

## **Pedagogical Aspects of Formation of an Adaptive Educational Environment in Preparing the Labor Resources of Economic Systems**

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**Abstract:** Socio-cultural changes in modern society form such conditions, that elements of the educational environment should be adaptive to adjust the effective implementation of the educational process in the formation of human resources for the needs of the economic systems of the country. The efficiency of the entire socio-economic system of the country is directly connected with the training of qualified personnel, which form the gross domestic product and added value. The article renews the issue of neuropedagogy in relation to the modern conditions of work environment. The authors identified the factors and proposed an updated model of the workforce development for the needs of the country's economic complex.

### **1. Introduction**

The stage of development of the modern society is characterized as post-industrial, the term proposed by Bell [1], where technology, communication, information, processing of information play key roles. For such a society, Masuda [2] introduced the term “the information society”, in which intellectual superiority and information processing dominate the struggle for the effectiveness of the process. The adaptation of the educational environment to the conditions of post-industrialization, due to the increasing incoming data array, involves the inclusion of machine learning and teaching in the pedagogical process of forming effective labor resources. Conditions should be created in which the link “learning – studying – teaching” is most effective. The importance of an integrated approach [3] is directly related to the effectiveness of the country's labor force.

### **2. Methodology**

The theoretical methodology for researching the subject is based on the concept of neuropedagogy [4], which includes methods for training neurons proposed by Hebb [5]. Thus, the cybernetic interpretation of the brain activity of human learning and teaching in the information society uses accessible technologies, communication resources and the information environment, which forms the prerequisites for increasing automation in the pedagogical process and organizes such an educational environment that takes into account the features of the post-industrial society. Heuristic methods of constructing a modular pedagogical system are used.

### **3. Results and Discussion**

The educational process of training the personnel for economic systems has a number of features:

- Scalability of knowledge: an economist should consider many factors outside his system in order to efficiently fulfill his duties; a machine operator is locally attached to his place of work, and his labor product is formed by a behavioral skill, unlike an economist who, for example, hedges currency risks – there is no localization of the workplace, the product of labor is the result of cognitive activity;
- Synergy of knowledge: economic processes are inextricable and complex in nature: when they interact, the influence they exert on each other creates effects that are not always expected. This requires a high degree of interdisciplinarity of data for digestion;
- Priority of quantitative methods of processing data over qualitative ones: the economist must be trained in the methods of quantitative assessment and quantifying analytical operations, otherwise the probability of erroneous conclusions increases many times.

Thus, it is necessary to establish the levels of the educational process, which will reduce the uncertainty in learning outcomes.

Let us describe the cybernetic levels of the educational process:

Level 1 – Perception (sensory, receptor, etc.): at this level, the incoming information is perceived by the subject, and here the completeness of perception of the incoming data array is an important factor. The effectiveness of this level is affected by three factors [6]:

- Generalization (the elements of the incoming experience are generalized into a new category that does not reflect the objective reality of knowledge);
- distortion (perception distorts the data obtained, based on the elements of subjective experience);
- Omission (part of the incoming data stream is skipped);

Level 2 – Associative (processing): this is a way of processing the resulting data array. At this level, the effectiveness of the educational process depends, first of all, on the cognitive functions of the subject;

Level 3 – Reaction: implementation of the received data in the form of applied conscious activity of the subject. At this level, efficiency is characterized by environmental conditions in which the applied activity is carried out.

For clarity, we summarize the data in Table 1.

Table 1 Levels of education (cyber description).

Levels	Elements that reduce the effectiveness	Antagonists
Perception	1.Generalization 2.Distortion 3.Omission	1.Modular feed data 2.The data of the incoming information in a larger volume should be presented in quantitative form 3.To provide feedback on the completeness of perception data
Association	Cognitive function is reduced (without regard to the physiological level)	The creation of an enabling environment to process data, including the environment and condition of the subject
Reaction	Adverse environmental conditions (technical, instrumental etc.)	Organizational and technical events, eliminating adverse impacts

These levels are present in each element of “learning – studying – teaching”, but the meaningful implementation of levels is different. The adaptation of the educational environment of the economic system imposes a set of requirements: what is a man's ability to learn, which directly affects the entire subsequent process, hence the important factor is the system of diagnostics (testing) – as the formation of the subject’s own experience in interaction with external environmental factors.

Let us relate the levels presented in Table 1 with educational institutions.

The level of perception, since it is the first and actually laid foundation, the sooner we form the level of perception of economic formations according to the age of the student, the better. And here

the first question arises: economics as a discipline is taught at a college level, but is not represented in school education. How can we expect the training of qualified personnel in the form of economists, financiers, investors, if in a significant part of the educational process (up to 7 years, excluding primary education) there is generally no data for the level of perception? The economy affects all spheres of life, it is the foundation of the well-being of society, but the idea of economic processes, for some reason, is formed belatedly.

The associative level determines the quality of processing the data array; at this level, quality is achieved through automation of processes (use of processing software, access to technical means of communication, etc.). The economist works with quantitative data, the actual result of the economist's labor is to increase the welfare of society as a whole and the individual in particular, and this is expressed primarily in quantitative form. Thus, knowledge of software systems that process an array of quantitative data with mathematical precision is necessary. That is, the level of applied informatization in the process of training personnel for economic systems should be significantly higher than when training workers in production systems whose labor results are expressed in processing materials and material form.

The reaction level is of an applied nature; here the student should have the opportunity to practice and self-test the developing skills, it is extremely important to undergo training, production practices at existing business entities. In this case, the important point is, for example, the following: we train the turner and in the learning process we can test the knowledge and the formation of the reaction level at the training stand, where the turner will create a product of labor. But as for the economist, we cannot recreate the training stand from the economic system, and, in this case, the modelling of economic processes in an interactive form will help us. Since we are talking about the information society, the modelling of economic processes involves the use of computer technology, which brings us back to the importance of the associative level.

The same applies to advanced training of existing employees of economic systems, where the key is the reaction level (it is obvious that the current employee already has a system for receiving and processing data).

In the information society, the share of non-technical professions is high, and this is logical, but the redundancy of specialist training is not offset by the quality of the results of these specialists. The results of labor of economists are expressed in material increase in the quantity of product and gross income of society, that is, it is always a quantitative form. Moreover, the lack of feedback between actions and the next result of labor leads to uncertainty in determining the quality of labor.

For example, the so-called big three international rating agencies, which determines the economic status of countries, business entities, large-scale economic systems, etc., use a symbolic image (Aaa, A + and etc.) to indicate the rating, which does not provide any meaningful quantitative assessment; these are quality ratings that are relative, but at the same time they affect managing entire countries. There is no feedback in the cycle of stimulus – response – test (TOTE model [7]): if the worker, when performing an operation, sees the defective part in the results of work, he redoes or fixes, but the result of the economist's work has no feedback from the contractor, and this is the omission of the educational environment, which forms the personnel of economic systems. It is necessary to form a communicative chain at each level to achieve the objectives of training highly qualified specialists. Using the discussed methods in education, which have recently been developed due to the progress of instrumental and technical research methods, are of priority importance for the formation of the conditions of an adaptive educational environment in the discrete information space of modern society.

#### **4. Conclusion**

The features of economic knowledge must be taken into account when developing labor resources in the economic systems. The scalability of data eliminates the localization of incoming information in the training process. Emerging synergy requires a multidisciplinary approach in presenting information and relevant skills from the teacher. Quantitative processing methods require increasing the level of computerization of the skill of processing incoming information for the

subsequent presentation of information in a quantitatively measurable form.

We have identified antagonists of the factors that substantively reduce the effectiveness of the formation of levels of the process of developing labor resources, while technically they are feasible. The issue of introducing economics in the school curriculum remains debatable, but the requirement for this is objectively determined by the environment of the information society. We believe that the concept of feedback from result to action is necessary if the target value, expressed in a quantitative form, does not pass the verification of actual data. It is necessary to form a feedback loop at each level, then the requirements for adapting the educational environment to the needs of modern economic systems will be met.

## References

- [1] Kaufman, M. T. (2011). Daniel Bell, Ardent Appraiser of Politics, Economics and Culture, Dies at 91. The New York Times, January 25. Retrieved from: <https://www.nytimes.com/2011/01/26/arts/26bell.html>
- [2] Masuda, Y. (1983). The information society as post-industrial society. Bethesda: World Future Society.
- [3] Luria, A. R. (1973). Fundamentals of neuropsychology. Moscow: MSU.
- [4] Patten, K. E. (2004). Neuropedagogy: Imagining the learning brain as emotive mind. The 2nd International Conference on Imagination in Education.
- [5] Hebb, D. O. (1949). The Organization of Behavior: A Neuropsychological Theory. New York: Wiley. Reprinted by Lawrence Erlbaum Associates, New Jersey, 2002.
- [6] Chomsky, N. (1982). Language and the Study of Mind. Tokyo: Sansyusya Publishing Co. Ltd. (Reprint of 1966 Japanese lectures, "Linguistics and the Science of Man" and "Language and the Study of Mind.")
- [7] Pribram, K. (1975). Languages of the brain: Experimental paradoxes and principles in neuropsychology. Moscow: Progress.