

Management of a Network Interaction of Educational Organisations Oriented to Innovation Development

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Abstract

In this article, approaches towards the creation of a scientific and educational network integrating many dynamic interconnected agents that are voluntarily integrated in a network structure, which functions to be a virtual organisation and carries out specific innovation projects at a high level of coordination of purposes and integration of all types of resources are considered. In the conditions of a scientific and educational network, due to the action of nonlinear communications, there are processes of a coevolution, having such characteristics that a general rate of participants' development during interaction becomes higher than before consolidation. It was shown that scientific as well as consulting support of project activities for forming contents and the organisation of education in a universum of innovation culture was an integrative basis of consolidation of participants of network interaction. The basic principles of self-organisation of the organisations in the conditions of a scientific and educational network are described. The main opportunities and problems of the development of a network are provided.

Keywords: Network Interaction, Scientific and Educational Network, Self-Organisation

1. Introduction

The results of complex researches in a modern social and cultural environment allows for formulating a conclusion regarding the emergence of a new image of the world: open and elaborate, continuously arising and changing¹⁻⁴. This situation is treated by modern researchers to be a transition from classical to neoclassical and in separate areas - to a post-neoclassical picture of the world, particularly: from objects to the relations between objects, from a cult of determinations to uncertainty and ambiguity, from uniqueness to plurality of interpretations, from totality to self-organisation. warned that, '... tension and deformations behind thresholds of dynamic stability lead to sudden changes ... It is quite possible that now we come nearer to the century of bifurcations'⁵. In this regard, the number of new tasks in the field of education was caused by high-quality changes as the external sociocultural environment steadily increases. According

to a number of authors, there is a new type of scientific character in education – a scientific character of a project and program type⁶ is currently forming. Its centre is the activity of design and programming that develops a not yet existing practice of education. Within this type of scientific character, the concept of a practically oriented science, which has as its subject the development of certain communities and contents, of which they are their own forms. The creation of a practically oriented science in the field of education is impossible without simultaneous and a parallel forming scientific oriented practice^{7,8}. In recent years, works that testify the role of the main mechanism in the development of innovation processes in education passes to cooperation in its highest, collaborative forms when it is connected with continuous coordination of actions of the participants group, providing a synergy of their joint efforts appeared^{9,10}. In this regard, in the last 10 years, the Russian State Professional and Pedagogical University, together with the Russian Academy of

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Education, conducts system activities for the development of a network interaction for educational organisations and enterprises in the form of a scientific and educational network^{11,12}.

2. Materials and Methods

In this research, the theoretical basis of management for the development of a scientific and educational network was based on a synthesis of the theory of network interaction, an anthropological approach to the management of educational innovations, systematic, functional, and synergy approaches. The main theoretical methods are theoretical and methodological analysis, as well as modelling. Empirical methods were based on a research and synthesis of the effective experience of the application of a network approach, supervision, questioning and an expert's assessment¹⁻²⁰.

3. Results

The scientific and educational network is considered by us to be a dynamic great number of interconnected agents that are voluntarily integrated in a network structure that functions to be the virtual organisation, which carries out specific innovation projects in the field of education at a high level of coordination for the purposes and integration of all types of resources. Scientific and practical results of interaction are reached by means of forming and developing internal information space of a scientific and educational network that provides the creation of collective objects of intellectual property and increases in external effects¹². The consulting support of project activities for forming the contents and the organisation of education in a universum of the innovation culture was shown in the form of all types of the consulting help when developing educational programs, research and managerial projects, with increases of methodological culture for participants during educational sessions in a scientific and educational network being an integrative basis of consolidation of participants. We consider a scientific and educational network to be a joint organisational fund for the participants of interaction. Forming the fund of participants occurs by transferring individual knowledge in intra-network knowledge and fixing in a corporate base of a scientific and educational network. It should be noted that participants of the interaction are independent, and

the relations between them were established within long-term contractual obligations on a voluntary basis. The resources that are saved up in a network, in our opinion, are effective instruments for the active development of educational organisations in remote territories.

The new paradigm of management considers both certain participants of the interaction and a network structure in general to be open self-organising systems possessing emergent properties, with management that requires knowledge and a correct application of synergetic principles for the purpose of productive use of potential self-organisation^{3,13,16,18,19}. Regarding a scientific and educational network, we will understand it to be the self-organisation property of the system to self-develop by means of, 'cultivation' for new, more durable managerial structures. We understand that the capability of participants' interaction for "self-cultivation" of internal resources of the personal structures of consciousness gives a humane sense of own activity to be pedagogical self-organisation. Conceptualisation of processes of self-organisation of management for educational organisation in the conditions of a scientific and educational network is rather difficult, and is defined among other components by the following basic principles:

- Openness, which are inclusions in management processes of synergy ideas of openness of the world, integrity and coherence of a person, nature and society, an appeal to world outlook and semantic models, installation of subjects of management on a most important task.
- Subjectivity, which is management promoting updating of internal creative activity of the personality.
- The formation that is expressed in change of a ratio of chaos and an order in management processes, which interaction opens an image of the subject turning from potentiality into relevance in the process of complicating its forms of existence.
- A valuable and personal approach of management in which efficiency of self-organisation growth directly depends on development of the relations of trust, mutual respect, mutual assistance with knowledge and experience of participants of educational process, and not just a small number of people participating in management processes are involved.
- The nonlinearity that is based on provision that the sum of managerial influences is not always equal to their result.

Organisational and managerial schemes of a network interaction are built concerning each specific organisation integrated into a scientific and educational network. The increased efficiency of a self-organisation of participants of interactions for an achievement of the set purposes is reached on the account of:

- Opportunities to build the relations not only on its own behalf, but also from a scientific and educational network in general because being representative of network organisation has a corresponding corporate business status.
- Declarations by an organisation of the main information resources and sources, determinations in coordination with other participants of a network of the principles of their use in common or private goals. It conducts towards growth of potential information for each participant without additional costs.
- Expansions of communication infrastructure.
- Associations of different types of material resources for members of a scientific and educational network for the sake of achieving a common goal. For example, forming a joint research budget, corporate advertising, etc.

For the last three years, pedagogical collectives of a scientific and educational network integrate more than 70 educational organisations and the industrial enterprises held more than 600 open events, participants of interaction took an active part in presenting the results of their own activity during academic and research conferences and forums at different levels. The innovation activity of a scientific and educational network was awarded with the Grand Prix, 'A pearl of Russian education'. All-Russian professional tender had, 'Innovatics in Education'.

4. Discussion

We consider that in open educational systems, a network interaction is directed to support a steady self-development of participants. It is known that a network interaction is based on a synergism strategy¹³, which is the reception of competitive advantages due to a consolidation of efforts for two or bigger numbers in organisations¹³. The availability of an effect of a synergism as well as an ability to manage this effect creates a specific competitive advantage for participants in a network interaction, which is shown at the level of specific organisations and enterprises. Eventually, network interaction is sold in different markets

of education or in the form of a decrease in level of costs, or alternatively in the form of acquisition byproducts' (in our case, educational services) unique properties. The strategy of a synergism assumes an increase in efficiency of activity due to a joint use of resources (a synergy of technologies and costs) and fields of activity (a synergy of planning and management). Moreover, it is necessary to consider that the synergy effect, however potentially big it was, will not be shown in itself, it needs to be planned and taken, and consecutive work on research of opportunities of a network interaction in education for this purpose is necessary. A broad educational practice within a scientific and educational network testifies that the effect of joint activity is always higher than the simple sum of individual efforts due to the growth of potential cooperation and expansion of interrelations. Therefore, in a scientific and educational network, the new property (an intellectual product) and the collective owner are formed. We should also remember that network management is based on specific scientific laws in which it is necessary to rely on the development of a scientific and educational network:

- In network organisations, the thermodynamic law fully works: 'The more methods by which the expected or desirable state can be reached, the higher its probability is'.
- The law, 'a phenomenon of the close world' is inherent to networks. In regards to how geographically widely the system was not distributed, as well as what capacity of a continuum it would not have, the maximum number of separations in a network will be no more than six, i.e. any network can be passed for 6 steps¹⁴. This property of network communication received the name, '6 steps of separation'. 'A phenomenon of the close world' is possible only on borders of the order that is responsible for stability and chaos, and therefore, stimulating development. It is noted that a property of 'the close world' possess not all networks, but only those in which the degree of a clustering and a small average length between nodes is high. The educational organisations and the enterprises, temporary creative collectives and groups, etc. act to be the last in our case.
- Network structures will be organised according to the law of scale-free networks. The property of scale-free networks does not mean the network sizes, but the mobility of its internal structure. Communications between cells of a network are distributed under

Tsipfa-Pareto's law. In one situation, the specific node of a network can have one number of communications, in another – a different number.

- Sedate (fractal) distribution is also a reason for emergence in a network of widely known phenomena of concentration and dispersion. It is possible to give emergence to a set of new technologies, acceptances and methods, scientific works being an example of a phenomenon of concentration (projects, uch. programs, etc.) in separate organisations of a scientific and educational network. The phenomenon of dispersion consists of an instant distribution of the staticised product among a large array of participants in interaction¹⁵.

In the case of a scientific and educational network, mechanisms of interaction between network nodes - the specific organisations define the principles of self-control. Each participant has a certain functionality and its contents, which according to the law of synergy described above can amplify in network interaction. A basis of functioning of a network are specific projects ('temporary communications') created on the basis of a network interaction for a solution period of a scientific and educational network for a task facing members. Therefore, vertical communications and taxonomies network nodes can change depending on the solved problem. Therefore, participants are unique nodes of a scientific and educational network that enter interaction on the following points: creation of joint programs, distributed training organisations, accomplishing scientific projects, holding an academic and research conference on a problem, etc. The solution of a task will be followed by changes in mechanisms of relationship between network elements: each new task can lead to forming a temporary hierarchical structure or some taxonomy. This methodology explains that the principles of functioning are the created distributed structure of network interaction, which defines functionality of network participants. Within the developed model, a network interaction is organised mainly on the basis of information and communication technologies (soft - power - technology)^{12,17}. Choosing this approach was based on the available experience of application of network interaction at creation and operation of the sites, portals, telecommunication networks, etc. Because an elementary unit of network interaction, the educational organisation or the industrial enterprise, which acts:

implementing innovation educational programs, having research experience, experimental and project activity of participants, building their own conceptual model of innovation behaviour, having a positive status in surrounding society, possessing a certain investment appeal, and also are guided by the advanced approaches as well as technologies of formation and tool maintenance for a new type of educational content.

5. Conclusion

In the conditions of a scientific and educational network due to the action of nonlinear communications, there are processes of a coevolution, having these characteristics that the general rate of development of participants during interaction becomes higher than before the consolidation. The sustainable development of a network interaction is provided with the following benefits of integration: network interaction allows to solve in complex pedagogical problems that are difficult to solve for some organisations. Participants of interaction see different methods of a solution for a common problem from colleagues on interaction that allows them to understand the benefits and shortcomings, and also to strengthen their own author's position. Interchange by resources between participants of a network makes each participant steadier and more mobile, capable to solve complex system challenges through building system projects in a sheaf 'education - business - society'. Today, obvious problems in an organisation regarding scientific and educational networks are: imperfection of technical and technological support of network interaction, allocation of new pedagogical positions at participants of network interaction, searching mechanisms of promotion for innovative educational programs and mechanisms of support of network groups as well as their activity from municipal and regional authorities.

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6. References

1. Kastel's M. Information era: Economy, society and the culture. Moscow: HSE; 2000

2. Knyazeva EN, Kurdyumov of S. P. Sinergetik as new world vision: Dialogue with I. Prigozhin. *Philosophy Questions*. 1992; 12:3-20
3. Meller K, Raiala A. Growth of strategic networks - New models creation of value. *Russian Journal of Management*. 2003; 6(4):113-40.
4. Watts DJ. *Six degrees: The science of a connected age*. New York: W.W. Norton & Company; 2003. p. 83-100.
5. Laszlo E. *Ways, leaders in the future millennium*. *Problems and Prospects: VIET*. 1997; 4:87.
6. Petrovsky AV, Slobodchikov VI, Bim-Bud BM, Gromyko YV. Tasks and directions of reorganization of pedagogical science. *Psychology Questions*. 1989; 2:15-9.
7. Zagvyazinsky VI. Strategic reference points of development of domestic education and way of their realization. *Science and Education*. 2012; 4:3-12.
8. Sidenko AS. Innovative potential of the teacher. *National Education*. 2013; 1:121-7.
9. Dmitriyeva EA. From experience of training in network interaction of teachers and students of pedagogical higher education institution. *Science and Education*. 2015; 6:77-89.
10. Silkina NV, Vaganov NO. Features of the educational environment in network interaction of the educational organization with production. *Science and Education*. 2015; 6:63-77.
11. Davydova NN. Realization of system and synergetic approach in practice of management of development of a scientific and educational network. *Education and Science*. 2013; 7:66-84.
12. Fedorov VA, Davydova NN. Control of the research and education network development in modern socio pedagogical conditions. *Scientific Bulletin of a National Mining University*. 2014; 2:126-33.
13. Ansoff I, Campbell E, Lachs K. *Strategic Sinergizm*. St. Petersburg: SPb.; 2004. p. 36-58.
14. Milgram S. *Experiment in Social Psychology*. St. Petersburg; 2001.
15. Fedorov VA, Gapontsev VL, Gapontseva MG. Sinergetik in pedagogics: Expediency of transfer. *Science and Education*. 2008; 9(57):100-9.
16. Vos A. East European qualifications frameworks lead reforms in education. *Education and Science*. 2014; 6:149-54.
17. Krasavina Y, Al Akkad M. Developing professional information and communication skills through E-Projects. *Education and Science*. 2014; 10:93-102.
18. Nonaka I, Takeuchi H. *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford: Oxford University Press; 1999.
19. Thomson AM, Perry JL. Collaboration processes: Inside the black box. *Public Administration Review*. 2006; 66(1):20-32.
20. Rae KS, Tai KS, Jun CY. Environmental regulation, process innovation and social cohesion in Korea. *Indian Journal of Science and Technology*. 2015 Jul; 8(15). Doi no: 10.17485/ijst/2015/v8i15/72942