Stages of the information society and the prospects for coordination information education and education for sustainable development

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Abstract. Two concepts of future society arrangement are presented in this article: "Information Society" and "Sustainable Development". According to these concepts education for sustainable development (ESD) and the information education (IE) become the leading vectors of global education modernization. They induce systemic education changes, providing the new quality and the new educational goal – to create a culture of sustainable development of the information society. However, ways of interaction ESD and IE are still poorly understood and not implemented in practice. In this article methodological approaches are presented for coordination ESD and IE.

Trends of the modern civilization development indicate that the next replacement of model of socio-economic development is approaching, and this model with the need will be global. Globality - as one of the attributes of a holistic world - means a rapid spontaneous spread of local practices beyond the borders of states, cultures and languages. Global practices lead to global results affecting (sometimes negatively) on the lives of the current generation and the current state of the biosphere, as well as the quality of the future of the world for many years and perhaps centuries [1].

A number of researches are devoted to the concepts of future scenarios.

The concept of sustainable development includes an understanding that if human society doesn’t try to overcome the extensive way of development, to build an efficient economy, to abandon the predatory plundering of natural resources and environmental pollution, the life on Earth is going to meet with danger of disappearance [2].

Modern ecological crisis appears, first of all, as crisis of management. The imperatives of sustainable development require the formation of new mechanisms of management in global, national (federal) and regional scales.

The concept of a sustainable development is, first of all, the theory of management of self-organizing systems which are able to keep homeostasis and rate of development without external managing influences and inflow of resources from the outside. Ideas of sustainable development force the international community to seek ways out of our crisis, in order to turn off unwanted scenarios. We have to learn to operate the development, without causing irreparable damage for present or future generations.

G.P. Schedrovitski, the Russian philosopher, wrote about the main contradiction of our time: "Structures subordinated to the goals and mechanisms of human action, are deployed in definite direction. Natural structures subordinated to fundamentally different mechanisms resist the direction and format of the produced conversion, break out of the system activity, and often – just destroy it ... This is the interrelation between the social and natural structures that ... we have designated as "resistance of a material nature", it is the most generalized characteristic of any system activity "[3].

The result of the conflict between social management and self-regulation of natural and social-natural systems is presented as the exhaustion of homeostasis reserves of self-organized systems. Globally, such management conflicts manifest itself in the current environmental crisis – depletion of the main life resource on Earth: the resource of adaptation of living beings to the rapidly changing conditions of life.

Such society transition to the controlled development is the most important aspect for a global perspective.

Edgar Morin expressed the main aspect of globalization by the following way: "Humanity has ceased to be an abstract concept - it has become a community having a common destiny ..." [4].

The civilization choice of sustainable or unstable development occurs in the conditions of information transformation into a significant ecological factor. The society transition to sustainable development is connected with not only industrial or agricultural
resources, but, first of all, with information technologies and education based on knowledge.

Humanity is in a state of global changes caused by, among others, the rapid development of information environment and its impact on all aspects of human life: economy, politics, culture and social relations. The global information space has become a familiar (and sometimes primary) habitat for a growing number of people. De facto, we already live in the world of information objects and we are already such objects though still we don't understand it. As information objects we are presented at all points of space and time simultaneously – we communicate, conduct joint activities, participate in decisions affecting all mankind… Information work appears to be an everyday affair, cognitive and creative activity is becoming productive force and a source of well-being [5].

The post-nonclassical methodology and transdisciplinary approach provide the basis for connection of concepts that characterize forms (ways) of information representation in different spheres: humanitarian (knowledge, meanings, ideas, values), "technical" (information, content, data), general scientific (facts, data) [6].

Researchers allocate different stages of information society depending on dominating form of data representation in the society. According to this approach, such forms define the leading ways of activity, communication and decision-making at every stage.

Stages represent necessary sequence of society development. The improvement of the technological infrastructure is the preceding phase for the circulation of information data, and the latter, in turn, precedes the data-using phase.

Obviously the society of facts and data can not be determined before the 17th century. This phase lasted until the end of the 20th century. It was characterized by a priority attention of its dominant worldview to facts than to other forms of information presentation. This stage is corresponded to the book culture period (so-called "Gutenberg Galaxy"). Its requirements of mass education system are the following: universal literacy, "read-write-count", unifed training, sufficient for the development of labor skills.

Currently, we are witnessing a society transition to the next stage - the information society, which is based on knowledge, meanings and ideas. The transition is accompanied by dramatic changes in politics, public life and social regulation, jurisprudence and legal practice, areas of professional activity, personal and family relations, culture and the media. This step is correlated with future concepts such as "cognitive society", "creative society", "self-learning society", "smart society", "understanding society" and "society of sustainable development."

In general, the essence of these concepts of the social future is focused on the fact that the main source of its growth and prosperity is informational (cognitive, creative, spiritual) activity. Knowledge, meanings, ideas become the main resource and wealth of society development and its main character is presented as an "informational" (cognitive, creative) person. This means a radical restructuring of public institutions, first of all – mass education system.

Problems of information society based on knowledge and society of sustainable development, taken together in their interaction with educational trends, install the vector and themes of topical studies for theorists, analysts, philosophers and methodologists.

Science, education and production are fused into a single productive force. They are engaged in the production of knowledge and formation of new person – the carrier of knowledge [7]. In the "knowledge economy" professional requirements include the competence to create knowledge and to be open to new information ("open mind") as the basis for the well-being. Such informational forms as knowledge, meanings, ideas, cultural values are regarded to be the public domain (along with the natural heritage) [8].

In general, we can say that the development of the Information society contributes to the formation of a new ecological culture, and the ecological culture provides meanings and sustainability for information society. Greening and informatization in their relationship are the characteristic features of the survival strategy of human civilization, the elements of the new emerging consciousness. It turns out obvious that high-tech without high-hume is pointless. The civilization of a sustainable development in essence will be informational and ecological society [9,10].

In such circumstances, education for sustainable development (ESD) and information education (IE) become the leading international vectors of education in the 21st century. The result of their interpenetration could be the formation of a culture of sustainable development of the information society based on knowledge, meanings and senses.

Information education is a vector of education, which is aimed at the formation of common cultural competence. It is related to acquisition of knowledge and skills of work with information, personal computer, information and communication technologies. It is aimed at the elimination of informational and computer illiteracy, the formation of the basis of personal information culture.

However, the achievement of this goal cannot be achieved by introducing new subjects into curriculums, and documents of the UN often underlined this idea. We are talking about the social challenge to change human psychology, values, worldview - the task extremely complex and unprecedented in the scale of its implementation.

People will have to understand and to accept that there are objective laws of interaction between society and nature, which add the laws of nature and society, and concern not only the material and power, but also information sphere.

Finally, the transition from informational to ecological society and then to noosphere will depend on quality and convergence of ecological and information education [11].

In global world, ESD and IE become the priority areas of scientific and pedagogical knowledge and practice that influence the choice by civilization a way of
development. However, the field of ESD and IE interaction is still being formed.

Meanwhile, crossing areas of ESD and IE maintain the hidden relations, which give rise to new integrative areas of scientific search. First we mean their general methodological bases. It is concerned with an ecological discourse in informatics and a role of information processes and systems in sustainable / unstable development of the world [12].

However usually teachers of informatics don't see links between information processes and environmental problems. Traditional ecological education is limited to studying of material and energy resources for the solution of environmental problems. Information education is far from noosphere and humanistic orientation.

The ecological aspect of informatization is usually reduced to information security, and information aspects of ESD are limited by capabilities of ICT. Usually ESD "gets stuck" at the global level, and IE – on applied aspects.

The task of formation of personal informational and ecological culture as an immanent part of the culture for sustainable development isn’t present in the national curriculum. IE is focused on the technical and technological issues of information that torpedoes a "worldview" bridge making between the IE and ESD.

We consider that the most productive area of coordination ESD and IE might be a topic of management of self-organizing complex systems. It could initiate the intersection of ESD and IE, their interpenetration and cooperation – as a vector of their content, the general basis of their teaching systems, and the strategy of "greening" the whole school.

The basis of such interaction concerns:

- the general laws of the control and transmission of information in technical systems, living organisms and society;
- the use of automatic control and monitoring systems for the environment;
- computer systems of prediction and decision making for the management of social, economic and environmental systems;
- modeling of control systems, etc. [13]

However, identification of crossing topics ESD and IE does not clear up the question how to link their content. General cultural and philosophical ideas of SD and IE remain low understandable for schoolteachers.

Didactic barriers of convergence ESD and IT exist as well. The theory of designing of the common cultural, transdisiplinary and integrated contents remains developed insufficiently so far [14].

We considered management topic is a key to reorient all areas of school activity for the interests of sustainable development [15].

Whole-institutional approach to ESD and IE, recommended by UNESCO, means the reorientation of all types of activity of educational organization to the creation of a culture of sustainable development in the information society [16].

This process can go "from above" (based on initiatives of teachers, citizens, researchers, volunteers, etc.), or simultaneously in both directions. But in all cases, all ways are based on the general principles of sustainable development management of complex systems.

Our experiment has shown that management topic can become an attractor of processes of cooperation (and convergences) contents of ecological and information education for SD in comprehensive school.

To achieve it, this topic need to go through the following steps of adaptation to educational process: understanding ideas by participants of the educational process; "objectification" of their meanings by the contents of different subjects and subject areas; finding personal points; purposeful and meaningful actions [17].

Understanding of ESD and IE as the future management tool is critical in school today. But ideas of a sustainable development remain unknown for teachers. There are various reasons of this: political (hushing up problems in the media), psychological (strong consumer patterns of thinking and behavior), educational (it is difficult to adapt social and political purposes of ESD to teaching) and cultural (features of national thinking, way of life). We proved that the pedagogical solution of the problem relies on use of cognitive linguistics, an infografic and combination of science and archetypical matrices of culture.

To be understood and accepted by all, the ideas of SD management should be presented in the form of recognizable patterns of behavior. They have to be adapted to the personal (individual and collective) experience, national mentality, national education systems, priorities of sustainable development of the country, region and local community. Moreover, we have to consider that ideas SD may generate intrapersonal moral, emotional and cognitive dissonances and appear as "an implant from the future" [9].

We believe that the meta-language, based on cognitive metaphor, could act as semantic "bridge" between every day and scientific concepts [12]. It can help to avoid the cultural conflict between scientific ideas SD and archetypal codes of behavior (national values and traditions rooted in mass consciousness).

"Objectification", or specification of management ideas, as the area of crossing ESD and IE, is carried out with the help of the content of school subjects, personal experience of pupils and parental education. For parents, for example, recommendations were prepared about children’s education, their health, "green" home economy.

For schoolchildren, "objectification" means their skills and abilities to find out the value of "green" control in the content of different subjects and situations. For teachers it means to follow "ecological imperatives in pedagogy": to prevent management conflicts and to implement transdisciplinary relations on the base of key ideas ESD and IE.

Finding personal point of "green" management means the transition from the socio-cultural values of sustainable development to their personal senses. This is a process of forming meaningful relationships and
motives for SD, which are achieved by psychological and pedagogical technologies of meanings and senses.

Development and implementation of semantic installations of behavior is carried out through the situations of educational and social design in the educational environment. This is based on trainings personal behavior to change themselves and environment.

The main ideas of such a management experience are the following: "Before you control nature, learn to govern yourself" (N.N. Moiseev); “society's attitude to nature should be not spontaneous, but planned” (V.I. Vernadski), self-organizing systems require a “soft control” and principle of precaution (UN). The acquisition of such experience is provided by improvement of content, methods and forms of education, educational environment, ways of school life, participation in social practices of the local community for SD.

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