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**CONCEPT OF NOOSPHERIC EDUCATION: INNOVATIVE
METHODS FOR DEVELOPING PERSONAL COGNITIVE
STRATEGIES**

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Abstract

The “noospheric” ideas of a sustainable and harmonious coexistence of man and nature emerged in Russia as a result of its spiritual search for its own, unique way of survival and a long experience of preserving its identity throughout the history of the country's coexistence with Europe and Asia. The latest reforms in Russian education are aimed at developing professional competencies focused on the regional economy. The shift in the educational paradigm demonstrates the abandonment of methods for developing cognitive skills in favour of practical skills, rarely sought by students, which encourage discrete thinking. Social sciences and humanities are trying to preserve the foundations of Soviet pedagogy in understanding the systemic and integrative interaction of an individual with society and nature. The concept of noospheric education has generated some innovative methods for developing personal cognitive strategies. Their aim is to develop spiritual, moral and intellectual foundations for a child's personality by stimulating creative functions of the brain asymmetry. The continuous scientific information exchange contributes to a system of harmonious coexistence of man and nature, with the values of man's self-preservation and self-development together with nature, regarded as the system-forming factors. Providing opportunities for learners to develop their cognitive abilities of emotional and visual thinking and formal logical thinking lays spiritual, moral and intellectual foundations in a child's personality while stimulating creative functions of his or her brain. This article presents research data from a study of functional brain asymmetry in university students, carried out at Kemerovo State University.

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Keywords: Educational technologies, noospheric education, development of cognitive strategies, creativity, brain asymmetry.



1. Introduction

Intensive transformations of society striving towards its coevolution with nature are based on viewing universal human values as part of general, natural and cosmic laws of evolution that encourage a conscious refusal to contribute to global technogenic catastrophes in exchange for a manageable, sustainable, safe and harmonious coexistence of man and nature. Basic spiritual and moral values are cultivated in the educational environment. Educational technologies aiming to form a spiritual noospheric view of the world involve developing learners' creativity. The continuous scientific information exchange contributes to a system of harmonious coexistence of man and nature, with the values of man's self-preservation and self-development together with nature regarded as the system-forming factors. The "noospheric" ideas of a sustainable and harmonious relationship between man and nature have always been popular in Russian society striving to find its own unique way of survival at the times of economic turbulence or external threats.

Their popularity lies in the unique civilizational code of Russian spirituality resulting from a long history of Russia's self-preservation in its coexistence with Europe and Asia, its losses in the world wars, its history of diplomacy and betrayal, the double-standard policies of European powers, and a complex relationship between authorities and people in its society. Modern reforms in Russian education are focused on laying spiritual, moral and intellectual foundations in a child's personality. The social and political crisis in Russia of the 1990s demonstrated a necrophilic orientation of the soul (Fromm, 1973; 35) and the loss of ideological and cultural foundations that used to help adolescents develop into mature and active individuals.

Now that Russia is finding its way out of the crisis, the "noospheric" ideas are gradually becoming an important value for the national system of educational technologies, with the potential to restore the lost ties. The Noospheric Spiritual Ecological World Assembly promotes the spiritually oriented models of the educational process (Maslova, 2013, p.24). The system-forming factors of self-preservation and self-development of man together with nature (Earth, Gaia) create a need for an on-going scientific information exchange contributing to harmonious coexistence of man and nature. The isolation from the basic values of Russian self-identity, world outlook and collective memory, caused by a shift in the national educational paradigm, is a major obstacle to developing a versatile and harmonious "noospheric" personality. Instead, this shift promotes narrow subject specialisation, greatly limits face-to-face contact between teachers and students and increases the proportion of students' independent work, leading to fragmented basic knowledge and, therefore, to a fragmented vision of the world, nature, society and a human being. Taking into account the fact that basic spiritual and moral values are cultivated in the educational environment, it is very important, when introducing new bachelor and master programmes, to identify and define the core values of professional competences that could form a basis for spiritually oriented models of the noospheric educational process.

There is a good reason why the Russian education reformers have introduced a new block of general scientific humanities (such as the Concepts of Modern Natural Science, Philosophy, and the Methodology of Natural and Social Sciences) integrating natural and philosophical knowledge, and expanded the established programmes by adding new specialities, allowing colleges and universities to tailor the courses to the local (regional) needs or the parents' demand. Despite the differing opinions of

these reforms, we must agree that modern education in many ways provides the teacher with an opportunity to implement the advanced noospheric ideas for a sustainable development and a harmonious coexistence of man and nature, incorporate environmental, spiritual and moral aspects into the curricula, and use those technologies which can help learners develop a spiritual noospheric view of the world.

However, one should distinguish an introductory presentation of the ideas of a sustainable development and a harmonious coexistence of man and nature using specific educational technologies that develop creativity as a professional competence.

2. Problem Statement

Today, there is an urgent need for an alternative search for ways of a harmonious coexistence between man and nature outlined in the social concepts of the “noosphere” and “sustainable development” (F.Ya. Aizyatov, V.I. Danilov-Danilyan, K.Kh. Delokarov, B.E. Bolshakov, R.L. Braun, N.S. Kasimov, F.D. Demidov, M.Ch. Zalikhanov, B.I. Kozlov, V.A. Koptyug, O.L. Kuznetsov and others), “universal evolution” (B.A. Grushin, A.P. Nazaretyan, V.V. Krushanov, T.A. Ursul and others), “noospheric cosmism” (A.D. Ursul, A.E. Akimov, N.N. Moiseev, N.V. Maslov, G.P. Kovalev), and “noospherism” (N.P. Antonov, A.K. Adamov, S.I. Subetto, S.I. Grigoriev, V.N. Vasilenko, M.V. Zhulkov, P.N. Pesterov, K.K. Kolin, V.T. Pulyaev, G.S. Smirnov and others), whose analytical review was done by D.Yu. Trushnikov (Truschnikov, 2016).

The source of basic assumptions about a sustainable and harmonious coexistence of man and nature lies in the ontologically interrelated concepts of the Russian thinkers. However, an important factor in coevolutionary development is a society in which most members are intellectually developed individuals possessing highly spiritual and moral qualities. And it is a society of this kind that could become “an educational society that effectuates the law for an advanced development of people, educational systems and social intelligence” (Subetto, 2006, p. 15).

Following an open lecture on “Accelerating Start-ups in the Entrepreneurial University: StartX and the Paradox of Success at Stanford” given by Professor Henry Etzkowitz of Stanford University on October 17, 2014 at ITMO University, the idea of a ‘third mission’ of universities became a trajectory for reforming educational programmes at Russian universities. M. Marhl and A. Pausist define this mission as a new strategy using “a set of specific services based on actions and opportunities that serve the public good” (Marhl, Pausist, 2013). Their paper presents a system developed by PRIME OUE Project to measure universities’ involvement in the implementation of the third mission.

The system’s quantitative indicators of an effective implementation of the third mission by universities include an increase in patents, contracts with enterprises, research into social problems, involvement in the social and cultural life of the region, and an open transfer of knowledge to society (Allinson, 2013; Clark, 2004; Clark, 1998; Etzkowitz, 2003; Etzkowitz, Webster, 2000; Farsi, 2012). Today, during the methodological crisis of educational technologies, reforming higher education aims to design innovative methods for developing personal cognitive strategies, on the one hand, and to lay spiritual, moral and intellectual foundations in a child’s personality by stimulating creative functions of the brain asymmetry, on the other.

What defines a **methodology for developing personal cognitive strategies**? A methodology is an algorithm or a set of procedures (methods/actions) leading to the expected result - in our case, to the development of personal cognitive strategy skills (by synthesising the skills of sensory and emotional thinking and formal logical thinking).

- The communicative approach to developing cognitive brain functions is a traditional method of training and learning based on real communication between teachers and learners. Its success depends on the teacher's uniqueness and moral qualities.
- The learner-centred approach that aims to unlock the hidden potential of both individuals and groups views training as a dialogue between teachers and students and regards learning by independent problem-solving methods more effective than the traditional listening to the teacher's talk.
- Cognitive and behavioural techniques developed within the studies of personality development disorders (developmental pedagogy and psychology) demonstrate unique breakthrough opportunities for the development of personal cognitive strategies.

Each of those generalised techniques offers a focus on certain beliefs, ideas and strategies based on some specific pedagogical experience. All of them aim to develop one's sense of self and the other, including society and its structure, shape an individual's worldview and help them to understand their life plan, dreams, fears and feelings by applying different educational technologies for developing cognitive and behavioural strategies.

The **noosphere** (Greek *noos* 'mind') is a **new evolutionary state of the biosphere** (nature of the planet Earth) that includes the anthroposphere (human society) and is **based on the spiritually sensible genetic unity of the laws of biological life**.

- The noospheric cognitive strategy is based on the scheme "SIGN –SYMBOL – MEANING – SENSE – AWARENESS – PRACTICE" that shows a direction of cognition from the deep foundations of natural phenomena to the necessary changes in the coexistence between man and nature to sustain their harmonious relationship.
- The noospheric education is a process of implanting in learners cognitive strategies for a value-oriented joint development of man, society and nature, allowing people to satisfy their needs without causing damage to the future generations, nature and the cosmos (Truschnikov, 2016; Maslova, 2013, p. 24).

The noospheric innovative technologies create an educational environment that ensures a harmonious development of learners with the dominant right or left hemisphere by activating their previously unused brain functions.

Functional brain asymmetry, first pointed out by R. Sperry (1964; 1980, p. 195), refers to the performance of mental functions by the right and the left hemispheres.

- Each side of the brain is manifested in two signal systems: the right one is responsible for emotional and visual thinking, whereas the left one, for formal logical thinking.
- Brain asymmetries and the differences in the way our hemispheres operate to a great extent determine our cognitive abilities.
- Individual cognitive qualities are believed to be determined by different parts of the brain and to be congenital and difficult to correct.

Kemerovo State University has carried out a series of studies to look at the manifestations of functional brain asymmetry in schools and university students in relation to different social and psychological conditions of their educational environment.

3. Research Questions

The emphasis on the development of research competencies and professional skills in the higher education reforms has changed the definition of a “quality of university education.” According to R.O. Safronov, universities have been assigned a new social and economic role as centres of economic growth initiating the “second academic revolution” due to their partnerships with industrial enterprises, government structures and society (Safronov, 2013, p.198).

Today, the traditional university functions of teaching and research are no longer sufficient. There is a need for an institutionalized exchange between universities and society through the participation of the former (or its individual members) as a social institution in the social environmental and economic projects of the region (Gritskevich, 2016, p. 51). It is this new function of universities, in line with the concept of the third mission that forms an essential “humanistic core” of the university’s vocation, i.e. of a selfless service to society and nature.

3.1. It is therefore important to understand what kinds of students clearly demonstrate spiritual and moral qualities and whether highly intellectual individuals can form the basis for a coevolutionary development of society.

Studies of successful progressive reforms show that it is individuals with a strong sense of social responsibility and a desire to change the reality against the majority’s expectations that are prone to highly transformative and creative activities (Gritskevich, 2007, p. 155). Creativity (from Latin *creare* “to create”, from Proto-Indo-European *ker* “to grow”) is the most important quality of reformers publicly recognized as progressive. Creativity not only significantly affects an individual’s personality and the results of their activities, but also largely determines their social and psychological qualities. With regard to self-regulation, creativity activates the mechanisms of the action result acceptor at the psycho-physiological level, those of attitudes at the orientational-adaptational level, and goal-setting mechanisms at the cognitive-transformative level. The most vivid manifestation of creativity is in visual thinking, capable of making a rapid transition from one solution method to another. The intellectual (left hemisphere) correlates of creativity include critical thinking, scepticism and a high level of mental activity. Among the “non-intellectual” (right hemisphere) correlates there are synaesthesia (multimodal perception), extrasensory perception, intuition, imagination, pro- and retroscopy (foresight), etc.

3.2. What in the educational environment with noospheric technologies can contribute to a comprehensive (“proper”) development of a creative personality?

An individual’s creative attitude to their (potential) job reflects their needs for search and transformation and is a major determinant in the process of creation. It is about overcoming behavioural stereotypes and creating new, productive personality traits of an integrative and inclusive nature related to almost all the other traits.

3.3. Can one enhance students’ cognitive abilities of emotional and visual thinking and formal logical thinking by activating both hemispheres using the method for developing personal cognitive strategies?

Providing opportunities for learners to develop their cognitive abilities of emotional and visual thinking and formal logical thinking lays spiritual, moral and intellectual foundations in a child’s personality while stimulating creative functions of his or her brain.

4. Purpose of the Study

The purpose of this study was to identify some positive dynamics of quality indicators in education and in the development of creativity and personal cognitive strategies resulting from the use of kinesiological methods for correcting the functional brain asymmetry.

5. Research Methods

To achieve this purpose, the authors analysed various research data, including data from interdisciplinary studies of functional brain asymmetry. Today, the interhemispheric asymmetry of the brain is considered as a basic psychophysiological characteristic and a consistent pattern of its functioning (Sperry, 1980; Annett, 1995; Gershwind & Galaburda, 1987; Vargha-Khadem, 1979). The activity of the brain is based on the dialectical unity of two main aspects: functional brain asymmetry and the interaction between the two hemispheres in providing mental activity (Kimura, 1966; Ellis et al., 1988; Rastatter et al., 1987). Among the most relevant studies today, there are those of modelling complex multilayer neural networks of the cerebral hemispheres (Bianconi, 2015; Boccaletti et al., 2014; Kleineberg et al., 2016).

5.1. There are quite a few approaches and methods that correspond to the goals of noospheric pedagogy: the REAL-method, Waldorf/Steiner pedagogy (Paull, 2011; Nielsen, 2004), Vygotsky’s and his followers’ developmental education system (Wertsch et al., 1992; Feustein, 2003; Tzuriel, 2009).

5.2. In the context of this work, special attention should be turned to those methods which promote the correct formation and development of functional asymmetry in learners’ brain.

The authors used a number of methods for correcting functional brain asymmetry in students to analyse the final indicators. During our research, conducted at Kemerovo State University, the authors measured the efficiency of kinesiological methods for correcting the functional brain asymmetry in 36

ninth-formers. The correction programme was based on the classical manual (Denninson & Denninson, 2010) and included a set of 49 exercises. The whole cycle ran for 2 months, with a frequency of four 15-minute sessions a week. The cycle was preceded and followed by an evaluation of the functional brain asymmetry profile and academic performance (teachers' expert opinion and average grades in such basic subjects as Russian, mathematics, physics and a foreign language).

6. Findings

Under examination, there were 246 children (aged 8-10), 72 teenagers detained in the remand centre on suspicion of a crime, 114 teenagers registered for drug addiction and alcoholism (aged 13-16), and 185 first-year students doing different degrees at university. Twenty specially selected tests were used to measure their functional brain asymmetry and the total asymmetry was calculated by the formula:

$$A = \{(N_{\text{right-sided}} - N_{\text{left-sided}}) / N_{\text{total}}\} * 100\% \text{ (Goldschmidt, 2011).}$$

Table 01. The profile of functional brain asymmetry in primary school children with different types of training

Classes and training groups	MA%	SA%
Residents of the children's home since birth (n=25)	15,1±3,5	-1,2±3,7
Remedial (correction) classes (n=56)	17,9±2,8	1,3±4,4
Traditional classes, unsuccessful (n=27)	13,2±4,0	-14,8±5,2
Developmental, unsuccessful (n=30)	14,1±6,9	5,5±3,8
Traditional classes, successful (n=49)	21,0±2,5	-17,5±3,9
Developmental (Zankov) (n=22)	26,8±2,3	-6,9±5,3
Developmental (Davydov) (n=37)	22,5±4,1	-10,6±4,2

Note: MA – motor asymmetry, SA – sensory asymmetry (M±m). Positive values of functional brain asymmetry correspond to total “right-sidedness” (right-hemispheric dominance), negative values - to total “left-sidedness” (left-hemispheric dominance).

Table 02. The profile of functional brain asymmetry in first-year university students in different degree programmes

Degree specialisation	MA%	SA%
Physics and mathematics (n=61)	47,0±4,2	63,2±6,6
Natural science (n=22)	57,1±5,5	32,5±8,9
Philology (n=61)	51,3±3,6	49,7±8,6
History (n=41)	39,4±7,2	35,5±8,7
Control group, performance in final exams (n=15)	25,0±5,9	4,5±5,7

Table 03. The profile of functional brain asymmetry in adolescents with addictive and delinquent behaviour

Addictive and delinquent behaviour, gender	MA%	SA%
Female murderers (n=6)	4,7±16,2	-1,7±9,5
Female thieves (n=7)	20,3±10,8	20,6±7,8
Male thieves (n=32)	20,6±4,9	24,5±4,5
Opium addicts (n=27)	32,0±4,8	9,1±7,7
Male murderers (n=12)	35,8±9,7	19,8±9,1
Male robbers (n=17)	42,8±6,7	21,8±6,2
Alcoholics (n=11)	66,6±7,7	63,5±9,5

Below there are some brief findings (see Goldschmidt, 2007; Goldschmidt, 2011 for a detailed analysis of all the results):

- 6.1.** Good performance among the children at primary school age corresponds to the profile “right-brain motor dominance – left-brain sensory dominance”, whereas poor performance corresponds to the profile “weak right-brain motor skills – left-brain sensory dominance or ambidextrous sensory function”.
- 6.2.** The first-year university students in different degree programmes demonstrated good performance (especially in the logical, rational sphere), corresponding to the profile “right-brain motor dominance - right-brain sensory dominance”; however, those in humanities showed a lower degree of right-sidedness, and the control group (standardised educational programmes) showed almost no sensory asymmetry;
- 6.3.** In the group of adolescents with addictive and delinquent behaviour, the authors found a high degree of ambidexterity in female murderers, a low degree of right-brain sensory dominance in opium addicts, and a high level of right-brain dominance in male robbers and murderers, especially in alcoholics. Studies show a sharp increase in left-hemispheric thinking and suppression of right-hemispheric thinking in the latter (Novikova, 2012).

These findings clearly demonstrate a connection between the profile of functional brain asymmetry and the level of mental development and social adaptation in school and university students.

The next step was to apply a number of innovative methods of noospheric education, namely:

- the communicative approach to developing cognitive functions of the brain based on genuine communication between teachers and learners;
- the learner-centred approach aiming to unlock the hidden problem-solving potential in both individuals and groups; and
- cognitive and behavioural techniques activating the creative potential of an individual.

When trying out the noospheric methods for developing cognitive strategies in the study groups, the emphasis was placed on developing the students’ creative abilities, encouraging them to use those brain functions which they use well in everyday life and, at the same time, stimulating their reflective thinking skills to enable them to find new intellectual ways of solving non-standard problems. This

brought about some changes in the students' views in the following key areas of reflection: ideas about oneself and others, including society and its structure; the world outlook and its value component; understanding one's life plan, having a dream, awareness of one's fears and feelings. The activation of reflective skills made it possible to apply educational technologies in developing cognitive and behavioural strategies and help the students to acquire new cognitive skills and improve the less developed ones.

Table 04. Changes in academic performance resulting from the correction of functional brain asymmetry

Correction	Not performed (16 people)			Performed (20 people)		
Academic performance	Deteriorated	The same	Improved	Deteriorated	The same	Improved
%	44	44	12	25	20	55

There should be improvement in the students' academic performance, whereas in its absence the students hardly make any progress.

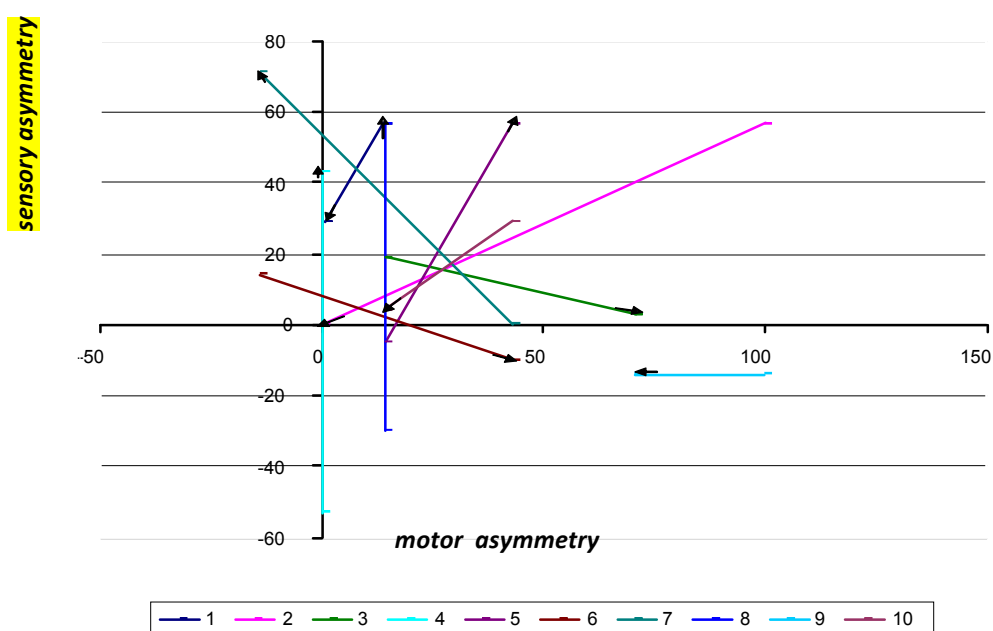


Figure 01. The vectors of change in the profile of functional brain asymmetry in students with no improvement in performance after correction

The figure shows that the vector of change in the functional brain asymmetry of most schoolchildren whose performance did not improve after the correction (and they did show some changes) is directed from the relatively optimal zone “right-brain motor dominance – right-brain sensory dominance”, which can be seen as a confirmation of the validity of the study results.

7. Conclusion

Due to significant differences in the initial asymmetry values, the correction results were presented as vectors, which initial values correspond to the initial asymmetry and final values – to the corrected asymmetry (measured after the correction). Fig. 2 shows the vectors of change in the profile of functional brain asymmetry in those students who improved their performance after a course of correction.

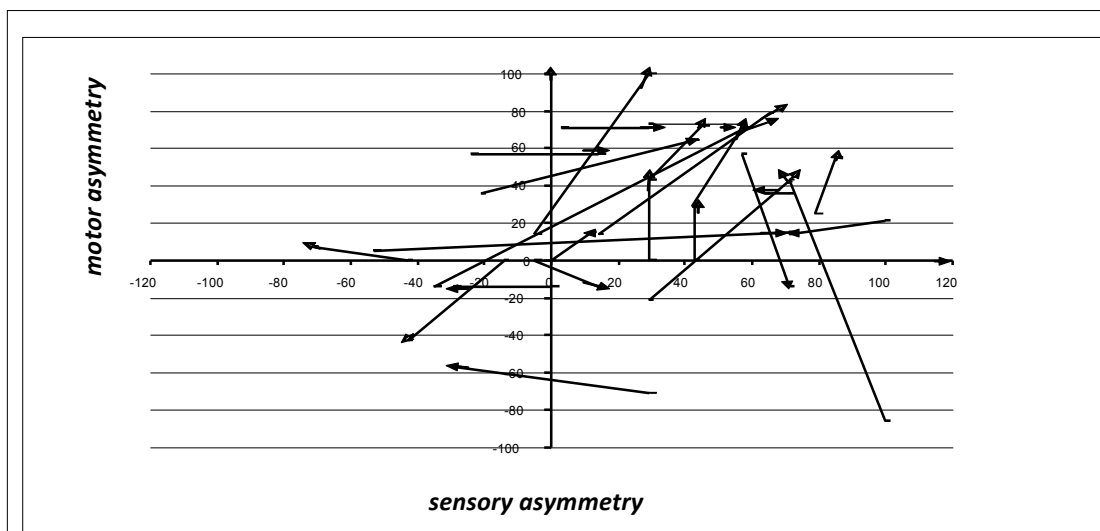


Figure 02. The vectors of change in the profile of functional brain asymmetry in students with improved performance after correction, % (see above)

Although the initial asymmetries in the majority of students are concentrated in the right upper quadrant of the diagram (the profile of functional asymmetry with right-brain motor and sensory dominance), quite a large number of them occupy the remaining three quadrants and the transition zones, which can be interpreted as the presence of individual cognitive strategies. Innovative methods for developing personal cognitive strategies were devised in line with the concept of noospheric education. Their aim is to lay spiritual, moral and intellectual foundations in a child's personality by stimulating creative functions of the brain asymmetry.

The further monitoring of the students for several months showed mostly the same results (changes in the functional asymmetry of the brain and improved academic performance).

The Soviet philosopher E. Ilyenkov said that a personality is determined by all those real and active connections that an individual makes at the material and bodily level with any other individual who lives in society and enters into social relations. This leads us to a few conclusions.

First of all, the personality of a future professional is shaped *in the sensorial and representational manifestations of creative research activity*. The development of creativity is stimulated by the use of new educational technologies aiming to realize the “noospheric” ideas of a sustainable development and a harmonious coexistence of man and nature, to promote continuation of education, to transfer technology and growth of innovation, and to encourage professionals to maintain links with universities in production and in the social life of the region.

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