

## THE TRANSFORMATION OF THE DIDACTIC PRINCIPLES IN THE INFORMATION SOCIETY

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### Abstract

Problem of bonds between laws of the information society development and didactic principles of the modern pedagogical process has been investigated in the article. The theoretical positions of the main theories of the information society have been considered. These theories are: the post-industrialist theory (D. Bell), the theory of the information way of the development (M. Castells), theory of the flexible specialization (C. Seybl), the theory of the postmodernism (J. Baudrillard). The questions of the appearance of the non-linear scientific thinking have been considered also. The didactic principles of the modern pedagogical process have been analyzed in the article. These principles are: the principle of the synergy; the principle of integration of science, education and production; the principle of scientific character of teaching, the principle of systematic training, principles of continuity and consistency of teaching; principles of visibility and humanization of education. The main new trend in the development of these principles has been defined in the article, namely: modern didactic principles are the reflection of the development law of the information society. The additional trend consists of changes of their content in according with capabilities of information technologies.

**Actuality of the investigation.** On border of XX and XXI centuries have been made the radical changes in the way of the society production. 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.

Separation questions of this problem have been investigated in scientific works of such authors in Ukraine: 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 investigated the synergetic problem in pedagogics, V. I. Lozova described modern didactic principles and rules, V. I. Bondar gave the general descriptions of didactics.

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

### The aims of this article are:

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

to define the tendencies of didactic principles transformation.

**Body text.** V. G. Kremen wrote about of the didactic changes necessity at 1998 year in the article «Pedagogical science: the time of methodological reflection». He wrote that didactic principles set out in the Middle Ages, reflected that public relations of the Middle Ages. [5]. Let us, please, to 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, postmodernist theory.

The author of post-industrialist theory is a professor of the Harvard University D. Bell. He used the concept of the postindustrial society for 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 noted essential feature of modern society: due to the automation of workplaces in industrial society of the beginning of the XX century were released lot of the labor force, which filled sphere of services. D. Bell notes also, that the culture, the part of which is the education, 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 services sector received the services connected with 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 notes the author of the monograph «Theories of an information society» F. Webster, 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 the higher school, and also integration of scientific knowledge into contents of programs for students of higher educational institutions become a necessary factor of activity of a higher educational institution in the 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 the goods to creation of services, researches, organization of education system, improvement of life quality; in which the class of technical experts became the basic professional group and, that the most important, in which introduction of innovations in the increasing degree depends on achievements of theoretical knowledge. There is some interesting feature of interaction of theoretical knowledge and information technologies: theoretical knowledge became more available thanks to information technologies.

The same thought is stated by the founder of the theory of information society M. Castells who considers that

knowledge influence the knowledge as the main source of productivity. Analyzing economic factors of economy development of developed countries, Castells paid attention that production in developed countries relies on educated young people at age of 25-40 years old. 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 became 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 the 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 considers that the knowledge and information 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 the success achievement depend of the expense of abilities and the efforts during training period and not of the inherited social advantages. That's why the universities try to impart the «convertible skills»: ability to communication, work in team, adaptability, readiness for continuous training; the information capital becomes more important than economic.

C. Seybl offered the theory of flexible specialization. According to their 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, for a survival in the conditions of information society market it is necessary to make training of the worker constantly.

Big role in information society should be given to design and production advertising. Symbols begin to play a dominating role in production of the goods and services. The dominating role of symbols in the information society is underlined also by J. Baudrillard – one of founders of the theory of a postmodernism [9]. The postmodernism became the ideological conductor of new post-industrial society. Theorists 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 the philosophical theories they put nonlinearity of thinking, having presented it as set of communicative acts. Such way of thinking processes became conformable to style of communication and thinking of global INTERNET users in which primary forms of

communication are chat, forum, work with the text in electronic form, in particular, with the hypertext. The virtual space becomes space both scientific communication, and an education system through distance learning, communication by e-mail. In these conditions the special role is got by registration of the electronic text: it turns into the hypertext with possibility of creation of parallel virtual reality, the dynamic graphic objects, and new possibilities of design and composition of training material. The form of presentation of the training material gains such value as well as the contents because information technologies give opportunity of esthetic designing of reality, changing the process and the character of scientific exchange and pedagogical influence. As notes A.P. Ogurtsov «The electronic communications release the production and mastering of the text from «binding» to a particular 'place'. More important is innovative content of the message, rather status of his author, his institutional place or place from where it has been sent. As the potential number of recipients of the message in on-line mode is infinitely large, the nationality neither of the author, nor of the user is not important, only his competence of understanding of the information maintenance. That's 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 the Information Society significantly effect 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 stimulate 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, which is followed the classical science. Mechanistic determinism of Newton and Descartes, which tried to decompose the nature into components recede into the past, giving the way to another approach, which has described by V.E. Voitsekovich in his article «The Human as an tractor of the Bioevolution» [11]: modern post-nonclassical science try to restore the integrity of the view of the world understands it as 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 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. By 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 led to the emergence of a new didactic principle – *principle of the synergy*. According to this principle, the educational systems are considered today as 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» more and more acquires features of open non-equilibrium system capable to self-organization. The emergence of the global information network Internet has opened for pupils and students unlimited access to information resources. 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. The rapid pace of emergence of new scientific and technological information, more and more make this system nonlinear and non-equilibrium. Under these conditions have weakened the vertical connection «teacher-student» and began to increase the «student-student» communication. With the help of social networks, students began 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 increase the chances of a student audience to self-organization.

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

The principle of **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 scientific character requires that the content of education, which is realized in the educational and outside the 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 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 relational graph, which reflect the relations (ratio) between objects.

The **principles of continuity and consistency of teaching** takes a new meaning through the use of electronic learning environments: software resources of learning environments 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 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 environments of education may be created the e-courses, system of tests to monitor students' knowledge, tasks for the self-control, and tasks for the control of feedback. E-course, tasks for the knowledge control and for self-control, composes the electronic resource of 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, should be involved all the sense organs of human. 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 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 student, so the memorization of educational material occurs 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.

The modern informational technology allows to make aesthetic the training material by use of virtual reality in which the aesthetic construction of reality was done by the programmer [12]. Examples of such aesthetic design of the physical process with the use of vector graphics and a specially written musical accompaniment are on the author's website [www.high-physics.com](http://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 on obligatory «learning» of children. Soviet pedagogy proclaimed the slogan of universal compulsory

secondary education. This slogan entered into conflict with information about the statistical distribution of pupils abilities and caused to the «distortions» in assessing of knowledge of pupils. The 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 was 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 forced to change the paradigm of education. The slogan of the 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 to the platforms of distance education, allowing

to implement the multi-level courses of the same subject. In this sense, it has become more humanistic: student may choose among provided diversity the course of such a level of complexity, which corresponds to his initial preparation.

**Conclusion.** The laws of the information society development, namely, the emergence of the non-linearity in the scientific thinking, a strengthening of the role of the scientific knowledge, a strengthening of the role of the mark in representation of knowledge have an impact on didactic basis of the modern pedagogical process. There are new didactic principles: the principle of the 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 filled with new content.

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#### Реферат

#### Трансформація дидактичних принципів в інформаційному суспільстві

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інформаційне суспільство, постіндустріалізм, постмодернізм, дидактичні принципи, синергетика, нелінійне мислення.

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. Проаналізовано дидактичні принципи сучасного педагогічного процесу. Ними 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. Додаткова тенденція полягає в тому, що їх зміст узгоджується з можливостями інформаційних технологій.

## Реферат

## Трансформация дидактических принципов в информационном обществе

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информационное общество, постиндустриализм, постмодернизм, дидактические принципы, синергетика, нелинейность мышления.

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 синергетичности, 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 законы развития информационного общества. Дополнительная тенденция состоит в том, что их содержание согласуется возможностями информационных технологий.

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