

Methodological aspects of the IT-specialists training

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Abstract – The paper contains some reasoning on the methodological problems of the IT-specialists training.

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An engineer in information technologies (IT-specialist) is nowadays one of the most demanded persons, what is caused by a wide spreading of the computer-based technologies practically in all the human activities. IT not only provides a growth of the global production volume in the modern world but changes the people's mining and attitude to information technologies themselves. Contemporary IT resources bear somewhat «aggressive» nature with a permanently rising complexity providing additional difficulties in their utilization and studying (with respect to the future IT-specialists in particular).

The high prices and complexity of the modern computer technologies lead to increase of the amount of the IT-specialists required in the market and differentiation of their qualification as well. For instance, qualification of the «System technologies engineer» includes positions of the «Engineer in the information technologies» as well as «System analyst», «Business analyst», «System architect», «Software maintenance specialist», «Specialist in Software testing and verification» and so on. This makes a gap in the quantities of the IT-specialists specialized in the different aspects of the information industry and in the quality of their preparation as well.

Evaluation and analysis of a role information technologies play in the modern global economy become quite a difficult matter because of the semi-organizational nature of the world economy processes. From this viewpoint the information technology learning systems can be regarded from different positions, for example from the basics of the modern logistics which demands **the required commodity in the required place, time and quantity with necessary props and minimum delivery expenses**. There remains to add to the above said that a man (as an object of IT processes) is himself (herself) a super-complex semi-organizing system characterized by three levels of a goal making: **genetic level** (comprising unconditional reflexes, vital, social and self-developing instincts), **subconscious level** (conditional and causal reflexes, habits, mentality and so on) and (as the highest) the **conscious level** (including planning, forecasting, decision making etc.).

In this connection, it becomes evident that analysis of the IT-specialists training requires an innovation approach which may be defined from the very nature of IT-technologies. Namely, the information technology (by itself) is a kind of a specific energy-substantial system component providing its functionality (so to say system metabolism) with respect to its goal and state.

By this one can interpret a system metabolism as a kind of internal organization providing its viability from the viewpoints of the **system, structure, goal and technology** [1]. A structure defines determinism of the system (as an artificial formation or a product of evolution). A structure is strongly connected to a system goal (defines the system

development) and a way it might be reached (i.e. technology (-es)). A structure leaves some reserve in choosing system behavior, makes the goal somewhat indefinite (with respect to stochastic nature of the system elements and external forces), fuzzy or undetermined. Here and henceforth we use an extended interpretation of the notion of «technology» by including in the field of its application the living creatures too. The genetic substance of the living creatures contains a kind of a program (-s) of their functioning and developing alongside with the bulk of details and props of the creatures themselves. This genetic program in a man determines his (her) abilities to make decisions alongside with subconscious and conscious levels of the goals definition and statement. Human learning is realized both on the subconscious level and the conscious level as well. Subconscious level is a basis of the general culture of a man; it provides his (her) sensing of the world processes, intentions and aspirations. This level is strongly determined by the social and economic possibilities of the people community. A growing feeling of a challenge which is immanent to the modern developed societies manifests most clearly in the innovation processes and in information technologies especially. The complexity of modern life requires of a man more abilities in knowledge acquirement and their usage. Obviously, a future life will be marked by an increasing intelligence level [2]. The role of information technologies will become practically decisive for the nation well-being and its competitiveness.

A conscious level of behavior defines a strategy a man should realize to reach the goals. This level is under a control of a human society because it takes into account the possibilities of the society and external factors. It is important that the solutions at the conscious level have to be in accordance with increasing power and potential of information technologies.

The approach under consideration is applicable to an arbitrary system: civilization, society, educational organization, a man, IT-technology etc. IT-technology meets economical demands of a state in the areas of management, service, planning, design, learning and so on [3]. Its contribution to these areas may be represented by a matrix with the rows standing for the types of information activities and the columns standing for the economical and social activities (see [3]). In various sources the role of information technology in general production output is pointed out directly. However, to obtain a formal model of the influence of IT on the production output seems to be too much aggravated task since it is required to take into consideration the structure of IT contribution to the different economical areas. Information technologies strengthen human intelligence and by this make influence on the results of human activities in the different areas.

Let us consider some educational organization. Accordingly to the approach we consider in this article a genetic level of goal making with respect to the educational organization is represented (figuratively saying) by a collection of the documents, official instructions and regulations providing functioning of the entire system as a whole and common for all educational organizations. This

level forms the backgrounds for the viability of a system. The second level of goal making called subconscious may be connected with a common spirit of organization, its «ambitions», the level of self-estimation etc. Clearly, every member of a successfully functioning organization gets a portion of positive energy and additional motivation in his (her) activity. The administration, lecturers and assistants should carry this elevated spirit and pass it to auditory. This is especially important in IT-specialists training due to the role of IT in economy and social life as was mentioned above.

The conscious level of goal making alongside with its formal part (directives, instructions of the administration of the educational organization) includes also different non-standard measures such as, for example, prizes and rewards for the best students and lecturers, providing better career possibilities, payment compensations etc. At this level it is very important to find a correct relationship between the fundamental knowledge and application knowledge since the last is much dependant on the market situation. In IT training this factor is especially important. The problem lies in a high mobility of IT. The programming languages, design environments and hardware means are changing drastically quick including their basic ideas and paradigms. This circumstance radically differs IT from, for example, physics and mathematics which have being built during hundreds of years. So, IT training must adequately react on the modern challenges and realities. The application part of IT plays by this a very essential role. Evidently, a solid lecturer of his (her) middle age (40-60 years) cannot in general follow IT-changes in such a degree of adequacy as his (her) more young (though less experienced) colleague. This means that IT-education system should actively recruit gifted young people. The educational system should provide necessary conditions in order to be attractive for the talented youth.

It is obvious that «genetic level» sets common principles of system functioning and in a great degree is sensitive to a bureaucratic influence of clerks not directly engaged into educational processes. A surplus activity at this level and at the subconscious level as well may lead to negative results and even null-measured technological output. A well-known proverb which sounds like «A surplus desire makes often no efficiency» is applicable in that case. It seems reasonable to wide use the quality management system at these levels on the basis of the ISO standard 9001-9008 oriented in its essence at the usage of logistics principles formulated above.

Let us consider in more details specialization «Automated information processing systems» which gives qualification of the «Engineer in the information technologies». The genetic level is represented by a qualification standards which give common content of the

disciplines and courses. Because of mobility of IT these standards should (as it seems) be reconsidered more often than for the other specializations. The subconscious level of the cognitive processes and their subjects is significantly dependant of the personalities (especially of the leading professors and lecturers). The prestige of the specialization may be estimated by the results of the entrance examination company, the student forums in the Internet and private communications. By these parameters one can judge that the specialization «Automated information processing systems» is relatively highly required and estimated. Clearly, the highly motivated spirit of the students must be constantly supported by the teachers. It is also important to keep up the traditions of the department and the learning system which made a significant contribution to the achieved results. As far as a subconscious level is concerned one should note that this level hides a lot of interesting possibilities thought not fully understandable. Different departments are very much alike at this level. As was mentioned above the personality factor plays a decisive role. For example, it was revealed that girls have definite difficulties in learning modern programming techniques and algorithmic fundamentals. So, a lecturer should find more refined ways in delivering knowledge by accentuation of the psychological moments, external forms etc.

Let us conclude this article as follows.

1. A future IT-specialists must be highly motivated as earlier as possible (subconscious level). The concrete forms of motivation widely change though (rewards, career improvements, etc.)

2. The young gifted people should be highly desirable as IT-instructors (assistants, coaches) in the fields of the modern programming platforms, technologies etc.

3. Educational standards in IT should be reconsidered more often than in the other areas due to a volatile character of IT software and hardware.

4. The laboratory equipment for IT-training must be of the top-level quality and respond to the modern requirements.

5. A management quality system usage is highly appreciated.

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