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**Some approaches and models into teaching mathematical disciplines for economists in higher education institutions**

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**Abstract.** The main problems of higher education in conditions of a modern information society are considered. In order to increase the competitiveness of the economical profile graduates implementation of synergistic approach and bilingual model of teaching mathematical disciplines for future economists are proposed. Described main principles and possibilities of their realization.

**Keywords:** *bilingual model, synergetic approach, communicative-activity approach, competitiveness, competence, educational process, mathematics.*

**Statement of the problem.** Information society requires a new social consciousness, socially active, creative personality, capable of freedom of choice and freedom of action, capable to self perfection, making decisions and personal responsibility for their implementation. The efficiency of a person activity in a modern dynamic world more over depends on his or her worldview, understanding of modern scientific paradigm. Namely the education system itself is to convey to the society the idea of modern scientific paradigm, inform about new methodological approaches to the analysis of the development of the society and interaction processes between nature and society. In the edition to the scientific worldview of a future specialist, the base of modern higher education should become innovation ways of thinking and action. Effective implementation of the mentioned requirements leads to development of a modern education paradigm, definition of the principles, on which all the education process will be built. Modern information and communication technologies, mathematical computer systems form an information structure that allows effective use of research approach, which should be permeated all forms of educational process. Providing conditions independent daily access to international scientific and technological databases will enable economic profile professionals to protect their interests in the global labor market in the age of globalization, as effective research to become an important resource for the development of society and economy.

**Analysis of the recent research and publications.** Modern world characterized by instability, diversity, ambiguity. Dynamics of social- economic and political changes taking place in the context of globalization is so valued that requires from each individual new strategies of thinking, by quality new approaches into analysis of society development processes. According to V. Andrutshenko, a new planet community is forming in complex controversial and sometimes conflict processes of globalization. More and more universal become the processes of integration – political, economic, informational, spiritual-valued. In such circumstances the main role plays the intellectual potential of human creativity, his or her communicative competence in the widest sense of its understanding.

According to V. Budanov, now more than ever there is necessity in holistic transdisciplinary view of the world of most people, since only in this case the public understanding of global issues and ways of resolve them in the society. According to the researcher, in order to learn how to

live in the modern world, in order to have an opportunity to counteract the chaos, develop the strategy of the behavior in it, there is necessity in new education directions, new interdisciplinary metalanguage of horizontal links taking into account the earnings of our intellect. Integrity of knowledge as the dominant of scientific fundamental education paradigm has to solve the problem of two cultures, to overcome subject-objective dichotomy of our mentality, restore harmony relationship of a man and nature. According to the scientist point of view, namely the methodology of synergetics as the theory of self organization will radically rethink the principles of construction of the education-bringing-up process.

More and more growing number of scientists and educators consider synergetics as a new education paradigm. In particular, V. Lutay, developing problems of modern philosophy of education, stresses that synergy is a new breakthrough in understanding the correlation between the general and specific in the development of all the phenomena of the world, including education. Recent studies show that in science there is an education paradigm shift. If before the gradual and ongoing development was absolute, now days the idea of abrupt changes is actively affirmed. In terms of synergetics, the society development should be considered in terms of moving from chaos to the order, i. e. in the society some destructions happen constantly, that make a new situation that promotes formation of a new order. Knowledge and understanding the principles of synergetics are as never essential today. We completely agree with the opinion of the researches, that social synergetics does not necessary mean formalization of the material that is taught at the level of mathematical formulas and graphs. First of all the appropriate way of thinking is necessary and adequate interpretation of basic concepts of the theory of self-organization.

Unfortunately to many researches, synergetics is not the base of modern strategy of human activity. As V. Lutay mentions there is a huge gap between the achievements of synergetic methodology and education systems that form the practical worldview of people. It concerns to both domestic and global higher education system, in which only occasionally used some principles of synergetics.

The same point of view supports V. Budanov, who emphasizes that the entire social experience transmitted by the system of educational institutions, that are oriented to the stereotypes of linear, stable development in the past, but now days in need is preventive education of the principles of being in instable nonlinear world where time

scales are illusory and a human being has to learn to live in a dynamic chaos, understanding its laws and the laws of self-organization.

Bilingual model is widespread in the world, but systematic approach towards teaching mathematical disciplines in English for students of economic profile is not developed yet. In Ukraine there is only one author namely Nichugovskaya L.I., who tried to implement elements of bilingual concept in Poltava University of consumer cooperation.

Taking into account all these, we set the goal, based on recent scientific publications, to justify the necessity of implication of synergetic paradigm and bilingual model in the education systems, to analyze the role mathematical disciplines in synergetic education of the students of economic specialties and to describe a new approach to teaching mathematical disciplines taking into account foreign language professional training, to form linguistic competence.

**The main research material.** Education always plays the role of the foundation of human development and social progress. But to fulfill this the most important function is only possible when all the educational-bringing-up process is based on modern scientific-worldview foundations and principles. The content, methods and the purpose of the education should be based on the modern achievements of science, not only in order to prepare the individual to professional work and life, but above all to support fostering a new worldview of the future specialist according to modern scientific picture of the world and modern achievements of science to develop creative personality of high moral character, responsible for his own decisions, tuned to achieve the goal.

In the professional sphere essential tool of cross-cultural interaction is language proficiency for international communication. The level of foreign languages of the specialists of economic sector influences a lot to the success of the integration of the national economy to the world, improve the competitiveness of our companies in international markets. For causes concern The Report of World Forum on the global competitive position. As a result of the last four rankings Ukraine has moved from 72 in 2008-2009 to 82 place in 2009-2010 among 133 countries, had 73 place in 2012-2013, has 84 place in 2013-2014 among 144 countries. In this regard, one of the problems that society and the state pose a in the laws of Ukraine "On Higher Education" is to look for a new approaches of professional training to form the linguistic competence, especially in the economic experts profile.

According to many researchers contemporary human problems are connected with the linear deterministic view of nature and technology, which has been transferred to the society, as that developed consumer ideology, the inability to predict ecological and civilization crises. As V. Budanov mentions the crisis of the modern education system – is only a part of the global crisis of the end of XX and the beginning of the XXI centuries, which is due to focusing on narrow discipline approach without the horizontal links, separation of humanitarian and natural-scientific disciplines. As a result – not only fragmented perception of reality, but its deformation, that enables to react adequately to the constant challenges of modern extremely complex and unstable world.

A modern approach to the problem of education consists of deep understanding of integrity of fundamental nature-scientific, technical and humanitarian education, that will support forming the postnonclassical worldview, by sense - evolutionary, noospheric, synergetic, creative. That is now days when the change of the scientific paradigm completely meets the cultural needs of mankind as a whole, the question of development of nonlinear thinking of the future specialist is actual, releasing from the domination of linear way of thinking. According to many scientists, synergetics as a postnonclassical direction of interdisciplinary research of processes of self-organization and development, that occur in nonlinear and far from equilibrium systems, can play the role of a new paradigm of education of the 21th century.

According to the S.Kurdyumov and H.Knyazeva namely these and other stereotypes defined predominant now days approach to management of complex systems, which is based on a linear understanding of their function.

S. Kurdyumov not once pointed out that the synergetics that is focused on the search for universal laws of evolution and self-organization of complex systems of any nature, has deep ideological consequences. Synergetics rebuilds a person's world, changing perceptions of space and time allows us to understand the course of evolutionary processes, changing attitude towards life and human life position. Synergetics rebuilds a person's world, changing perceptions of space and time allows us to understand the course of evolutionary processes, changing attitude towards life and human life position. Synergetics lets look at the world differently: it opens unreasonable side of the world - its instability, modes of aggravation, nonlinearity and openness.

Synergetic paradigm of education is based on a holistic perception of man and the world, understanding the need for integration of personal interests and social values. Synergetic approach is to stimulate the learning activities of pupils and students in self-education, in cooperation with each other and other members of the educational process. In terms of synergetics, education - is self-organization of a person as a holistic ordered structure identical to itself and to the environment. Self-organization is understood as the processes of development of interrelated elements that are directed to maintain and develop not only parts but also the whole system, primarily by internal factors.

According to many researchers, synergetic methodology must fundamentally change the view of the process of education. Education - this is not the transfer of knowledge from teacher to student, without offering ready-truths; education - is a nonlinear situation of open dialogue and direct feedback connection; a process that promotes the awakening of learners' their own power to cooperate with themselves and other members of educational process. In terms of organization of education process, it means abandoning traditional methods that are based on the reproduction of knowledge, uniqueness of the only correct choice. Instead there offered problem-based learning methods, methods of updating their own experience of students and teachers, synergistic methods of education.

According to H. Knyazeva, knowledge of which cannot be taught - it's a way of thinking and creativity devel-

oping in the process of education and providing opportunities to transform existing theoretical and practical knowledge in problem-solving strategies and methods for obtaining new knowledge into personal know how. Consequently, the task of education is to teach people to learn, rather, to learn learning - one of the main demands that are put forward by the information society to the individual. Learn to live is not just to have access to information and constantly replenish it, it's the ability to navigate in the flow of information, to gain fundamental knowledge, to transform this knowledge into wisdom and most importantly - to build their lives wisely.

Stressing the particular importance of synergetics for the education system, the researchers note that the realization of the synergetic principles in the restructuring of the educational process is based on two interrelated aspects. The first is synergetic education – broadening of synergetic knowledge about the laws of self-organization and co-evolution of complex systems, forming a synergetic outlook, using the principles of synergetics in the natural sciences and the humanitarian disciplines, deep understanding of the integrity of fundamental nature-scientific, technical and humanitarian education. The second – synergetics as a method of education means to build the entire system of education on the principles of synergetics, using these principles in the construction of separate educational-bringing-up process and the process of identity formation; the use of synergetic methods of education: self-education, non-linear dialogue, evoking learning, learning as adaptive modification training as phase transition, heshtalt education.

Synergetic education of future professionals, including economists is extremely important because it promotes deeper understanding of the functioning of such complex, non-linear, open systems as a society and its subsystems.

One of the modern disciplines are synergetic economics that focuses on the economic aspects of nonlinear evolutionary process: instability, structural changes, discreteness. Synergetic economics considers the non-linearity and instability as a source of diversity and complexity of the economic dynamics, while taking into account the uncertainty of information. Synergetics focuses on the fact that the economic system can pass through the hierarchy of unsustainable development, and they may occur more and more complex structures. Such instability may be caused by the influence of both internal and external factors and can lead to a new space-time organization of the system: the emergence of structural changes, the existence of limit cycles, chaos, and so on. Namely the universality of synergetic methods as the theory of nonlinear oscillations, allows us to study economic objects on the base of construction and analysis of nonlinear dynamical mathematical models, to figure out the cause of occurring auto oscillations, parametric processes, dynamical chaos.

To master synergetic methodology of future economists should understand the sense of such terms as bifurcation, limit cycle, attractors, fractals, deterministic chaos and so on.

In our opinion, the special role in synergistic education of students of economic specialties should play the disciplines of mathematical cycle. When teaching mathematics there is the opportunity for the first time to familiarize

students with the history of synergetics, its basic concepts, modern methodology of analysis of nonlinear dynamical systems, that in its turn promotes the study of evolutionary and synergetic economics.

Unique opportunities with students in the implementation of the bilingual education model mathematical disciplines, such as: master the system of mathematical concepts, develop the ability to play quick mental operations and the formation of their results, commenting English; get in-depth knowledge of mathematics, including knowledge of special terminology, which is the basic minimum academic English; to establish incentives based on a desire to learn quickly to operate a foreign-language scientific databases; enhance the students' interest, indifferent to mathematical knowledge; to develop and consolidate the skills and abilities of systematic, independent work, quick orientation in the learning material. The function of the teacher changes from ready-made theories demonstrator manager search process and the provider of new knowledge, and function of students - from the recipient ready to design their own theories. Cooperation of teachers and students in a communicative activity-process model of learning mathematical subjects in English - is an effective tool for managing the activities of the teacher and student may, of course, only in adequately reflect the realities of teaching process, that model of education - not a closed circuit, it contains rather a dynamic program of action of the teacher and the student, taking into account factors that affect the learning process: the presence and levels of training learning skills of students, reproductive or productive thinking, intrinsic motivation, level of ability and so on.

Taking into account the specificity of mathematics as a fundamental communicative activity- learning model implements informative, motivating, and controlling functions of pragmatic learning. Informative function model means to provide students with the opportunity to obtain adequate, affordable individual, objective, useful, complete, relevant and timely information that corresponds to the current level of basic sciences. Orientation motivating function means to compensate for the lack of language environment, contribute to the creation of internal and external motivation, stimulate cognitive interest. Pragmatic function supports encourages the use of scientific English, shows the applied nature of mathematics. The control function model involves the creation of real opportunities for monitoring and self-control. Appropriate bilingual methodological support should be designed to provide the above features of the model.

For the future economists mathematics is primarily a tool of analysis, organization and management. Abilities and skills, gained by student achievements in the process of mathematical disciplines studying are not the main purpose but a means to solve professional problems. Thus, "Mathematics for economists" should be considered not only as an independent discipline, but, above all, as a discipline subjected to professional disciplines.

Realization of the potential ability of mathematical disciplines in the preparation of future professional needs to improve quality, update the contents and forms of organization of the educational-bringing-up process. Among the ways to improve the quality of mathematical preparation of future professionals special attention is need in the

following things: modification of existing programs of mathematical sciences, modernization of mathematical courses in order to fulfill them with modern achievements of mathematical science; modernization of higher mathematics course to shift the focus from the question "how" (to solve, compute) to the question "what" and "why"; improving the professional orientation of mathematical disciplines cycle; introduction of new mathematical courses of humanitarian character, nonstandard forms of students' self-work, broadening of teaching math at the undergraduate, in its turn requires special training of teachers of math departments; development and implementation of methodical systems of teaching mathematical disciplines based on the latest pedagogical and ICT using training complexes, electronic textbooks, supervising and training facilities.

Conclusions. Thus, it should be noted that the application of synergetic approach and the bilingual model provide a qualitative change in teaching mathematics disciplines for economic profile students as refocus the paradigm of mathematics education and the priorities of its orientation. Practice implementation indicates that students: quickly identify certain mathematical structures in

accordance with the given information, easy to master the basic skills training to resolve typical problems of specific topics and sections of mathematics, demonstrate the ability to apply mathematical knowledge to the obtained solution as the standard and non-standard tasks of learning activities, understand the power of mathematical tools for forecasting and decision making in banking, investment banking, business, by understanding the methodology of mathematical modeling of economic phenomena and processes of self-production problem to solve the situation, give an economic interpretation of the results. Synergetics and self-organization become a modern paradigm of development and learning. Synergetics promotes the formation of a new vision of the world, understanding the laws of evolution, principles of management activities and prospects of development of complex systems. Leading role in the formation of synergistic knowledge belongs to education. Promoting of synergetic paradigm requires a synergistic understanding of educational processes, implementation of appropriate learning technologies, pedagogical mastering and professionalism of teachers, readiness of pedagogical staff and educational institutions to innovation activity.

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**Дахер К., Коломієць С.**

**Некоторые подходы и модели обучения экономистов математическим дисциплинам в высших учебных заведениях**

**Аннотация.** Рассмотрены основные задачи высшего образования в условиях современного информационного общества. Для повышения конкурентоспособности выпускников экономического профиля предлагается внедрить в учебный процесс синергетический подход и билингвистическую модель обучения математическим дисциплинам. Приведены главные принципы, возможности их реализации.

**Ключевые слова:** билингвистическая модель, синергетический подход, коммуникативно-деятельностный подход, конкурентоспособность, компетенция, учебный процесс, математика.