INTELLECTUAL EDUCATIONAL TECHNOLOGIES OF COHERENT MAINTENANCE OF DIGITAL TRANSFORMATIONS

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INTELLECTUAL EDUCATIONAL TECHNOLOGIES OF COHERENT MAINTENANCE OF DIGITAL TRANSFORMATIONS

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Abstract. The problems of forming adequate educational technologies and supporting digital transformations for the formation and development of relevant professional competencies as innovative receptivity are interpreted. The fundamental principles of educational technologies that act as a catalyst for educational innovations in the context of digital transformation of economic and social processes are described. The main modern educational platforms of educational support of professional activity are analyzed. The author's interpretation of the synergetic effects in the education system, as well as loans as an educational cryptocurrency is suggested.

Keywords: intellectual technology, individual educational trajectory, networking, formation and development of competencies, digital transformation.

1 Introduction.

At the present stage of development of information society, the basic value gets effective and reliable information support of processes of making management decisions by heads and specialists of the enterprises and organizations of the real sector of economy as well as state bodies, interstate unions and associations. Separately it should be noted that in administrative activity in the conditions of digital transformation of economy and society the optimization of decision-making processes in the conditions of the "information explosion" [1] caused by the exponential growth of volume of resources of the professional focused information which considerable part is semi-structured, incomplete, insufficiently
relevant and reliable is of particular importance. According to experts, only about 10-15% of electronic (digital) resources are presented in the form available to use in the educational purposes. Other 85-90% can be received only by the system analysis and management of big and separate data. The last assumes formation of adequate educational technologies for formation and development of the corresponding competences. In the present article we offer the principles of the educational technologies called by us coherent, which are characterized by smaller lag effect and, therefore, capable to act as the catalyst of educational innovations in the conditions of digital transformation of economic and social processes. The term "coherence" assumes creation of synergetic effect as a result of proper management activities on the basis of formation and development of competency as innovation susceptibility [2].

2. Networking educational platforms

Continuous education of managers and experts in the sphere of education can be carried successfully out on the basis of the specialized information and analytical training systems (IATS) based on the principle of optimization of individual educational trajectories [3]. Similar IATS can process and integrate big arrays of data arriving from various distributed information resources both internal and external, including the websites, databases, web pages of on-line social networks on the basis of technologies Hadoop, Oracle, NoSQL Database, etc. For ensuring functioning of IATS various methods, including information search, data mining, a reasoning on the basis of precedents, imitating modeling, evolutionary calculations and genetic algorithms, situation analysis, cognitive modeling and also a method of indicative planning of administrative activity on a remote basis can be used. Under conditions of "information explosion" the overall performance of the persons making the decision (PMD), demands various and advanced skills of information and analytical activities and use of analytical services, including such as "Popsters" "AgoraPulse", "Hootsuite", "Quintly", "Simply Measured", "Socialbakers", "Audiense", "TweetReach", "Arion" and others. The last ones allow to analyze content of social networks (including VKontakte, Odnoklassniki, Facebook, Instagram, Telegram, Twitter and others), to form analytical and other reports, to estimate reaction of consumers of goods and services in various segments of the market. At the same time, the use of all listed information social and networking platforms is accompanied by possible risks of negative and destructive information impact on results of administrative activity. In this regard it is expedient to provide a complex of actions ensuring information and psychological safety of all participants of educational process under the conditions of "information explosion". One of the perspective directions is realization of IATS on the basis of on-line social and networking technologies for continuous in-service training of educational managers. The prospect of this direction is caused, in particular, by the fact that a number of public authorities and organizations actively form virtual communities on popular social media.

For educational maintenance of decision making under conditions of digital economy the systems of expeditious analytical information processing on the basis of OLAP (Online Analytical Processing), means of processing and data mining (Data Mining) and also wiki-technology can be the main information and technological platforms. OLAP technologies are interactive, directed to preparation of the total (aggregated) information on the basis of the big data arrays structured by the multidimensional principle which are components of software solutions of the class "Business Intelligence". Development of professional competences of heads and specialists of state bodies, the public and other institutions and the organizations in the course of continuous increase in their qualification and retraining perhaps on the basis of use of technology of the OLAP cube containing basic units of data and information on their measurements. The OLAP cube potentially contains all information which can be required for responses to any inquiries at the solution of situational tasks of professional activity. The most effective, obviously, the multidimensional WOLAP technology (Web based OLAP - OLAP focused on Web), the providing high performance in combination with all advantages which are provided by the Web application. The architecture of WOLAP assumes use of various opportunities of Web for the solution of problems of educational maintenance of professional activity. WOLAP system also perform analytical functions, such as aggregation and specification.
3. Optimization of educational trajectories (ET)

We suggest to realize optimization and forecasting of efficiency of processes of competencies development on the basis of individual educational trajectories, applying cognitive complex maps, Bayes networks of trust, method of the analysis and prediction on precedents, method of logic-probabilistic and cognitive analysis and modeling of problem situations in various spheres of professional activity. At the same time the number of the possible individually optimized plans of professional development/in-service training under the conditions of information uncertainty and risk can be designated by a set \(X=\{x_1, x_2, \ldots, x_i, \ldots, x_m\}\), including \(m\) versions (scenarios of formation) of plans. On this set the distribution of probabilities \(p(x)\) successful realization of ET is set if the number \(p(x_i)\) such is delivered to each outcome \(x_i\) in compliance that for all \(i = 1, 2, \ldots, m\) has to be \(p(x_i)\geq0\), \(\Sigma p(x_i)=1\). The set of individual educational trajectories of \(X\) together with the distribution of probabilities set on it is a discrete probabilistic ensemble \(\{X, p(x_i)\}\).

We can also estimate entropy of accidental distribution of indicators of the information flows and Internet resources defining quantity of plans of professional development of education experts on the basis of an information and analytical training complex by introduction of a measure of probability \(p\) and also symmetric non-negative real-valued function \(\rho(x, x_j)\) from couples of outcomes \(x\) plans on the main great number of probabilistic ensemble as "randomized" distance \(\rho\). It is subject to the natural condition \(\rho_{ij} = 0\), and is limited from above by unit:

\[0 \leq \rho(x_i, x_j) = \rho_{ij} \leq 1.\]

As a measure of uncertainty of existence of set of curricula and educational programs of additional education of adults the geometric entropy, or the B-entropy determined by formula (1) can be applied:

\[B_p(p) = -\sum_{i=1}^{m} p_i \log_2 \sum_{j=1}^{m} (1 - \rho_{ij}) p_j,\]

where \(\sum_{j=1}^{m} p_j = 1\); \(\rho_{ij}\) - distance between the actual \(i\) and expected \(j\) values of an event \(x\) from implementation of the plan of skills development (retraining) under information uncertainty and risk.

At the same time B-entropy can be criterion for system of forecasting of efficiency of individual ET and measure of a discrepancy of the actual and planned parameters of influence of information flows and Internet resources on efficiency of the educational activity realized on the basis of IATS interfaced to Internet resources of an educational segment of on-line social network and wiki-technologies [4-5].

From positions of the theory of the genetic algorithms (GA) the great number of all possible individual ET can be considered as "population of chromosomes" in the frame of "selection by natural selection":

\[GA = \{p^0_i, N, P^T_i, T, L_{ij}, t\},\]

where \(P^0_i\) - initial set (population) of all possible (alternative) ET of educational experts; \(N\) - power of a set of all individually-defined ET; \(N = |P^T_I|\); \(P^T_i \in P^T_I\) - individual scenario \(k\) of realization of "populations ET" \(i\), being in "generation of evolution ET" \(T\); \(T = 0, 1, 2, \ldots\) - number "generations" of the experts with individually optimized ET for professional development (retraining) during "evolution" by "natural selection"; \(L_{ij}\) - educational efficiency of \(i\)-th ET realized by \(j\)-th user of educational support for PMD.

4. Possible threats

Free circulation of information gains global character and, together with distribution of on-line social networks, increase in frequency of cases of deviant behavior among the numerous contingents of Internet users can be accompanied by emergence and promotion of new cultural values of information society, deformation of outlook and mentality, loss of traditional moral values and social norms. Under conditions of the integrated labor markets, its virtualization, wide electronic education distribution efficiency and reliability of recognition of professional competencies and documents on education become of significant value. Educational credit technologies modernized to block-chain algorithms may
have substantial potential for corresponding successful practices. Thus, credits initially introduced as “a common educational currency” we suggest to convert into educational cryptocurrency.

**Conclusions**

Thus, for social and economic digital transformation requires development of IATS for optimization individual ET and scenarios on the basis of a specialized educational segment of on-line social network, web focused by OLAP and wiki-technologies provided with proper resistance [4] to influence of negative and destructive information content.

On the other hand, design of educational programs providing acquisition of new qualifications of the higher education in a master cycle as the most dynamic and coherent to modern integration processes becomes particularly important trend. We offered and implemented for the first time on educational space of the former Soviet Union the master program “Electronic Government” [6]. The proposed by us [7] program for the Eurasian integration has been implemented in the Tomsk State University (Russia) as international Master’s degree program in "Digital economy and artificial intelligence" has been developed and the program for the Eurasian integration is implemented in the Tomsk State University (Russia).

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