign tumors of ovaries is the presence of one or some new formations in the ovary, sizes are more than 5 sm in the diameter, the absence of the effect from the conservative therapy. The volume of operation had straight correlated dependence on the age ($r=0,089$); urgency of carrying out of operation ($r=0,166$); intraoperational diagnosis ($r=0,152$). And reverse correlated dependence on the belonging of new formation to defined morphological group ($r=-0,175$); on the composition of new formation with other pathology of organs of small pelvis ($r=-0,166$) or with outward genital endometriosis ($r=-0,230$), and also on the necessity of carrying out extra operation at the second ovary while the two-side process ($r=-0,232$). Thereby, while the general analysis of received facts, we noticed that independently from the type of access and urgency of carrying out operation while the presence of intraoperational conditions we carried out organ-saving operations, which were directed to the saving of reproductive function of patients. As while the timorous formations of ovaries – 45,5%±0,02 (334/734 cases), that also while benign tumors of ovary – 43,38%±0,04 (82/189 cases) surely frequent that were cystectomy ($p<0,001$ and $p=0,02$ accordingly).

At the third stage with the aim of restoration of reproductive function 784 from 923 operated

sick people (84,94%±0,01) at the post-operational period, with the taking into account of histological conclusion and changes of hormonal status, there was appointed antioxidant (vitamin E) and metabolic therapy (vitamins A, B, C), combined oral contraceptives, progestagens, preparations for the substitutive hormonal therapy, agonists of gonadotropin releasing hormone, immuno-modulating and system enzymotherapy.

At the four stage while the inefficiency of offered complex cure sick people, who desired to continue therapy, were included into a program of auxiliary reproductive technologies (ART). For this aim there was formed a group of 85 people, what was 8,72%±0,009 from the initial number of sick people (85/975 cases) or 10,72%±0,01 from the number of sick people, who received post-operational cure (85/793 cases). The average age of patients of the group, which was included into a program ART, was 32,6±5,28 years (DI 95% 31,46; 33,74; $m=0,57$). The group of comparison was compound of 30 sick people with infertility, which connected with male factors.

72 female patients out of 85 72 (84,71%±0,04) was immunohistochemically examined. The sampling of material was carried out at the waited “window of implantation” on the 21–24 days of 28-daily menstrual cycle. With the help of hysteroscopy with the use of apparatus «Karl Storz» (Germany) there was carried out Pipell biopsy of endometrium or, by the indicators, separate curettage of mucous membrane of cervical channel and uterine cavity. Immunohistochemical reactions were carried out at the stepped paraffin cuts by peroxidase-antiperoxidase method with demasking of antigens in the SHF-oven. For the visualization of reactions there were used the universal peroxidase tool LSAB+kit («Dako», USA). The intensity of immunohistochemical reactions to the α/β -receptors of oestrogen and progesterone at the nuclei of cells of epithelium of the glands and stoma were estimated by the method of histological count H-score (McClelland R.A. et al., 1991). The degree of evidence of expression of receptors were estimated by following way: 0-10 points – absence of expression, 11–100 – weak expression, 101–200 – moderate expression, 201–300 – expressed expression. The intensity of immunohistochemical reactions to the protein Ki 67 was calculated in the percents (quantity of tinged nuclei to 100 cells).

With the aim of improvement of results of cure by methods of auxiliary reproductive technologies (ART), depending on the results of immunohistochemical research of endometrium, to

the female patients with an abnormality of steroid receptiveness and proliferative activeness was carried out hormonotherapy during 3 months till the including to a program ART. The stimulation of superovulation was carried out while the dynamic examination and observation. The fertilization was carried out by the methods of ECO and IKSI.

The static treatment of received material was carried out with the help of program of the treatment of electronic tables Statistica 6.0 with the use of generally accepted parametric and nonparametric statistic methods.

Received results. 139 sick people out of 784 (15,06%±0,01), who received after operation complex therapy, the pregnancy appeared at the natural cycle in 1-2 months after the beginning of cure. With the infertility from them there were 56,83%±0,04 (79/139 cases). The average age of sick people with appeared independent pregnancy was 29,77±5,46 лет (DI 95% 28,85; 30,69; $m=0,46$). Among the sick people with appeared pregnancy 25 out of 139 female patients (17,98%±0,03) were with the initial infertility, and 54 out of 139 (38,85%±0,04) with repeated. After the ending of carrying out the post-operational therapy the pregnancy, at the time constraints from 1 till 6 months appeared of 196 from 975 sick people (20,1%±0,01). The average age of these sick people was 30,78±4,99 years (DI 95% 30,08; 31,48, $m=0,36$). Among the sick people with appeared pregnancy 20,41%±0,03 (40/196 cases) were with initial infertility, and 25,0%±0,03 (49/196 cases) with the repeated and 54,59%±0,04 (107/196 cases) with normal fertility.

At the four stage of cure in connection with inefficiency of offered complex cure 85 sick people were included into a program ART. The group of comparison was compound of 30 sick people with an infertility, which is connected with male factors. From the 72 sick people 39 (54,17%±0,06) had female infertility, which was connected with tubal factor, 17 out of 72 (23,61%±0,05) suffer from the female infertility, which was connected with abnormality of ovulation and 16 out of 72 sick people (22,22%±0,05) had infertility, which was associated with an endometriosis.

In the result of carrying out of immunohistochemical research, we revealed, that steroid receptiveness of endometrium of women with the tubal factor of infertility ($p=0,008$) and with an infertility, which was associated with an endometriosis ($p<0,001$) was reliably changed. While these factors of infertility the level of expression of receptors of progesterone at the glands of endometrium was rather lower that the level of expression

of α -receptors of estrogen, in comparison with the group of sick people with the male factors of infertility. While the comparison of groups with different factors of infertility between them there were not revealed essential peculiarities of reception to the estrogens and progesterone. At the glands the number of α -receptors to the estrogens and progesterone was a little bit higher while the tubal factor, and at the stroma the reception to the estrogens and progesterone had a tendency to higher indicators of women with the abnormalities of ovulation ($p<0,001$), than in the groups of tubal infertility and infertility, which is associated with an endometrium. Proliferative activity (expression of protein Ki 67) considerably prevailed while the tubal factor of infertility ($p<0,001$) and in glands, and in stroma, at the same time while the infertility, which is connected with the abnormality of ovulation the proliferative activeness was higher ($p<0,001$), than while the infertility, associated with endometrium.

Reliable and bright differences of proliferative activeness at the glandular and stromal cells while different factors of infertility objectively reflect inadequacy of proliferative processes and degree of their deflection from the norm. Taking into consideration received facts, to the sick people with infertility, which is connected with tubal factor and associated with endometrium, before the program ART was carried out the preparation with the preparation of substitutive hormonal therapy, which contains estradiol in combination with progesterone – didrogesterone during 3 months.

Carrying over of embryos was carried out to 64 out of 85 sick people (75,29%±0,05). Carrying over was carried out average at the 17,7±1,76 day (DI 95% 17,32; 18,08; $m=0,19$). Finally, the pregnancy biochemical was registered of 27 out of 85 sick people (31,76%±0,05), clinical of 33 (38,82%±0,05). Reliable differences by the number of sick people with clinical pregnancy at the base groups of examination were not revealed. Among the patients with the initial infertility the clinical pregnancy appeared of 16 out of 33 sick people (48,48%±0,09), with the repeated infertility of 17 out of 33 sick people (51,52%±0,09). From the group with tumorous formations of ovaries the pregnancy clinical was of 26 out of 734 sick people (3,54%±0,007) and benign tumors of ovaries of 7 out of 189 sick people (3,70%±0,01).

In all at the result of our clinical observation and carrying out of complex therapy pregnancy appeared of 377 sick people, what was 38,67%±0,02 from all 975 observed sick people. Among the patients with the infertility the preg-

nancy appeared of 206 out of 317 sick people with the infertility ($64,98\% \pm 0,03$): from them in $85,92\% \pm 0,02$ (177/206 cases) the patients with operated tumorous formations of ovaries and in $14,08\% \pm 0,02$ (29/206 cases) the patients with operated benign tumors of ovaries.

Resume. Thereby, modern technology of curing the infertility of women with the pathology of ovaries consists in the early revealing of reason and successive carrying out of cure stages. While the absence of positive effect from the traditional ways of curing the infertility during 1 year, it's reasonable to recommend the overcoming of infertility by the methods of ART. Modern higheffective methods of curing of infertility (hormonal preparations, endoscopic methods and methods of auxiliary reproductive technologies) are the links of one circuitry, the final aim of which is maximal rapid realization of reproductive function of woman.

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CHANGES OF FUNCTIONAL CONDITION OF ENDOTHELIUM AND MECHANICAL BEHAVIOR OF VESSELS OF SICK MEN WITH THE ARTERIAL HYPERTENSION WITH METABOLIC SYNDROM UNDER THE INFLUENCE OF THERAPY

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Metabolic syndrome (MS) at the last years owing to wide spread is called "epidemic of highly developed countries". The components of MS in aggregate with arterial hypertension (AH) cause the development of cardiovascular complications.

By the researches of last years there is established the connection of pathological changes, which are connected with mechanical behaviors of the wall of artery and frequency of appearance of cardiovascular complications. It was revealed that increase of speed of developing of pulse wave (SPW) is registered at early stages of sick men with cardiovascular pathology. There is noted the multifactorial essence of rising of rigidity of vessel and the role of endothelial dysfunction, as one of the base mechanisms of progressing of cardiovascular pathology. Therefore as perspective there

is considered the assessment of influence of anti-hypertensive therapy to the indicators of endothelial function and rigidity of vessels with the aim of studying the possibilities of opposite development of these abnormalities, what can lead to the decrease of the risks of development of vascular catastrophe of AH sick men with MS.

The aim of work: study of interconnection between the indicators of endothelial function and characteristics of elastic behaviors of vascular channel of sick men with arterial hypertension in combination with metabolic syndrome.

Materials and methods. There were examined 98 sick men with AH of 2 stage with the metabolic syndrome at the age of 40-60 years, 78 men and 20 women. The presence of metabolic syndrome was defined by the criterions of WHO. AH was defined in correspondence with the classification of All-Russian Scientific Society of Cardiologists (2008). The group of control was formed by 20 clinically healthy persons, the group of comparison was formed by 30 sick men without metabolic syndrome. The level of endothelin-1 (ET-1), the Willebrand factor (fW) were defined by immunofluorescent method. Elastic behaviors of vascular wall were estimated with the help of twenty-four-hour monitor of arterial pressure of company "Petr Telegin" (Russia). Static treatment of the results of research was carried out with the use of standard package of applied programs Statistica.

Results and their discussion. The assessment of functional condition of endothelium of vessels of AH sick men showed reliably big concentration ET-1 ($59,8 \pm 2,3$ ng/l) and fW ($169,8 \pm 5,2\%$), being laboratorial markers of endothelial function, of examined sick men in comparison with control. In the group of sick men with a combination of AH and MS there was revealed maximal high concentration of ET-1 ($78,9 \pm 3,8$ ng/l) and fW ($189,3 \pm 6,1\%$). AH sick men in combination with MS have definitely reliable decrease of time of development of pulse wave (RTT) by 31% in comparison with control ($165,8 \pm 4,8$ m/s) and by 26% by patients with AH without MS. Maximal speed of increase of arterial pressure (dPdt)max, which indirectly reflects the load to the wall of vessels during the passing of pulse wave, was lowered in 2,1 times with the AH sick men. The index of rigidity (ASI) of patients with Ah by 28% ($p < 0,01$) exceeded control values and by 13% of AH sick men with MS, and index of augmentation (A|x) in 3,4 and 1,6 times accordingly ($p < 0,01$). Revealed changes testify to the presence of endothelial dysfunction and decrease of elastic behaviors of vessels of AH

sick men, the biggest changes of researched indicators were established while the combination of AH and MS. The definition of speed of spreading the pulse wave (SDPW), which is a criterion of arterial rigidity, shows an exceeding of control level ($137,8 \pm 2,3$ m/s) by 25% and by 12% SDPW at the group of comparison. Carried out correlated analysis revealed the presence of reliable connections between the level of ET-1, fW and SDPW ($r=0,63$; $r=0,51$ accordingly). Reverse dependences were established between RTT and content of ET-1, fW ($r=-0,59$; $p<0,01$; $r=-0,47$, $p<0,01$ accordingly). Also straight correlated dependence was defined between the index of rigidity (ASI), augmentation (A/x) and level of ET-1 ($r=0,69$, $p<0,01$; $r=0,53$, $p<0,01$). Received facts testify to the pathogenetic meaningfulness of endothelial dysfunction at the decreasing of elasticity and rise of rigidity of vessels of AH sick men the most important changes of showings of endothelial function and rigidity of vessel channel were defined while the combination of AH and MS.

To all AH sick men with metabolic syndrome at the phone of hypocholesterolemic diet and taking of simvastatin 20 mg/a day there was prescribed an equator 1 tablet a day. After 12 weeks of therapy 81,6% of sick men have reached the normalization of the level of AH, 19,4% have decrease not less than by 15% from the initial level. The control of showings of endothelial function establish reliable decrease of concentration ET-1 (by 16,5%) and fW (by 26,4%). There was noted the decrease of rigidity of arterial channel by 20,5%, the index of rigidity decreased by 14,8% ($p<0,05$). Received facts testify to that fact, that side by side with hypotensive effectiveness the equator has a vasoprotective action.

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*Materials of Conferences***THE CARBON MARKET FORMATION
PERSPECTIVES IN FOREST
CLUSTERS OF THE RUSSIAN
AND THE KOMI REPUBLICS**

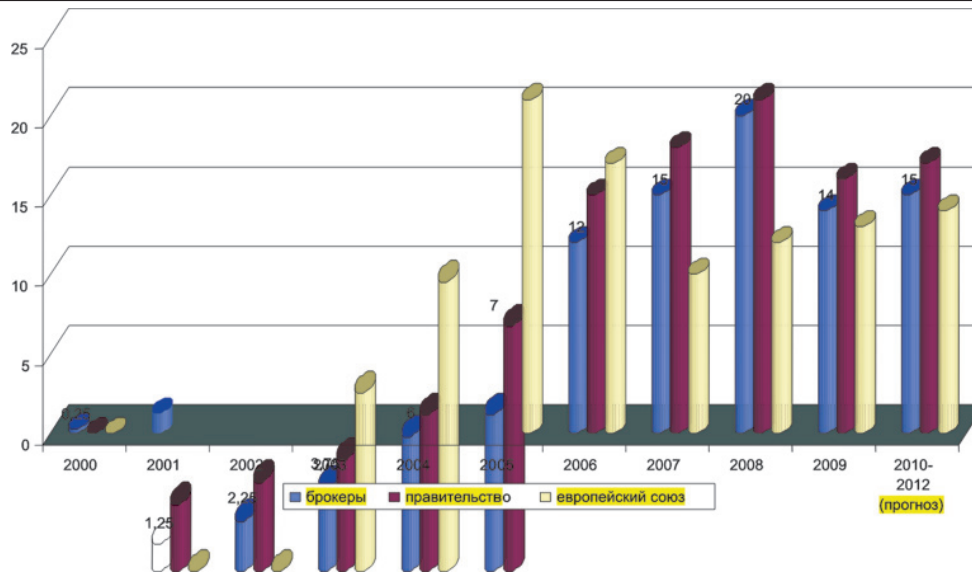
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Economical development is impossible without new market tools and instrument formation. The fact approved by both scientists and politicians, as well as the President of the Russian Federation, D.A. Medvedev. The carbon market development might become one of those perspective trends of RF development, which can create additional opportunities and improve its status on the international arena. Reducing the greenhouse gases emission corresponds to the long-term development of the Russian economics and current tendencies of the leading countries development, particularly, the country should carry out the given obligations. The carbon market is developing rapidly, many new countries and economical sectors are involved and it becomes one of the main leading powers of the technical progress and economic growth, in Russia this sphere is in development stage. Russia can make obligations to limit 80% greenhouse gases emission until 2020, comparing to the basic year 1990. Today, there are 4 market mechanisms in the international carbon market: selling waste quotas; forest quotas sale; joint implementation projects; clean development mechanism. In the frame of the each mechanism there are special carbon market units: units of the fixed quantity; absorption units; reduction waste units; certified waste reduction. Each of the above – mentioned units has its own cost on the carbon market. Evaluating the cost dynamics (e.g. on the European market), for example, reduction units, one can see that the prices are different, and they are changing. The max was 21 euro per unit in 2005 (Appendix 1, diagram 1). This unstable situation is caused by the fact that legislative data base is still adapted, the criteria are also debatable. In general, we can suppose that in 2010-2012 – es, the price for that type unit is approximately 14-17 Euros per unit on the European market. There is the different situation on the North American market, where the price is less (about 1 dollar per 1 ton carbon), however, by 2050 (according to the Canadian colleagues information) the price might be increased by 250 dollars per ton. There are obvious reasons for the price difference: high demand in Europe, public activity and interest, legislative

base and historical factor, the first steps were made in Europe. But the most active is the Asian market. Evaluating the international carbon market, we can come to the conclusion- the formation process has not been completed yet. Russia might be become one of the biggest carbon units' sellers at both European and Asian markets (if we take into accounts, its geopolitical and economic positions). Having known the peculiarities and forest sector problems, we should notify: the most efficient product on the carbon market might become the joint implementation project. However, we should remember that forests in Russia are being owned by the State, that's why, the beneficiary and the mechanism of the carbon credit units should be defined. Forest projects are, in most cases, the long – term projects.

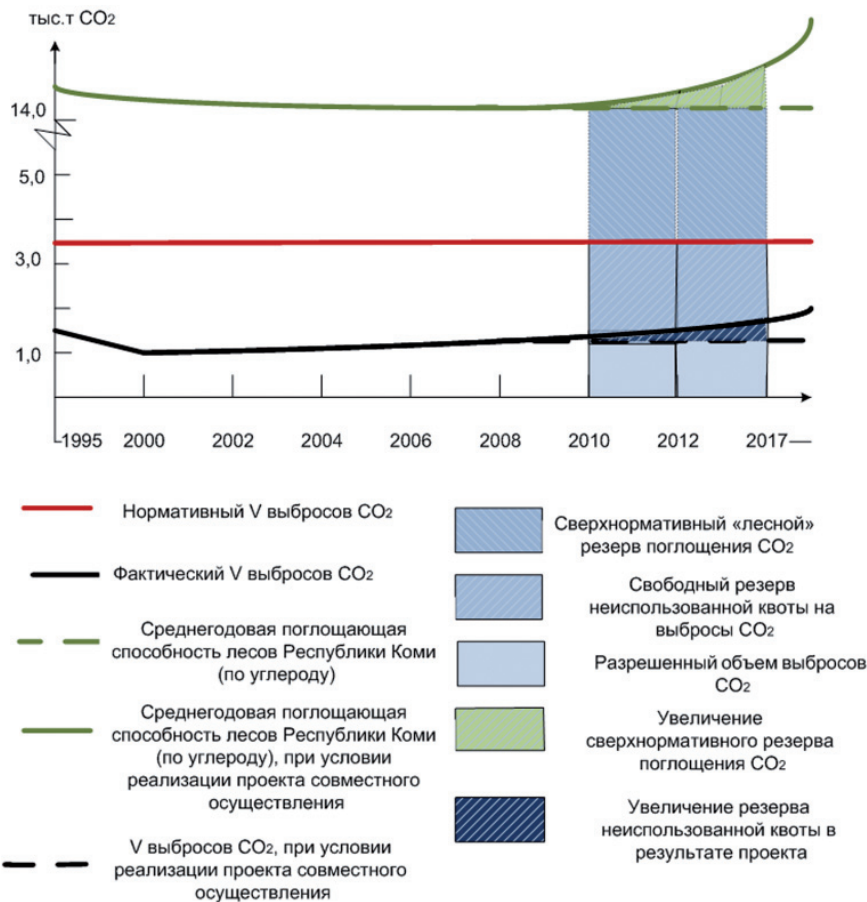
The Komi Republic can function on the international carbon market, as a federal constituent entity, under the condition that Russia is involved in the carbon market. Our region has a big volume stock. The total forest area in the Komi Republic is 38.9 mln. ha., where forest covered area – 30 mln. ha., and it makes 3,5% of All-Russian forests and about 50% of forests of the European North (e.g. boreal forests). Estimating the forest potential, we can be sure, that taking part in the carbon market can have only positive effect (e.g. the Appendix 2, picture 1). Analyzing the absorbing ability of the Komi Republic forests (e.g. 3,600 tons a year), if the current price is \$ 15 per ton, the profit is \$ 54 000 a year. While implementing joint projects, where cost of the unit is \$ 10 a year, the profit for the Komi republic might be \$ 29, 500 a year. If we have the clean development mechanism (unit cost \$ 17 a year), the profit is \$ 50, 150. (e.g. the Appendix 3, tables 1-2). But we should take into account, that not all forest resources of the Komi Republic might be included in the carbon market, because of the conditions, criteria of the carbon market. The mechanism of entering the market is not clear yet (e.g. carbonic deal participants; roles of the participants of carbonic deal; connections among participants).

To make the conclusion, it's necessary to say, that our country, the Komi Republic, is ready to become a participant of the carbon market: we have the resources, we can plan production setups of this resource to the market. But lack of initiative and administrative mechanisms prevent Russia from taking part in the market. Though the Russian Federation could have extra profit, to decrease waste amount and to improve techniques and equipment, by means of attracting the foreign investors in forest industry. There's the need of the efficient legislation, which doesn't exist today.



Appendix 1: Diagram 1. Dynamics of the price development for reduction units in 2000-2012 –es (e.g. the European carbon market):

- 1 – брокеры – the brokers;
- 2 – the Government;
- 3 – the European Union;
- 4 – the forecast



Appendix 2: Picture. 1. Carbon project potential of the Komi Republic forestry cluster

Appendix 3:

Table 3

The Supply and Annual Consignation of the Carbon Distribution on the Forest Covered Area in the Komi Republic [2]

The Forest Covered Area	Units	Including by the Reserve Carbon (PC) Gradations, t./ha				Including by the Annual Storage Carbon (ZC) Gradations, t./ha.			
		3-39	40-47	48-55	56-110	0,4-3	3,1-3,5	3,6-4	4,1-6
29,229	th. ha.	22,602	3,891	1,036	1,699	2,277	26,951	-	-
100	%	77	13	4	6	92	8	-	-

Table 2

The Cruising Characteristics and Carbon Sequestration by the Forest Phytomass in the Komi Republic. The Carbonic Deal Participants and Their Roles.

The Pedigree Structure	The Mean Age	The Forest Covered Area, t./ha.	The Total Reserve (t/m ³)	The Average Reserve, m ³ /ra	The Reserve Carbon in the Phytomass			The Annual Storage Carbon in the Phytomass			Relation (ZC/ PC), %
					Total (PC), th.t.	t./ha.		Total (ZC), th.t.	t./ha.		
						1 ha.	On total S		1 ha.	On com-mon S	
6E2C1B1Oc	140	29229	2855807	98	102957	35,2	27,4	50389	1,72	1,34	4,9

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*Materials of Conferences***COMPETENCE APPROACH
TO THE APPRAISEMENT
OF KNOWLEDGES OF STUDENTS**

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The accession of Russia to the Bologna process had an essence influence on aim and content of Russian educational reforms. Their important direction was the reaching of All-European guidelines of development of educational systems, which are responsible for the aims of internalization and creation of general European space of higher education. One of the base directions of action of countries-participants of Bologna process is the use of credit system ECTS, which should become the general basis for national credit systems, including Russian credit system.

The system of credits as an innovative form of measuring of laboriousness educational work produces new for the Russian higher education requirements to the organization of all aspects of educational process at HEI: standards of educational disciplines, educational plans and programs, system of knowledge estimation, level of mastering by students the educational programs, load of pedagogue, economy of educational process etc.

Target installations to the preparation of future specialists in the individually-oriented educational process at the base of accepted in it competence approach to the quality of preparation of students as to the result of education. One of the key elements of the system of credits is stimulating grade-rating system of knowledge assessment of students. Let's examine it from the view point of competence approach in education.

The use in educational process of grade-rating system of estimation is not only new approach to the assessment of students' knowledge and skills. New system of stimulating estimation should form the students' active ability to independent studying-cognitive activity, the components of which are: studying-cognitive interest, definition of objectives, educational actions, actions of control and self-control, self-estimation of one's own activity, reflection of one's own activity. And also to formulate the value orientations, the most important elements of the personality's structure, which were consolidated by life experience

of individual and which limit the essential, meaningful for present human from the insignificant, inessential, formed totality of which guarantees the stability of personality, succession of defined type of behavior and activity, is the most important factor that regulates motivation of personality.

The process of use of stimulating grade-rating system of estimation of studying-cognitive activity should be combined with the effective pedagogical management at the level of subject-subject interaction of students and teachers at the process of studying educational disciplines, which is based on special methods of forming the key competences, from which there is formed professional competence of future specialists. Let's examine some aspects of such "competence" methods, that means methods, which allow to form the key competences at the process of studying the educational disciplines at HEI.

The forming of independent studying-cognitive activity of students at the process of studying of educational disciplines is directed to the reaching of following, equally meaningful for the development of personality, aims [1]:

- to form the students' volume of knowledge, which is necessary for further education; to form the students' ability to use received knowledge in solving of object and over substantial tasks;
- to form the readiness to motivated educational activity, including its independent estimation;
- to form the ability to correlate the offered norm of activity with an actual level of abilities and the system of personality values;
- to form the value approach of students to the received knowledge, abilities, personality qualities and experience of their own activity;
- to form the students' ability to continue the education and value approach to the education during the whole life.

For the realization of these aims there should be created special didactical conditions, which are defined with active approach to the direction of studying-cognitive activity of students and the complex of aims of developing education, its requirements to the selection, methods and organizational forms of education in activity [3]:

- specification of the aims of studying-cognitive activity of students at the process of studying of educational disciplines, the orientation to the development of creative thinking and personality qualities of students;

- specification and constant development of programs and contents of educational disciplines at the base of active standards and described above aims;

- including to the activity, forming of inside motives of educational activity, forming of independent studying-cognitive and scientifically-researching activity of students and its self-appraisal;

- the use of special complex of methods and forms of education, special complex of object tasks, which promote the forming of value approach of students to knowledge, abilities, skills, experience of their own studying-cognitive activity.

The result of stimulating grade-rating system of knowledge assessment while these conditions should be formed motivated active position of students in the direction of their own studying-cognitive activity at extracurricular time.

Above formulated didactical conditions allowed us to definitely define following base principles of effective use of stimulating grade-rating system of knowledge assessment of students at the process of studying the educational disciplines [2].

The principle of correlation to the aims of professional preparation of HEI's students supposes, that the aims of effective use of stimulating grade-rating system of knowledge assessment at the process of studying the educational disciplines should correlate the aims of professional preparation of the HEI's students, which were accepted at the active standards of higher professional education, and at the programs, which were developed at their base.

The principle of openness. The presence of clearly proven standard instructions and their strict observance. Students should have the free access (at the library, reading hall or at the university site) to the standards, program by the subject, technological map. By every modulus at the technological map should be argued the criteria of interpretation of minimal and maximal quantity of marks. Objective mutually control, which guarantee the predictability of students' marks.

The principle of continuity and comfort means the organization of educational process and audience and at extracurricular time, while which the result of activity at the previous stage guarantees the including into the activity at the following stage. Continuity, operative, objective, full, and constant estimation with the calculation of individual peculiarities of students; fair approach to the students.

The principle of activation of self-control and self-appraisal of studying-cognitive activity of

students. Forming at the process of studying the educational disciplines of students' ability, readiness and solid skill to control and estimate their own activity in the audience and independent extracurricular work.

The principle of creativity supposes the maximal orientation to the creative origin in audience and extracurricular educational activity of students, acquisition of their own experience of scientifically-research activity.

The principle of guaranteeing of value-oriented activity. Teaching of the ability to correlate the supposed algorithm of activity with the actual level of abilities and system of values; constant immersion of student into a situation of choice, forming of ability to the search of possible variants, their estimation and choice of optimal variant of solving; forming of positive needs, motives and value direction of personality.

The experience of use of "competence" method at the process of studying mathematical disciplines in HEI, some aspects of which are described above, allow to state that continuous estimation of studying-cognitive activity of students at the process of studying of mathematical disciplines at the base of stimulating grade-rating system promotes the forming of students' motivated active position at the direction of their own studying-cognitive activity at the educational lessons and at extracurricular time.

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**THE GEOMETRICAL PROBLEMS
AS THE MEANS OF THE FORMATION
OF THE KEY COMPETENCES**

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The purpose of the educational system was always concentrated upon the formation in the oncoming generation those behavioral models and values which will allow it to become successful out of the school walls. The scientists from different countries consider that the expansion of the possibilities of the social choice consists in the formation of the key competences of the citizens as the complex of the individual characteristics which are necessary and sufficient for the effective realization of the professional work in the predetermined conditions and on the predetermined level of the quality.

The idea of the competency building approach has become the answer for the new social request not only in the vocational training, but also in the training to any subject at the comprehensive school, especially in mathematics. According to the educational standard, the formation of the key competences in mathematical training is understood as the formation of the readiness of the pupils to use the acquired knowledge, the abilities and the ways of an activity in a real life for the solution of the practical problems.

The important place in mathematical training is occupied by such problems as: both the purpose, and the means of study. Besides, the mathematical problems possess the huge potential in the sense of the methodical reserves. The activity of the solution of a mathematical problem is adequate to the activity of any kind, including a professional one. The ability to search and to choose the resources to plan the solution, to reach the result of the activity, to estimate and to correct is always and repeatedly necessary in the course of the solution of a mathematical problem. The work with a mathematical problem represents didactically adapted social experience of the solutions of the problems (informative, world outlook, moral, political and others).

Thus, the mathematical problems are the effective means of the formation of the key competences. And the ability to solve a problem is an indicator of the development of the pupil, his social maturity, an activity of a vital position, an independence of the person.

In the designated sense, the geometrical problems are especially valuable. Their mainte-

nance and the methods used for the solution allow the complex apply of the major knowledge and skills in a non-standard situation. The combination of the constructions, the calculations, the proofs, the researches aggregated in one problem is the best way to improve the formation and the development of key competences.

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**THE INTEGRAL MONITORING SYSTEM
OF KNOWLEDGE: REALITY OR MYTH?**

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Speaking about integration of education, we should not forget about that, for example, the control of its quality should be built at the base of integral and united approach, to correspond state standards by the concrete discipline. It's necessary to use identical measure materials and define identical degrees of reaching the aim.

One of the checkout instruments is text control, which is long ago and rather widely used at pedagogical practice. The necessity to have some universal, reliable and effective measure instrument, which can estimate the quality of higher professional education, has been being always felt.

If we try to formulate the aim, for example, of language testing at technical HEI, that this is diagnosis of communicative abilities of students and estimation of their ability to understand and produce writing speech. What concerns the task of testing this is a development of test materials, at the base of which we could measure indicators of receptive and productive activity of students, in consideration of concrete parameters of communicative task.

In Samara State Technical University (filial in Syzran) for several years there is carrying out an internet-testing of students of second course by the foreign language. There suggested that passing through this testing student demonstrates all his knowledge, which he received and consolidated during first two years of studying in the HEI. (Naturally into consideration there also are taken that base knowledge, with which he came to the university.) Tasks of the test were formed such way that student can show the level of owning all skills, except such aspects as writing and oral speech (or in the less degree, than rest of them). Big part of

questions is devoted to the country-specific aspect of language at its rather narrow description, what carried complications, because our program is oriented to the understanding of the material of technical character. This, obviously, were chalked up by us.

Can we consider internet-testing as dimensional replacement of oral exam of the foreign language? I think, a lot of people agree, that only in part. So far as we will not receive real picture without alive communication with student, without "palpation" of his ability to react to the questions, talk or pick up the talk.

Therefore, to measure the quality of owing the foreign language ONLY by text way, rightly is not enough. But to become a PART of this process internet-testing is worth it.

Is it possible to create the integral systems of the control of quality of knowledge in the near future? Traditions and mentality of different nations will be always at defined opposition. Undoubtedly the integration of education is this to we should rush. But this process is very thorny and conflicting.

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**PSYCHOLOGIC-PEDAGOGICAL
FOUNDATIONS OF SENSORY
EXPERIENCE FORMATION
OF CHILDREN IN EARLY AGE IN THE
PROCESS OF GRAPHICS ACTIVITY**

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A child is born helpless, but with a huge potential of development, which appears more intensively in babyhood and infancy. Every day of his life is important to appear something new in a child's behavior, and losses in development are irretrievable. A newborn develops quickly. While analyzing psycho development of a newborn every day is taken into consideration. For example (Neonatal Behavioral Assessment Scale, (NBAS), composed by T. Berry Brazelton studies newborn's reflexes, the scale helps to control changes in his

conditions and determine peculiarities of his reactions to physical and social motivations.

A fact of "hospitalism syndrome" is known when to some reasons a child was in an environment in which there was no communication with adults. The care was taken formally, there was poor communication and did not enrich a child's sensor experience. More often such situation happens with newborns left in public institutions and maternity hospitals.

Sensor experience supposes not excessive stimulation of child's sensory organs, but the ability of an adult to show love and attention to a child. An adult should not forget that a baby see the world for the first time and everything is interesting to him. It is important that an adult accompanies his every action with words: "This is a ball. It is round. It is nice and red. It can bowl." The more often an adult communicates with a child, the more intensive a child develops. The communication should be of personal orientated, contextual character and accompany all actions of a child. That's why it is called contextual-practical communication (according to M.I. Lisina Lisina M.I. Problems of communication ontogeny. – M.: Pedagogy 1986. – 144 c.) And it is also so important to develop manual abilities. Even in babyhood thanks to inborn reflexes a child clenched his fists when an adult put into his hand a finger. Then in infancy a child studies any subject in his hands. Under sensor experience we understand a total of perception actions for the reception of subject's features. The perception of the environment comes with the help of a child's sensory organs and is accompanied with words. It seems that sensor experience is accumulated spontaneously, without organized study, but it is not so. If the process of perception comes spontaneously than a child may not pay attention to this or that object. Perception is a result of sensor experience. Physiologically perceptions are formed thanks to memory, thinking and speech. After an action of a specific stimulus upon a child's sensory organs, fixated in the act of perception, nervous connections are left in cortex, which are activated in verbal mention. Such connections are unsteady with children and can be easily destroyed that's why it is necessary to have certain development of memory and thinking for more steady perception fixation. In the situations of a child's sensor deprivation such development is slow. At the same time excessive stimulation and early teaching of children is also harmful to mind. When a child has no sensor experience due to his age abilities, intellectual operations are not developed (synthesis, classification) and mnemonical memory mechanism are not enough mastered

(association remembering), children can be put in a situation of frustration. A requirement to think about unknown problems and remember information patently not mastered through sensor experience, brings a child's mind to frustration. That's why a child's teaching should have situational character, so that the information is presented to child in that amount that is necessary to him at the moment and through sensor perception.

The most appropriate educational activity for a child is graphics. The value is that working with graphic materials we get natural enrichment of sensor experience. Working with a marker, a pencil or a wax pencil an infant develops fine motor skills, a hand becomes stronger. Manual abilities come as a result of fine motor skills development. And what a child cannot yet depict, he describes with words. In graphic activity right hemisphere is developing, which responds for creative thinking, intuition.

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TEACHER'S PEDAGOGICAL MASTERY OF TECHNOLOGY AS THE FACTOR OF DEVELOPMENT OF TECHNOLOGICAL AND AESTHETIC CULTURE OF PUPILS (GIRLS) 5-8 CLASSES (EXPERIENCE OF WORK OF OEP SEI CGS N1973 OF MOSCOW)

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The perspectives of development of the direction "Technology. Service labour" in modern school are connected with the forming of new generation of teachers of technology< which is connected with the development of their pedagogical mastery. Besides, the leading place in the preparation of students there occupies the development of technological and aesthetical culture. The main task of culture activity of teacher is creation of conditions for revealing of abilities of students, upbringing of students' aesthetic delight in cognition and participation in "useful" labour, receiving of

qualitative product of labour. Thereby, in the article there are examined the components of pedagogical mastery, technological and aesthetical culture, there is established their interconnection. The processes of scientific search, the experience of work and results made the essence of research of circular experimental ground by technology.

The formation of generation of professional personnel, which defines the competitiveness of graduating students of middle school and education in common, as president D.A. Medvedev noticed in his messages to the Federal assembly, should become the base while **the development of new educational conceptions** and strategies of development of the school.

The solving of this problem is directed to the satisfaction of social requests of society "in possibility of opening by children of their abilities and their preparation for the life in high-technology world". Similar conditions of development of education bring forward advance requirements to the qualification of pedagogue and his methodological work.

There are still actual the aims of educational sphere "Technology": mastering of technological knowledge and culture at the base of including of students into different types of technological activity by the creation of personality or socially meaningful products of labour. At the process of this activity there are formed threshold and differentiate competences of students, which define the level of competitiveness and realization of their own potential. The formation of high level of these competencies consists in the development of technological and aesthetical culture of students (girls) of 5-8 classes by the way of improvement of the system of professional-technological and aesthetical viewpoints to the quality of produced items. In connection with this in the September 2009 at the base of laboratory of technology of SEI CGS N1973 there occurred **the opening of circular experimental ground.**

Object of research is the process of education of students of 5-8 classes by the direction "Technology. Service labour".

Subject of research is the development of technological and aesthetical culture of students (girls) of 5-8 classes as the result of pedagogical mastery of the teacher of technology.

Aim of experiment is the development and approbation of author's educational program of the direction "Technology. Service labour", which guarantees the usage of forms, methods and means of education and upbringing, elements of educationally-methodical complex for the development of technological and aesthetical culture of students of 5-8 classes.

Tasks of experiment:

1. forming of the students' of 5-8 classes system of professionally-technological and aesthetical approach to the quality of made items at the lessons by the direction "Technology. Service labour";

2. creation of organizational-pedagogical conditions of development of threshold and differentiate competencies of students;

3. including of the requirements of state educational standard into a program by the direction "Technology. Service labour";

4. development of author's educational program of the direction "Technology. Service labour" for the students of 5-8 classes;

5. development of integrate model of the development of technological and aesthetical culture of the teenagers as the result of pedagogical mastery of the teacher of technology;

6. development of program documentation, contents and educationally-methodical complex by the sections of technological preparation;

7. development of procedural documentation (diagnosis, effectiveness etc).

Scientific novelty and meaning of the results of the experiment consist in the consideration of the possibility of pedagogical mastery of the teacher of technology by the development of technological and aesthetical culture of students (integrative model), and also development of new contents of educational-programm documentation of the direction "Technology. Service labour" and aesthetical-methodical accompaniment of the lessons of technology.

Integrative model**Components of pedagogical mastery of the teacher of technology**

Pedagogical mastery is the system of complex of the behavior of personality, which guarantees the high level self-organization of professional activity; synthesis of scientific knowledge, skills and abilities of methodical art and personal qualities of teacher.

1. Component of spiritually-moral values and ideals (oath of the teacher): humanistic and ideological direction; noble moral aspect and own example; love to the children and profession, enthusiasm; responsibility and behavior.

2. Component of pedagogical abilities and technique: interaction; empathy; attention; trust; support; ability to admit an error; development; emotional stability; flexibility; dynamism; creativ-

ity; exactingness; optimistic prognosis; direction and interaction; foresight of mistakes.

3. Component of professional skills and abilities: cultural; scientific; psychologically-pedagogical; methodological; special professional.]

Levels: 1. Low (professional unfitness). 2. Middle (threshold, standard). 3. High (effective and differentiative).

Components of the development of aesthetical culture of teenagers

Development of aesthetical culture is the process of forming and development of emotionally-sensitive and value cognition of personality and corresponding to it activity by the influence of different aesthetical objects and phenomena of reality.

1. Emotionally-sensitive component: interests; feelings; motives; creativity.

2. Intellectually-valuable component: values; norms; aesthetic; understanding; manufacturability; curiosity; self-realization.

3. Productive-action component: personal interest in the result of labour; possibility of using and exploitation of product; producing of the requirements to the quality of item and separate operations; technical aesthetic; transformation; approach to the product; satisfaction from the results.

Levels: 1. Low (aesthetical illiteracy, "tastelessness"). 2. Middle (standard and template). 3. High (productivity, creativity, quality).

Components of the development of technological culture of teenagers

1. Culture of the labour (technique of safety, organization of labour, graphic tastelessness, discipline).

2. Process of the making of item (projecting, constructing, design and sketch, producing of requirements, maintenance of parameters and regimes).

3. Quality of items and consumer purpose (the possibility of use and exploitation of the item that is based at the reaching of requirements to the item).

Levels: 1. Low (item is unfit to the use, low quality of making). 2. Middle (item has mass character of production, item contains not laborious technological nodes and processes). 3. High (individual model, synthesis of styles and ways of treatment, high quality).

Model shows the right dependence of effectiveness and success of the labour of the teacher of technology on the productiveness and quality of labour of students. In connection of this there was

developed and implanted to the educational process the new aesthetical-methodological contents and accompaniment of lessons.

**Contents and accompaniment
of the lessons of technology
(educationally-methodological complex)**

1. Author's program by the direction "Technology. Service labour" for 5-8 classes, which foresees the new approach to the structure and organization of the process of education with the saving of the requirements of educational standard. The special place at the program there is allotted to the carrying out of **lessons at the manufacture**, where students can familiarize and examine real technological processes.

2. Methodological manual for carrying out of lessons by the direction "Technology. Service labour" in 5-8 classes of middle comprehensive school, uniting and opening principles of education, methodic of education, traditional and untraditional technologies of education etc.

3. Lecture material for the carrying out of lessons by the sections of "Technology of preparing meal", "Bases of sewing materials technology, engineering science, construction and modeling, technology of making of sewing items", «Bases of the technology of modern manufacture". Material was made at the base of studying of modern professional literature and documentation about condition of industry, technological processes of treatment of items, requirements to the quality.

4. Electronic **illustrated manuals** by the categories of technological preparation and **educational movies** about modern manufacture, which demonstrate "live" technological process, modern approach to the design of items, culture and aesthetic of labour.

5. **The complete set of posters** by constructing and modeling of sewing items in the 5 class (aprons), in 6 class (skirts), in 7 class (shorts and trousers), which reflect modern tendencies of fashion and construction of items, which allow to students to carry out the choice of their own item, to develop a sketch.

6. **Graphic manuals** by the technology of making the sewing items with the step-by-step treatment of nobles, which open the essence and peculiarities of technological treatment, criterions and control of quality.

7. The complete set of educationally-methodological **documentation** and manuals by the organization of **designed activity** (study of design and technology – making of complicated models,

preparation of the foreign dishes; theory and practice of carrying out of the projects – business plans, houses for the birds etc).

Direction "Technology. Service labour" in the modern school continues to carry out the tasks by the forming of technological skills and abilities, development of aesthetical culture. It should be mentioned the importance of girls-teenagers teaching of technology: it's an ability to orientate oneself in modern sewing materials, make and estimate the quality of purchased items, culinary preparation, forming of technological thinking in common and getting of the aesthetical delight from the results of labour. Mentioned knowledge and skills define the success and competitiveness of graduating students, and are also necessary in the connection with the fullness of the market with the sub-quality goods. The solving of examined problem directly depends on the high level of pedagogical mastery of the teacher of technology and equipment of the cabinets-workshops.

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*Materials of Conferences***THE EDUCATIONAL PROCESS
OPTIMIZATION WITH THE REMOTE
STUDY MODES APPLICATION**

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The educational Institution innovative activity is the significant resource in the educational system modernization processes provision, which is being directed, first of all, at the new, the contemporary education quality achievement, at the content renovation first – priority tasks and also at the teaching and the education technologies solution.

So, the occupational and the vocational education system liberalization, and the labor relations, the industrial production crisis, and the services sphere development have already been resulted in the fact, that the educational process innovation, its maximum proximity to the consumer are being more valued just in the educational services sector. Thus, at present, the case – technologies and the remote educational form are being possessed the similar qualities.

It is necessary to be distinguished the remote teaching, as the system, well as the process. The remote study is being assumed the pedagogical planning stage theoretical comprehension, its substantial and the pedagogical, and the educational (e.g. in the concept of the pedagogical and the educational technologies, the methods, the forms, and the modes application) components by the analogy with the teaching other forms and the modes. And, consequently, the pedagogical and the educational planning stage tasks are the following: the electronic courses, the electronic textbooks, and the training aids, the teaching techniques, the learning crutches complexes making, the study process organization pedagogical and the educational technologies development just in the nets.

The remote teaching courses are being assumed the pupil's activity thorough and the detailed planning, its organization, the teaching tasks and the targets' challenges clear definition and their setting, the necessary curricular and the teaching materials delivery, which have to be provided the interactivity between the pupil and the teacher, the feedback between the pupil and the curricular and the teaching materials, and also to be provided the group training and the learning possibility. Thus, the efficient feedback presence is quite absolutely necessary, as only it is able to be allowed the pupil to receive the necessary information on his or her advancement and the improvement correctness on

the way from the complete ignorance to the full knowledge. And, it goes without saying, the student's independence just from the Institute of the Higher Education, the College, and the University geographical situation is the remote study modes and the forms main quality.

At the present moment, the remote study modes and the forms organization main challenge is the fact, that the remote teaching and the training efficiency is directly being depended on many following parameters: the process technical organization, the accompanying personnel competence, as from the teacher's side, well as from the student's one, the necessity in, exactly, the knowledge receiving (e.g. the main condition) and, it goes without saying, those teachers' and the lecturers' technical, the pedagogical, the educational and the casual qualification, who are making their direct work with the pupils. It will have to be the teachers and the lecturers with the universal preparation and their training: having possessed the contemporary pedagogical, the educational and the information technologies (IT), psychologically having prepared for the work with their pupils in the new educational – cognitively network environment, having assured of their activity necessity. So, at present, there is such kind of the tendency, having resulted in, that the high level qualification and with the versatile skills and the many – sided habits teacher and the lecturer is not quite needed any more, after the academic discipline complete course one – time development. After this, the electronic sheet is being formed on the basis of the already passed tests, and it is quite be possible to be printed by every clerk. The challenge on the remote pupils performance their score passing control organization and the conducting has not also been decided. So, it is quite necessary the students' knowledge grade normative – legal basis creation and also the arrangements development, having permitted the leading teachers' and the lecturers' interest to be increased in the remote study modes and the forms development and the further improvement for all these challenges solution.

Thus, the teaching on the remote technologies is, absolutely, being meant the complete knowledge the work skills and the habits with the PC, with the "Office" main programs, and also the skills and the habits to work with the service programs and the service routines (for example, the "Educon" complex has already been realized in our University). For all this, the teacher and the lecture, having been involved into such educational mode and the form, will have to possess, ideally,

the Electronic Methodological – Educationally Complex (EMEC) complete form.

Certainly, the electronic MEC is being existed on the basis of the paper version. The Institute of the Higher Education, the College, and the University teachers and the lecturers, at the same time, are creating the Methodological – Educationally Complex (MEC) backbone, having developed and having, annually, renovated the executable codes and having refreshed the working programs. For all this, the executable codes and the working programs modernization is being taken into the consideration such general processes, as the human activity all types informatization, the education and the vocation specialization at the industrial needs and under the region vital activity and the vital functions conditions. At the present day, the teachers, the lecturers and the tutors EMEC is being included into itself the executable codes, the working programs, the lectures, the operating instructions, the user's guides, the laboratory and test works and the necessary directions and the instructions on their carrying out, the literary sources lists, the test material, and also the testing standards and their models on all the given and the teaching academic disciplines. Optimally curricular and the teaching material is being presented in the structured form, that it simultaneously gives the possibility to the pupil to be received the systematized knowledge on each subject and the theme, and to the teacher and to the lecturer – pedagogically to work it out and to systematize his academic discipline description and also the testing material acquisition and the completing. The “Skype” type programs application is being assumed the academic disciplines study process to be individualized and also to be concretized.

So, the transition on the remote code and the form has also been demanded the virtual laboratory works development. At the evident substitution, such developments application is being permitted to be received the background knowledge in the unequipped branches, in the offices, or in the representations, or even not having gone outside the house for the students. And, it goes without saying, the laboratory works, even in such approximate form, are being permitted to be received more full and the versatile and the many – sided presentation on the studied academic discipline, to be deepened the notions and the definitions, to be improved and to be perfected the laws and the regulations perception for the user.

The education remote receiving form is, ideally, being opened the necessary access to the non – traditional informational sources, to be increased the independent type of the work efficien-

cy, to be given perfectly the new possibilities for the creative work and the activity, the quite various and the different occupational skills and the vocational habits acquisition and the consolidation for the students, and, it, moreover, is being permitted to be quite realized the new modes and the forms and the teaching methods for the teachers and the lecturers.

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**THE SYSTEM ANALYSIS
AND THE MATHEMATICAL
MODELLING IN EDUCATION**

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The teaching long – term and the many years' experience such academic disciplines, as «The Theoretical Mechanics», «The Strength of Materials», «The Applied Mechanics», and also «The Experimental Mechanics» for the full – time tuition or the resident instruction and the non – resident instruction or the distant education students has been given in this paper.

So, we have stopped at the full – time tuition or the resident instruction in the Technological Institute of the Higher Education, the College and the University, as there is the considerable difference between the full – time tuition or the resident instruction and the non – resident instruction or the distant education. The system approach, the multi – parametric optimization, and the mathematical modeling have been assumed as the research basis. Moreover, the hierarchical structure charts for the different and the various levels have already been built.

So, the Institute of the Higher Education, the College and the University – this is the opened system. That is why, the schoolchildren are the quite initial «material» for them. The already – made «production» is coming at the enterprises, into the offices, into the scientifically – planning – research Institutions. Thus, we have the first level system: the preschool Institution – the school – the Institute of the Higher Education, the College and the University – the enterprise.

Then, let us single out «the Institute of the Higher Education, the College and the University»

subsystem, and we shall consider it, as the second level system, the constituent elements of which are the following: the Chancellor – the University Administration – the Departments – the Institute (e.g. the Dean's Office) – the Chair – the Teacher or the Lecturer – the Student. «The teacher or the lecturer – the student» link is the main participant in the Institute of the Higher Education, the College and the University. So, the education quality, on the whole, is being depended just on him. Further, the knowledge transfer is being carried out by «the teacher or the lecturer – the academic curriculum – the student» system.

So, in its turn, «the teacher or the lecturer» subsystem is being consisted in the following elements: the instructional work, the methodological work, the scientific efforts and the study, the family, the health, and also the leisure – time. Analogically, it is also quite possible to be presented the «student» subsystem.

The «academic curriculum» subsystem is being included in itself: the lectures, the practi-

cal trainings, the laboratory session, the textbooks (e.g. the printed and the electronic ones), the normative and the standard materials, the operating instructions and the user's guides, the testing, the final test, and the examination.

At present, the quite different information and the various control technologies and the testing facilities are being entered in the training and the educational process. But it should be noted, «the teacher or the lecturer – the student» reciprocal relationship necessity, and it is hardly be possible the thinking engineer or the scientific worker to be prepared by «the professor – the student» non – personal contact.

Further, it is quite be possible to be continued the necessary detailing and the specification, with due regard for the studies schedule, the studies type, the teacher's qualification level, and also the methods study influence.

So, the quality global function, having accepted the maximum value, has been taken for the system optimization:

$$F(x) = \sum \alpha_i f_i(x_i),$$

$x_i \leq x_{max}$ – the restrictions, where $f_i(x_i)$ – the local (e.g. the system's separate elements) optimization functions; α_i – the weight coefficients; x_i – the variable parameters vectors; $i = 1, 2, 3..$ – the system blocks. The system programming is being used for the final results receiving.

Thus, it is quite advisably to be made up some mathematical models variants: just from the enlarged flowcharts up to the detailed charts, having singled out, as the main, well as the secondary cogs. The xi vectors are quite able to be presented by the functions, in particular the subsystem separate elements quality numerical scoring system.

Thus, the given analysis has already been shown, that more detailed quite different and the various factors recording is weighted with some other primary factors. On the other hand, the parameters, having entered just in the optimization formulae, are, to a large extent, the subjective ones, and it should be carried out the statistical analysis for the α_i weight coefficients definition. On the whole, the task is the stochastic one. Moreover, it should be taken into the consideration, that the Institute of the Higher Education, the College, and the University public image has the great influence upon the final result. Nevertheless, the up – to – date mathematical apparatus and the computer engineering are being permitted to be optimized the whole educational process and the teaching training just in the specific Institute of the Higher Education, the College, and the University. Thus,

the mathematical model research and the study are being carried out by the simulation method, having permitted to be considered the quite different options and the various variants, and also the separate structures and the system elements influence.

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LOSS MINIMIZATION IN THYRISTOR CONVERTER WITH DOSING CAPACITORS

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Thyristor converters of direct current with dosing capacitors in power train are widely used in different electro-technologic devices of medium and high (more than 100kW) capacity in which realization of a converter at transistors is difficult.

However, regulation of load current of such a converter is possible only with the help of pulse-frequency method in quite limited range, and in light load it is unworkable at all. Thyristor- con-

denser converter with an additional commutator of dozing capacitors allows regulating load current with Pulse Width Modulation (PWM) in wide range [1]. The regulation is carried with the help of commutator by partial recharge of a dozing capacitor around a closed L-C loop, passing load. It leads to additional losses in mentioned L-C loop, where except for additional thyristors and inductor, also two thyristors of a thyristor bridge are included.

In [2] a new scheme of a thyristor- condenser converter is suggested, it allows excluding losses in recharge loop. It is depicted in pic. 1.

The device is working the following way.

Let in point of time $t = 0$ voltage at dozing capacitor 5 has plus at lower plate and at additional capacitor 12- at upper plate. At that moment ($t = 0$) from pulse distributor 15 gating pulses to thyristors 1, 2 are given as there's zero at inverting input of element "T". Thyristors 1, 2 are gated and through dozing capacitor 5, load 7 and current probe 8 of load 7 current starts coming. If a signal of current U_3 is close to zero then by appearing of even low load current a signal from current probe 8 load 7 will be equal to signal U_3 and impulse from im-

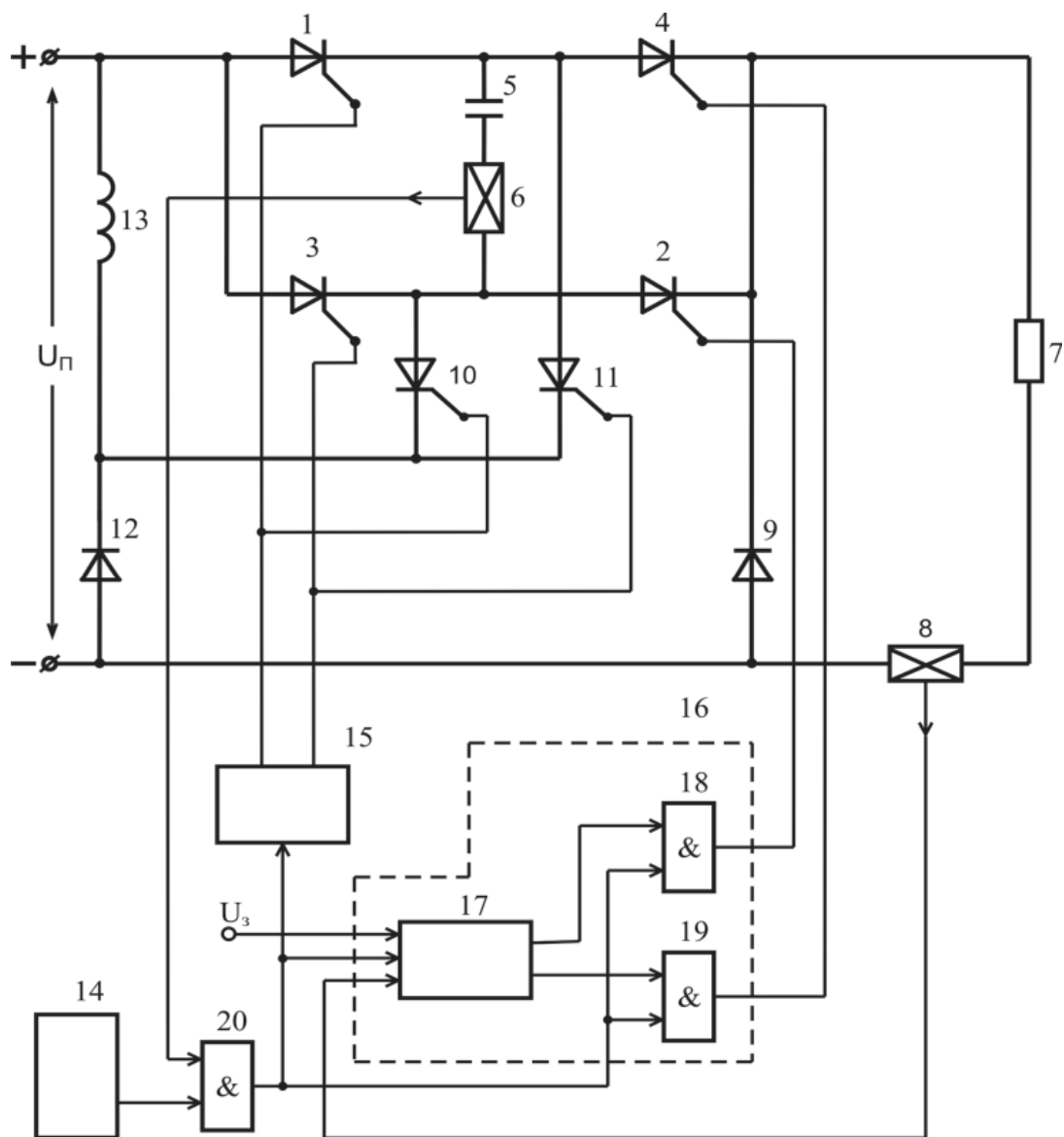


Рис. 1

pulse generator 14 will come through pulse-width modulator 17 almost without time shift. As a signal from the additional current probe 13 is equal to zero and it comes to an inverting input of a two-input logic element "I" 18, there'll be logical one at output of logic element "I" 18, that is impulse at control input of additional thyristor 10. Thus, by low signals of U_3 impulses to control inputs of thyristors 1, 2 and an additional thyristor 10 will come almost simultaneously. Capacitance of the additional capacitor 12 is much less than capacitance of a dozing capacitor 5, that's why by low load current 7 voltage of dozing capacitor 5 is close to zero in the process of recharge, and voltage at additional capacitor 12 is changing. That's why switch on of additional thyristor 10 leads to switch off of thyristor 1, and load current comes through circuit of a positive side of a power supply U_n – additional thyristor 10 – current probe 13 – additional capacitor 12 – thyristor 2 – load 7 – current probe 8 – negative side of a power supply U_n . Current goes till full recharge of an additional capacitor 12. At interval, necessary for recovery of thyristor gating characteristics, another impulse from impulse generator 14 comes. Through logic element "I" 20 and pulse distribu-

tor 15 another impulse at diagonal thyristors 3 and 4 comes, then to additional thyristor 11 and the process repeats. At the same time every commutation is possible only when there's no current in diagonals of alternate current of thyristor bridge 1–4 and additional bridge 2, 3, 10, 11, as only in this case there's "resolving" zero at inverting inputs of logic elements "I" 18, 19, 20.

If a signal of U_3 is increasing, an impulse shift from impulse generator 14 through pulse-width modulator 17 and logic elements "I" 18, 19 to control inputs of additional thyristors 10, 11 will increase, that means that there'll appear time shift between impulses from impulse generator 14 and impulses from pulse-width modulator 17.

Further increase of load current is characterized by the breakover delay of additional thyristors 10, 11, and voltage at dozing capacitor 5 in the process of recharge doesn't yet reach power supply U_n voltage. Current through capacitor 5 controls current probe 6. Bypass diode 9 by-passes load 7 and current probe 8.

When load current reaches critical point, when voltage at dozing capacitor 5 in the process of recharge becomes equal to voltage U_n and energy, given to load by one cycle of recharge becomes constant:

$$W = C \frac{(2U)}{2} = 2CU = \text{const},$$

further increase of load current is possible only by decreasing load impedance as in all known thyristor-condenser converters with dozing capacitor, included successively in load circuit. Such mode can be used in electro-technologic devices, for example, with variable resistance of a spark gap.

The device allowed not only regulating with pulse-width modulator method in a wide range of loads, but also excluding all additional losses, common to known converters of similar use.

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