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Шульга Н. В. Стохастическое образование в Австрии.

Рассмотрены методические особенности процесса обучения стохастике в школах и высших учебных заведениях Австрии. Особенности образовательного процесса отображены с точки зрения компетентностного похода. На основе аналіз учебных планов раскрыты основные содержательные линии стохастической підготовки.

Ключевые слова: *стохастика, теория вероятностей и математическая статистика, обучение в Австрии, содержание обучения, компетенции.*

Shulga N. V. Stochastic education in Austria.

The study highlights the methodological features of the learning process stochastics in schools and universities in Austria. Features of the educational process are presented in terms of the competence approach. The main content of the stochastic line training revealed by analyzing the curriculum.

Keywords*: stochastic, probability theory and mathematical statistics, studies in Austria, the content of teaching, competence.*

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TRANSFORMATION OF DIDACTIC PRINCIPLES IN INFORMATION SOCIETY

У статті досліджена проблема зв'язку між законами розвитку інформаційного суспільства та дидактичними принципами сучасного педагогічного процесу. Розглянуто положення головних теорій інформаційного суспільства таких, як: теорія постіндустріалізму (Д. Белл), теорія інформаційного способу розвитку (М. Кастельс), теорія гнучкої спеціалізації (Ч. Сейбл), теорія постмодернізму (Ж. Бодрійяр). Розглянуто також питання появи нелінійного наукового мислення. В статті проаналізовано дидактичні принципи сучасного педагогічного процесу. Такими принципами є: принцип синергетичності, принцип інтеграції науки, освіти і виробництва, принцип науковості викладання, принцип системності навчання, принцип логічності і послідовності викладання, принцип наочності та принцип гуманізації навчання. Визначена нова головна тенденція у розвитку дидактичних принципів, яка полягає в тому, що вони віддзеркалюють закони розвитку інформаційного суспільства. Додактова тенденція полягає в тому, що їх зміст узгоджується з можливостями інформаційних технологій.

Ключові слова: *інформаційне суспільство, постіндустріалізм, постмодернізм, дидактичні принципи, синергетика, нелінійне мислення*

Investigation topicality. At the turn of the XX and XXI century drastic changes in the way of a society development happened. The society transformed from industrial phase to postindustrial (informational) phase of the development. These tendencies of the society development changed all areas of society activities, particularly, pedagogical activity.

Particular questions of this problem have been investigated in scientific works of such

authors in Ukraine as: the President of National academy of pedagogical science V. G. Kremen [1], academician S. U. Goncharenko [2], academician V. I. Bondar [3], corresponding member, professor V. I. Lozova [4]. V. G. Kremen and S. U. Goncharenko have investigated the synergetic problem in pedagogics, V. I. Lozova has described modern didactic principles and rules, V. I. Bondar has given the general descriptions of didactics.

Despite the great work of these authors, the question about relation between society changes and the basics of the didactics has been investigated insufficiently.

The object of the article is:

– to find a correlation between laws of the information society development and didactic principles;

– to determine tendencies of didactic transformation principles.

Body text. In 1998 in his article "Pedagogical science: the time of methodological reflection" G. Kremen wrote about necessity of didactic changes. He wrote that didactic principles, set out in the Middle Ages, reflected public relations at that time. [5]. Let us consider the philosophic theories of information society for analysis of the didactic principles in the information society.

The most significant are post-industrialism theory, theory of information way of development, theory of flexible specialization, postmodernism theory.

The author of post-industrialism theory is a professor of Harvard University D. Bell. He uses the concept of *postindustrial society* to designate the society in which the industrial sector loses the leading role owing to increasing technologization, and in which the science becomes the main productive force. The potential of society development is determined by the level of possessed knowledge. D. Bell marks an essential feature of modern society: due to the automation of workplaces in industrial society of the beginning of the XX century a lot of labor force which filled the sphere of services was released. D. Bell also notes that culture, whose role is to educate, is developing dynamically in the information society: " … culture has become the most dynamic component of our civilization, outreaching the dynamism of technology itself … " [6, p. 33].

The faster development among all types of a service sector has resulted in production and application of information technologies: the role of theoretical knowledge rise due to the information of all spheres of life and activity of the society. As the author of the monograph "Theories of an information society" F. Webster notes, theoretical knowledge may be considered as defining line of the information society [7]. The penetration of information technologies into process of teaching of disciplines at a higher school, and also integration of scientific knowledge into contents of programs for students of higher educational institutions become a necessary factor of a higher educational institution activity in conditions of information society. The postindustrial society, according to Daniel Bell, is a society in which: the priority of economics has passed from primary manufacture of goods to creation of services, researches, organization of education system, improvement of life quality; the class of technical experts has become the basic professional group and, to be the most important, in which introduction of innovations in the increasing degree depends on achievements of theoretical knowledge. Theoretical knowledge and information technologies interaction have some interesting feature: theoretical knowledge has become more available due to information technologies.

The same thought is stated by the founder of the theory of information society M. Castells who considers that knowledge influences the knowledge as the main source of productivity. While analyzing the factors regarding economic advance of developed countries, Castells emphasizes that production in developed countries relies on educated young people aged 25-40 years. Castells notes that one of key lines of information society is the specific form of the social organization in which generating, processing, and transfer of information become the fundamental sources of productivity and power: "In a new, informational mode of development, the source of productivity consists in technology of generation of knowledge, processing of information and symbolical communication. Certainly, knowledge and information are crucial

elements in all ways of development, because the process of production is always based on some level of knowledge and on information processing. However, the main specificity of informational mode of development is the impact of knowledge on knowledge as the main source of productivity. Distinctive feature of information revolution consists in almost instant covering the space of planet by the new information technologies. The various countries react differently to new information technologies: speed of access to new information technologies becomes a source of inequality in modern society". M. Castells offers a new scheme of distribution of work in information society [8]. The first place, according to Castells, belongs to producers of the high cost based on information – there are world-leading companies on production of computer equipment, software, and network technologies. On the second place he puts the producers of large volumes of production based on use of low cost work. On the third place – producers of the raw materials, which use the natural resources, and on the last, fourth place – the superfluous producers, which use the depreciated work. Castells contemplates that knowledge and information have became the main materials of modern production, and education — the main quality indicator of work. New producers in information capitalism conditions are those generators of knowledge processors of information, whose contribution to economy is the most important. In modern information society successful achievement depends on the expense of abilities and the efforts during training period and not on the inherited social advantages. That's why universities try to impart the "convertible skills": communication ability, team work, adaptability, readiness for continuous training; the information capital becomes more important than the economic one.

C. Siebel offers the theory of flexible specialization. According to her statements new technologies allow small firms to make competitive production and to create the flexible production, capable to satisfy the differentiated tastes of consumers. Thus, to survive in conditions of information society market it is necessary to have constant workers training.

Big role in information society should be given to designing and producing the advertisements. Symbols play a dominating role in production of goods and services. A dominating role of symbols in the information society is also underlined by J. Baudrillard – one of the founders of a postmodernism theory [9]. Postmodernism has become an ideological conductor of a new post-industrial society. Theoreticians of postmodernism – French philosophers J.-F. Lyotard, J. Baudrillard, J. Derrida, M. Foucault – paid attention to new tendencies in the European culture. In the center of philosophical theories they put nonlinearity of thinking, having presented it as a set of communicative acts. Such way of thinking processes has become conformable to style of communication and thinking of global INTERNET users in which primary forms of communication are chat, forum, work with a text in electronic form, in particular, with a hypertext. Virtual space has become the space for both scientific communication and an education system through distance learning, communication by e-mail. In these conditions a special part is assigned to registration of an electronic text: it turns into a hypertext with possibility to create a parallel virtual reality, dynamic graphic objects, and new possibilities as regards design and composition of training material. The form of training material presentation has the same value as the content because information technologies give opportunity for esthetic design of reality, changing the process and the character of scientific exchange and pedagogical influence. As A. P. Ogurtsov notes "Electronic communications release production and mastering of a text from "binding" to a particular 'place'. Innovative content of a message is more important rather than the status of its author, its institutional place or the place from where it has been sent. Since a potential number of recipients of a message in on-line mode is infinitely large, nationality of neither an author nor of a user is important, only their competence of understanding of information maintenance. That is why occurs the blurring of national boundaries of scientific and educational communities, both with destabilization of statuses distribution and social roles on which industrial society has been based" [10].

These and other laws of Information Society significantly affect the methodology of educational processes leading to the emergence of new didactic principles (principle of

integration of science, education and production, principle of synergy, principle of humanization) and fill the other content to existing classical didactic principles.

Among the most significant facts which stimulated the research of new educational paradigm was a revolution in modern science: the science has passed the stage of post-nonclassical science. Post-nonclassical science has come to replace the non-classical one, which is now followed by the classical science. Mechanistic determinism of Newton and Descartes, who tried to decompose the nature into components, has gone to the past, giving the way to another approach, which is described by V. E. Voitsekhovich in his article "The Human as an aAttractor of the Bioevolution" [11]: modern post-nonclassical science tries to restore the integrity of the view of the world understanding for synergetic body – in unity, in the coevolution of developing of a living and inanimate matter, human and the universe.

Avalanche growth of scientific knowledge demands from a modern human the orientation in continuously updated scientific information flow, using a flexible, non-dogmatic, paradoxical, creative thinking.

Accelerated rates of appearing of new technological information make us review the relation to word and sign. Culture of modern society is based on the sign and image, rather than on the word and book. This thesis is well known to all who work in e-learning platform MOODLE. With use of this platform, Martin Dugimas introduced the character symbols for lectures, tests, practical assignments. Opening the course, you immediately understand what section it is.

Certainly, these trends of scientific development in the information society affect the development of modern didactics.

Trends to synergy in scientific knowledge have led to the emergence of a new didactic principle – ***principle of the synergy***. According to this principle educational systems are considered today to be non-linear open systems that can change the direction of its development, depending on the small bifurcation within the system. The main feature of this system is its ability to self-organization. In natural sciences the synergetic approach is used to study the non-equilibrium open thermodynamic systems, catastrophe theory, group theory, tensor analysis.

Attempts to use a synergistic approach to pedagogy have been criticized. However, due to informatization, the system of "teacher-students" acquires more and more features of open non-equilibrium system capable to self-organization. The emergence of the global information network the Internet has opened unlimited access to information resources for pupils and students. In this sense, the system of "teacher-students" began to acquire the features of an open system because the teacher has lost the monopoly on the generation of knowledge. Rapid pace of emergence of new scientific and technological information, more and more make this system nonlinear and non-equilibrium. Under these conditions the vertical connection "teacher-student" has weakened and the "student-student" communication has been increasing. With the help of social networks students begin to find a like-minded people in other universities and countries.

This is facilitated by information and training environment, offering forums and chat rooms to discuss scientific and educational information. The e-learning platform MOODLE provides a form of work that the author of the platform, Martin Dougimas, called "social constructivism", suggesting that the students discuss academic issues with each other more easily than with a teacher, so the solution of scientific problems or learning with social medium of students will have more constructive character than with the teacher. In this sense the chances of a student audience to self-organization increase.

As direct consequence of information society development was the emergence of ***the integration principle of science, education and production***: because of significant reduction of time between the emergence of the invention and its implementation into the production education should bring into line the course material with new developments and production technologies. The discovery of a giant magneto-resistance in 2007, in which Albert Fert and Peter Grunberg won the Nobel Prize, can serve an example. The prize was awarded to scientists not only for the discovery of the giant magneto-resistance, but also for its application in creation

of a disk with more memory.

The principle of a ***scientific character of teaching*** follows logically from the integration principle of science, industry and education. The principle of scientific character of education suggests the correspondence of content to the level of development of modern science and technology and experience of world civilization. The principle of a scientific character implies that the content of education, which is realized in education and outside a classroom, was designed to familiarize students with the objective scientific facts, phenomena, laws, basic theories and concepts in a particular industry, approaching the disclosure of its current achievements and prospects of development.

One of the most actual in the information society becomes ***the principle of systematic training.*** At time when the flow of information increases by the nonlinear law, we must find concise form of its representation as a system, using vivid visualization. One of the ways to visualize knowledge is a graph – the mathematical object that consists of the union of vertices and arcs which connect them. Graphs are used in information science (discrete mathematics, theory of algorithms), cognitive linguistics, for presentation knowledge in physics, to make the image of the molecule structure in chemistry. The most important for systematization of educational material is a relational graph which reflects the relations (ratio) between objects

The ***principles of continuity and consistency of teaching*** take a new meaning through the use of electronic learning environment: software resources of learning environment allow to create interactive, logically complete, consistently built training system that can be used at all educational levels with preservation of continuity of instruction. Widely known today is the following electronic information environments: IBM Lotus Learning Space (Forum 3.x and 5.x), WebCT Campus Edition 4.1, WebCT Vista 3.0, Blackboard 6.x, MOODLE, OLAT. In electronic environment of education the e-courses, system of tests to monitor students' knowledge, tasks for the self-control, and tasks for the control of feedback may be created. E-course, tasks for the knowledge control and for self-control, composes the electronic resource of a subject. Electronic resource provides identification of the student position in the tree of knowledge, maintains the last open page as a bookmark, presents the history of resource pages passing, provides the necessary information search by keyword, and provides the ability to turn sound or animation. Well-constructed electronic resource that contains electronic course, glossary and power control has such opportunities for training and self-learning which no print edition can give.

A well-known didactic ***principle of visibility*** is filled with new content in information society. Jan Amos Komenski called this principle the golden rule of didactics. In the learning process, according to the principle of visibility, all the sense organs of a human should be involved. An outstanding teacher of the 20th century Lydia Montessori expressed the view that there is nothing in consciousness before it will be feeling. In the information society the principle of visibility, should be understood primarily as a principle of multimedia visibility. Multimedia is a synthesis of three elements: digital information (text, video and graphics), analog information of visual images (video, photos, pictures, animation), analog audio information (music, language). Psychologists have proved that multimedia influences the intellectual sphere of human activity by activation of the right hemisphere of brain which is responsible for birth of new ideas and intuition. Use of media visibility improves the psycho-emotional state of a student, hence letting memorization of educational material occur at the level of his subconscious reactions.

The principle of multimedia visibility is consistent with the need of postmodern society of aestheticization of reality (J. Baudrillard), in which a form (in education – the form of presentation of teaching material) takes the same value as content.

Modern informational technology allows *the training material* to be *aesthetic* by use of virtual reality in which the aesthetic construction of reality is made by a programmer [12]. Examples of such aesthetic design of a physical process with the use of vector graphics and a specially written musical accompaniment are on the author's website *www.high-physics.com*, as

well as in the article "Visualization of knowledge as a realization of the didactic principle of aesthetization of education" [12].

The ***principle of humanization of education*** is also a consequence of the information society. In industrial society education, in particular in the Soviet Union, was directed at obligatory "learning" of children. Soviet pedagogy proclaimed the slogan of universal compulsory secondary education. This slogan contradicted with information about the statistical distribution of pupils' abilities and caused "distortions" in assessing of knowledge of pupils. A teacher had to get "at any cost" an answer from the pupil at least at the level of "satisfactory". This was an authoritarian pedagogy and teaching methods were reproductive. However, we understand that according to a normal distribution only 70% of pupils can demonstrate the knowledge, measured by "satisfactory" and "good" evaluations, 15% of pupils can keep pace for "fine", and 15% for "unsatisfactory". Market conditions have caused changes in the paradigm of education. The slogan of modern education system can be expressed by the words "the provision of educational services". A necessary condition for the provision of educational services is the use of information technology in education, in particular, e-learning environments. Among them belong the platforms of distance education, allowing implementation of multi-level courses of the same subject. In this sense it has become more humanistic: among provided diversity a student can choose the course of such a level of complexity, which corresponds to his initial preparation.

Conclusion. The laws of information society development, namely, emergence of non-linearity in scientific thinking, strengthening of the role of scientific knowledge, strengthening of the role of a mark in representation of knowledge have an impact on didactic basis of the modern pedagogical process. There are new didactic principles: the principle of synergy; the principle of integration of science, education and production. The role of such principles increased: the principle of scientific character of teaching, the principle of systematic training, principles of continuity and consistency of teaching. The principles of visibility and humanization of education have been filled with a new content.

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Швец В. Д. Внедрение дидактических принципов в информационное общество.

В статье исследована проблема связи между законами развития информационного общества и дидактическими принципами современного педагогического процесса. Рассмотрены положения главных теорий информационного общества таких, как: теория постиндустриализма (Д. Белл), теория информационного способа развития (М. Кастельс), теория гибкой специализации (Ч. Сейбл), теория постмодернизма (Ж. Бодрийяр). Рассмотрен также вопрос о появлении нелинейного научного мышления. В статье проанализированы дидактические принципы современного педагогического процесса. Такими принципами являются: принцип синэргетичности, принцип интеграции науки, образования и производства, принцип научности преподавания, принцип системности обучения, принцип логичности и последовательности преподавания, принцип наглядности и принцип гуманизации обучения. Определена новая главная тенденция в развитии дидактических принципов, которая состоит в том, что они отражают закони развития информационного общества. Дополнительная тенденция состоит в том, что их содержание согласуется возможностями информационных технологий.

Ключевые слова: *информационное общество, постиндустриализм, постмодернизм, дидактические принципы, синэргетика, нелинейность мышления*

Shvets V. D. Transformation of didactic principles in information society.

The article investigates a problem of relations between laws of information society development and didactic principles of modern pedagogical process. Principles of the main information society theories have been considered. They are: post-industrialism theory (D. Bell), theory of information way of development (M. Castells), theory of flexible specialization (C. Siebel), theory of postmodernism (J. Baudrillard). The question concerning emergence of the non-linear scientific thinking is also taken into account. In addition the author analyzes didactic principles of the contemporary pedagogical process, specifically: synergy principle; principle of science, education, and production integration; principle of scientific character of teaching; principle of systematic training; principle of logicality and consistency of teaching; principles of visibility and humanization of training. A new major trend as to development of the aforementioned principles that consists in their reflecting the information society laws is determined. The additional trend is backed by the fact that their content conforms to capabilities of information technologies.

Keywords: *information society, post-industrialism, postmodernism, didactic principles, synergy, non-linear thinking*