An Imperative of a Poorly Recognized Existential Risk: Early Socialization of Smart Young Generation in Information Society

Vladimir A. Fomichov
Faculty of Business Informatics, National Research University Higher School of Economics
Kirpichnaya str. 33, 105187 Moscow, Russia;
E-mail: vfomichov@hse.ru; Web: http://www.hse.ru/en/org/persons/67739

Olga S. Fomichova
State Educational Centre "Dialogue of Sciences", Universitetsky prospect 5, 119296 Moscow, Russia
E-mail: vfomichov@gmail.com

The birth of this paper was motivated by the foundation in July 2013 of the Centre for the Study of Existential Risk (CSER) at the University of Cambridge (UK). The first aim of the paper is to attract the attention of the researchers and educators throughout the world to a poorly recognized kind of existential risk: it is the dangerous consequences of misusing the information and communication technologies by adolescents in the context of permanently increasing intelligent capabilities of computers and an easy access to Internet. The second, principal aim of this paper is to propose a constructive way out: it is earlier than usually socialization of children in order to inscribe a deep awareness of social responsibility into the conceptual picture of the child and adolescent and to enable him/her to analyse the consequences of the fulfilled actions. The proposed way out is elaborated under the framework of a new scientific discipline called cognitonics. This way is provided by the System of the Methods of Emotional-Imaginative Teaching (the EIT-system). The constructive core of this paper consists of two parts. The first part considerably expands the Level of Consciousness model proposed by P.D. Zelazo in 2004. It considers fours levels of the development of conscious control of thought, emotion, and action and covers the child's age from one to four years. Our model is based on the EIT-system and introduces three additional levels, where the seventh level is called the level of enhanced awareness of social agreements and social responsibility. Our model covers the ages from five – six to 13 – 14 years. The second part of this paper's constructive core presents a new look at the process of education when the values of the student act like a lighthouse for the teacher at the moment of presenting material and arranging the process of education, the process of acquiring knowledge.
Povzetek: Kako socializirati mlado generacijo v informacijski družbi?

1   Introduction

The technical characteristics of computers have been improving since their birth and their intelligent capabilities since the end of the 1960s, when the scientific-technical field "artificial intelligence" was born. Now computer systems are able to understand a broad range of texts in natural language (English, Russian, Chinese, Japanese, etc.), to recognize visual images, and to do a lot of other things.

The considerations of the kind became the reason for introducing in 1993 the notion of singularity by V. Vinge [30], a scientific fiction writer. It is the moment when intelligent capabilities of computer systems will exceed the capabilities of human beings, and the further development of computer systems will be determined by the needs of the global family of computers but not by the humans. The starting point for V. Vinge was the ideas initially formulated by John von Neumann and I.J. Good [18]. Later the term "the singularity" was popularized by R. Kurzweil [22], an inventor and futurist.

The achievements obtained during last decades on the way of designing intelligent computer systems and in several other fields, in particular, in genetics, biotechnology, nanotechnology, became the reasons for introducing the notion of existential risk and for founding in July 2013 the Centre for the Study of Existential Risk (CSER) [3] as a research centre at the University of Cambridge (UK). Now CSER is hosted within the Cambridge's Centre for Research in the Arts, Social Sciences, and Humanities. The goal of CSER is to study

possible catastrophic threats caused by the existing or future technology. The co-founders of CSER are Dr. Huw Price (Bertrand Russell Professor of Philosophy, Cambridge), Dr. Marteen Rees (an Emeritus Professor of Cosmology and Astrophysics, Cambridge and former President of the Royal Society), and Jaan Tallinn (a computer programmer and a co-founder of Skype) [3, 20, 23].

Professor Price expressed the opinion that "sometime in this or the next century intelligence will escape from the constraints of biology". In this case "we're no longer the smartest things around, and may be at the mercy of "the machines that are not malicious, but machines whose interests don't include us" [20]. According to Price, many people consider his concerns as far-fetched. However, since the risks are very serious and we don't know the time parameters, it is necessary to put the problem into the focus of attention of international scientific community [20].

We completely agree with this opinion. However, we believe that there exists at least one additional kind of existential risk, and it is poorly recognized by international scientific community. This practically unnoticed global problem is the expanding negative consequences of misusing information and communication technologies (ICT) by a part of smart young generation. During last decade, one has been able to observe numerous cases when the hackers-teenagers managed to cause a very considerable damage to significant social objects and even military objects.

Let's consider a risk that can emerge many years before the singularity. We will take into account the well known fact: the technical characteristics of computers double every two years. Imagine that one or several decades later a person with high computer skills (may be, an adolescent or a group of adolescents) will pose a socially dangerous task to a multi-agent system consisting of the future computers with very high intelligent capabilities. Then the damage from achieving the formulated goal may be very high, even immensely high.

In other words, it is easy to assume that a person (regardless the age, spiritual maturity which includes the developed feeling of responsibility, intelligence maturity, which suggests the improved cognitive mechanisms of information processing) will be able to take power and influence the life of community, society, people all over the world due to his/her well-improved skills of using various ICT. It may happen even with school children, because every new generation born in the information society (IS) is much more skilful than the previous one, and they have much more time to improve their skills, because since the early childhood it is as usual as walk and talk for all the children.

On the other hand, the curiosity and strong aspiration to discover the digital world are underpinned by the common (for their age) desire to emulate grown-ups and become as smart and powerful as grown-ups are, or even much smarter and much more powerful in comparison with the people belonging to previous generations.

Even nowadays the teachers in various countries complain that school children are smarter and more skilful as they are. It discourages the teachers and makes the relationships with school children of the kind much more complicated.

In various countries throughout the world, there is an age requirement for allowing an adolescent to drive a car. Obviously, the reason is dramatic consequences both for other people and for the young person in case a socially immature or a technically insufficiently qualified person will drive a car.

In the modern IS, a considerable part of teenagers possesses very high computer skills, and they have access to Internet and its immense technical possibilities. But very often these teenagers are socially rather immature.

For instance, UK is the country where the term "screenager" (instead of "teenager") was born [25]. It means that very many teenagers in UK spend much more time for the communication with computers than with people. This fact allows us to conjecture that very many teenagers in UK possess high computer skills. However, the psychologists discovered in 2013 that many boys and girls at the age from 18 until approximately 25 years are rather socially immature (see Figure 1) and should be treated by the psychologists as teenagers. A part of university students living in one home with their parents considerably increased. The parents were recommended to increase the socialization of their children – students by means of asking them to wash their dresses, to pay various receipts, etc. [31]. Taking this situation into account, we may imagine the cases of misusing ICT not due to any bad intention but because the consequences have not been thought over in detail.

The problem looks like an iceberg, and the humans in general way may become the passengers of "Titannik", because they don't expert an iceberg on the way.

This paper continues the line of the articles [9, 10, 15]. Metaphorically speaking, the aim of this series of publications and of this paper is to propose the kind and the parameters of a manoeuvre preventing the collision of our information society with the iceberg of described sort. This manoeuvre is much earlier socialization of children than it is done now throughout the world; that is, it is a way of early and deep inscription of the notion "responsibility" into the child's conceptual picture.
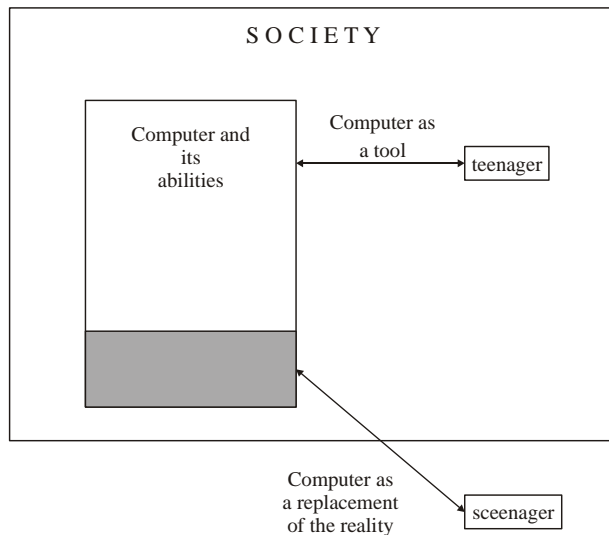
Figure 1: Screenagers and society

Our key idea is to inscribe into the world's conceptual picture of the child a deep awareness of social agreements and the feeling of social responsibility *before* the transition age 11 – 12 years (before the age of conflicts and evoking sexuality). The proposed way of early children's socialization has been elaborated under the framework of Cognitonics [8-12]. It is a new scientific discipline, its first aim is explicating the distortions in the development of the personality and national cultures caused by the peculiarities of information society and globalization. The second (principal) aim of Cognitonics is coping with these distortions in different fields by means of elaborating systemic solutions for compensating the negative implications for the personality and society of the stormy development of ICT and globalization processes, in particular, for creating cognitive-cultural preconditions of the harmonic development of the personality in the information society and for ensuring the successive development of national cultures and national languages.

The goals and ideas of Cognitonics have evoked a vivid interest of the scholars from over 20 countries located in Africa, Asia, Europe, North America and South America. Due to this interest, three successful international scientific conferences on Cognitonics were organized in the years 2009, 2011, 2013 under the framework of the international scientific multiconference "Information Society" (Slovenia, Ljubljana, Jozef Stefan Institute) [1, 2, 16].

The constructive core of this paper consists of two parts. The first part (Sections 2 – 6) considerably expands the Level of Consciousness model proposed by P. D. Zelazo in 2004 [32]. It considers fours levels of the development of conscious control of thought, emotion, and action and covers the child's age from one to four years. Our model introduces three additional levels, when the seventh level is called the level of enhanced awareness of social agreements and social responsibility. Our model covers the ages from five – six to 13 – 14 years.

The second part (Sections 7 – 11) of this paper's constructive core presents a new look at the process of education when the values of the student act like a lighthouse for the teacher at the moment of presenting material and arranging the process of education, the process of acquiring knowledge. Four discoveries underpinning the proposed complex method of early socialization of children in modern IS are described. *The first discovery* is the fundamental conclusion that young children and adolescents can be attributed to one of two groups (children with preponderance of material values and children with preponderance of sublime values), and different methods of teaching should be developed and used for achieving educational success for each of these two groups.

The second discovery is an original method of splitting young children in two groups of mentioned kinds. *The third discovery* is two developed different practical approaches to teaching allowing to achieve educational success for each of two groups. *The fourth discovery* is the proposed notion of cognitive engagement and original methods enabling a teacher to successfully reach the goals of teaching in each of two groups by means of realizing cognitive engagement of students at lessons. As a result, a new psychological and educational paradigm is presented.

2 Central ideas of positive psychology movement

Let's consider a broad scientific context being most appropriate for stating and assessing our original, many-staged method of early children's socialization. During the 1990s, it was possible to observe the steady growth of the number of children at school age in the developed countries encountering various social, emotional, and behavioral problems. Numerous observations provide the possibility to conjecture that, to a large extent, it was a consequence of more intensive interaction with computers at lessons and at home and of stormy Internet's expansion. Besides, the criminal films and horror films continued to negatively influence the mental state of very many children and adolescents, in particular, causing anxiety and aggression. These negative shifts became sufficiently noticeable by the beginning of the 2000s. According to [28], approximately one fifth of children and adolescents experienced problems showing their need for mental health services.

One of the consequences of this conclusion was the increased attention of the scholars to clarifying the extent of exposure to and use of media and electronic technology by very young children. A large-scale study described in [29] showed, in particular, the following alarming facts: (a) 27% of 5-6-year-old children used a computer during 50 minutes on average on a typical day; (b) more than one third of 3- to 6-year olds also have a television in their bedroom; 54% adults said that it frees up other TV in the house, that is why other family members can watch their own shows, 38% of adults

indicated that it keeps the child occupied, so the parents can do things around the house.

As a principal way out in the current situation with mental health of the young generation, many psychologists indicated the importance of promoting children's social and emotional experience in schools. As a consequence, a new paradigmatic shift was observed in psychology: a shift from the accent on repairing weakness to the enhancement of positive qualities and preventing the problems before the moment when these problems arise [27]. As a result, the positive psychology movement was born, the principal objective of this movement is studying the positive features of humans development, in particular, investigating such significant traits of the person as "subjective well-being, optimism, happiness, and self-determination" [27, p. 9].

As a logical consequence, the task of promoting positive emotions in children and adolescents was posed [19]. The evidence obtained in the 2000s shows that a critical role in the success of children in school and in their social and emotional competence is played by self-regulation, in particular, by controlling attention and inhibiting aggressive reactions.

The publications on positive psychology allow to distinguish a factor being beneficial to well-being, this factor is called *mindfulness* [21]. According to the definition given in [24], it is a way of directing attention. Generalizing a number of available definitions of this concept, mindfulness can be characterized as the ability to maximally proceed from the context while taking decisions in any situations. It is the ability of paying attention to many details while elaborating a decision but not only "mechanically" following a number of prescribed rules, etc.

3   The key role of broad beauty appreciation

The analysis of scientific literature provides weighty grounds for concluding that the first educational system satisfying the criteria of a mindfulness-based program was born and well tested several years before the emergence of the term "mindfulness-based educational program". Such criteria are satisfied by the system of the methods of emotional-imaginative teaching (the EIT-system). The core of the EIT-system was elaborated by O.S. Fomichova in the first half of the 1990s and has been expanded in the second half of the 1990s and in the 2000s. This system is underpinned by our Theory of Dynamic Conceptual Mappings (the DCM-theory). This theory is stated in numerous publications both in English and Russian, in particular, in [5 - 15]. Both the DCM-theory and the EIT-methods form a principal part of the cognitonics constructive core.

The main component of the DCM-theory is an original informational-aesthetic conception of developing the cognitive-emotional sphere of the learners: young children, adolescents, and university students [6, 7, 9, 10].

On the one hand, this conception says that it is important to actively develop a broad spectrum of the learners' information processing skills. On the other hand, our conception has a number of original features. First of all, it is the idea of the necessity of inscribing, in a systemic way, the feeling of beauty into the world's conceptual picture of the child. Proceeding from our experience accumulated during 23 years, we consider the following educational processes as the principal instruments of achieving this goal: (a) early support and development of figurative (or metaphoric) reasoning; (b) teaching young children (at the age of 5 – 6) very beautiful language constructions for expressing the impressions from the nature; (c) a unified symbolic approach to teaching natural language (mother tongue and a foreign language), the language of painting, and the language of dance [6 - 15].

The next central idea is the conclusion about the necessity of passing ahead the development of soul in comparison with the development of reasoning skills. A well-developed feeling of beauty plays an especially significant role in the realization of this idea. Besides, it is very important to be aware of the fact that children should have enough time for the development of soul: the time for contemplation, for imbibing the beauty of the nature, etc., i.e. children should have time for self-paced activity [7, 14].

Much more information about our informational-aesthetic conception of developing the cognitive-emotional sphere of the learners can be found in [6, 7, 9, 10, 13, 14].

For the realization of these ideas, an interdisciplinary educational program has been developed by O.S. Fomichova. The elaborated program is intended for teaching children during twelve years, where the starting age is five to six years. The program has been personally tested in Moscow with permanent success by O.S. Fomichova over a period of 24 years. The total number of successfully taught students (young children and adolescents) exceeds nine hundred.

The program is implemented at extra-scholastic lessons of a foreign language (English), literature and poetry in mother tongue and second language, symbolic language of painting, communication culture, and classical dance. All these lessons are the links of one twelve-year-long educational chain. More details about the composition of the program can be found in [9 - 15].

A considerable role in the success of the educational program play regular (every semester) performances – a form of demonstrating knowledge and skills acquired during the current semester. The scripts for the performances are original and take into account both the learned materials and the individuality of each student. All personages in the performances are positive, no one negative. During each semester, all young students and teenagers master new elements of classical dance and train the known elements. Each performance includes singing world known songs in English, e.g., "White Christmas" and "Let It Snow" in case of winter performances. The highest form for demonstrating the acquired communication culture and culture of classical dance is the Christmas and Easter Big Balls, including the most part of students at the age from seven to twenty.

4   An environment of conceptual learning

One of the distinguishing features of our approach to this problem is that it is realized at lessons of a foreign language (FL) – English, where the mother tongue of children is Russian. The use of original analogies (being the parts of fairy-tales and thrilling stories) for teaching the English alphabet, the rules of reading, and the basic rules of English grammar contributes to developing associative abilities of children at the age of 5 – 6. The EIT-system provides *an environment of conceptual learning instead of a memorization-based one*. In particular, it is the principal distinguished feature of the developed original approach to teaching FL as an instrument of thinking.

The interesting stories about the life of verbs and other words (see, in particular, [5, 7, 8]) establish in the consciousness of the young child a mapping from the objects and situations of the real life or fairy-tale life to the domain of language entities (letters, sounds, verbs, nouns, pronouns, etc.). That is why the consciousness of the young child receives a considerable impulse to developing the ability to establish diverse analogies.

The other reason for using the lessons of FL is that (as a 24-year-long experience has shown) young children easier learn beautiful language constructions for describing the impressions from the nature than the equivalent constructions in mother tongue (see [6, 7]). The explanation of this phenomenon is that in the first case children don't feel any contradiction with the every-day use of language.

Example. Let's consider a fragment from the home composition "The Winter Day", it was written in English by an eight-year-old Russian speaking student Polina of the third year of studies in experimental groups:

THE KINGDOM OF THE WINTER

One winter day I was sitting near the window looking at the street covered with fresh clean snow. At first time, there was nothing so remarkable in that. Nor did I think it so very much out of the way to see that falling snowflakes, snow storm, the grey cloudy sky and the noisy crows. But when afterwards in the evening going to sleep I thought it over, it occurred to me that I ought to have wondered at this. I thought that the snow storm might be a wicked magician Winter, the grey sky with running clouds – his kingdom. Every beautiful princess that refused to be his wife because he was very angry and cruel was turned by him into a crow. And then their tears he turned into the falling snowflakes. And only the coming of the kind Fairy Spring can destroy this magic.

The realization of the teaching objectives mentioned above in this section is an important part of the first stage of supporting and developing the reasoning skills and creativity of the child. A map of cognitive transformations realized at this stage and the maps reflecting the next cognitive transformations can be found in [9, 10].

5   A known four-level model of consciousness development

It seems that the model proposed by Zelazo [32] can be considered as a good working instrument for studying the development of conscious control during the first – fourth years of childhood. This model, called the Levels of consciousness (LOC) model, emerged as a result of reflecting the experimentally discovered regularities of the development of conscious control of thought, action, and emotion. The model describes four transitions from one LOC to another, higher LOC, these transitions depend on age. Let us say about the zero LOC in case of newborn babies and very young children at the age less 11 – 12 months. Zelazo [32] characterizes the consciousness of this period as minimal consciousness; it is responsible for approach and avoidance behaviour based on pleasure and pain and is present-oriented, unreflective and doesn't operate with the Self-concept.

The principal distinguished feature of LOC1 is the emergence of concepts and of the connections between the perceived objects and concepts (playing the role of labels of experienced objects). LOC1 is called by Zelazo [32] as the *level of recursive consciousness*. LOC2 emerges at the end of the second year, the essence of the transition from LOC1 to LOC2 consists in the emergence of symbolic thinking, in children's awareness of Self. The signs of LOC2 are the first use of personal pronouns by children, their self-recognition in mirrors. Besides, children feel first self-conscious emotions, first of all, shame.

LOC3 is called by Zelazo as *reflective consciousness 1*, usually this level characterizes the consciousness of three-year-olds. The manifestation of this level is the ability of children to systematically use a pair of arbitrary rules (for instance, the object of big size and of small size) for sorting the pictures representing these objects. However, the executive function of three-year-olds is still limited, it was shown by the experiments with Dimensional Change Card Sort. For being successful in this game, children must integrate two incomparable pairs of rules into a single structure. This ability characterizes the LOC4, called by Zelazo [32] as *reflective consciousness 2*. Usually, LOC4 emerges by the end of the forth year, this level is also characterized by a spectrum of meta-cognitive skills.

6   Expansion of the levels of consciousness basic model in cognitonics

It seems that the broadly felt necessity of promoting children's emotional and social competence in schools and the lack in the scientific literature of rather simple solutions to this problem are the grounds for putting forward the following conjecture: the levels of consciousness model proposed by Zelazo [32] indicates only some basic stages of consciousness development. The goal of creating appropriate theoretical foundations of promoting children's emotional and social competence

will lead to discovering additional, higher stages of the child's consciousness development corresponding to mature emotional and social competence of the child.

Realizing this idea, let's give a new interpretation of the methods of developing conscious control of thought, action, and emotion described in [9, 10, 14] and belonging to the System of the Methods of Emotional-Imaginative Teaching. We'll suppose that these methods underpin the transition from the level of consciousness 4 (LOC 4) to LOC 5, from LOC 5 to LOC 6, and from LOC 6 to LOC 7. The new levels LOC 5, LOC 6, and LOC 7 will be respectively called *the level of broad beauty appreciation, the level of appreciating the value of thought, and the level of enhanced awareness of social agreements and social responsibility* [11, 12].

A very short, preliminary description of these levels is as follows. Reaching LOC 5 by the person means that this person possesses a well-developed feeling of beauty in various manifestations: the beauty of a thing, of an idea, of an expression, of a picture or sculpture, of the interpersonal relationships, etc. [10, 14].

The successful transition from LOC 5 to LOC 6 means that (a) a child is aware of the fact that his/her ideas may be socially significant, i.e. the child may be appraised by the friends or adults for the originality and beauty of his/her idea; (b) a child appreciates the value of the thoughts of other persons [8, 13]. Reaching LOC 7 by a person means that this person is sufficiently mature in the social sense, i.e. possesses an enhanced awareness of social agreements and social responsibility [9, 10].

It should be underlined that modern preschool and school educational systems in various countries encourage only a rather small proportion of children to reach the 5th - 7th levels of conscious control. But to considerably increase this proportion is vitally important for successful socialization of children in information society. Happily, at least one broadly applicable way of solving this problem has been available since the 1990s, it is given by the EIT-system.

7 Two kinds of values imply different methods of teaching

7.1 Two kinds of values

The human being is brought up in the own culture and imbibes the spirit of the culture he/she is brought up. On the level of the every-day communication and acting, the culture is revealed in the answers to the following questions: *what you value, what you believe, and how you act.*

It is well known: "For where your treasure is there will your heart be also". It means that main values influence greatly the way a person perceives and processes the information, acquires knowledge, because the values emotionally colour every cognitive process.
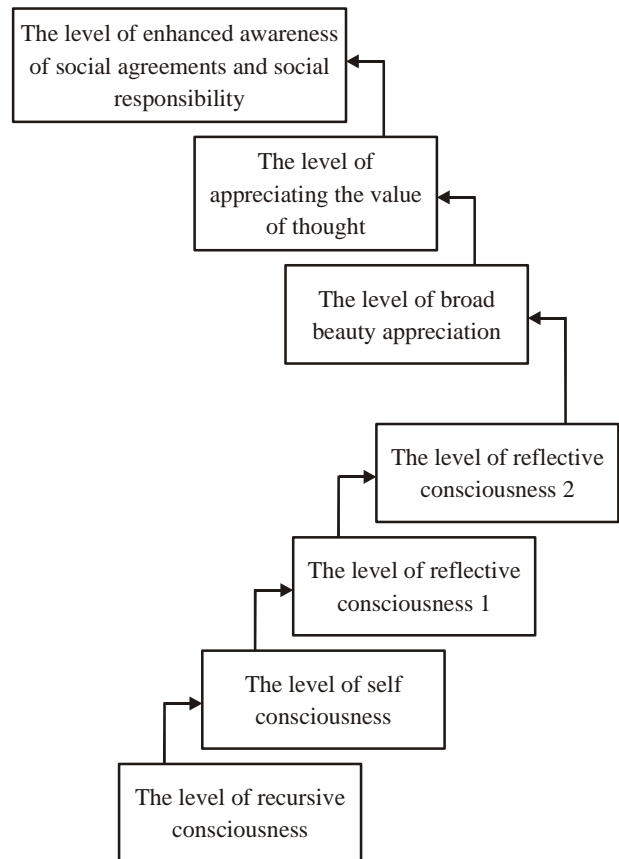

Figure 2: The updated configuration of the levels of consciousness model. The levels 1 – 4: P.D. Zelazo, 2004; The levels 5 – 7: V. Fomichov and O. Fomichova, 2013.

A cognitive process includes analysis, estimation, forecast, decision making, and it is underpinned by a system of values. An educational process under the frame of Cognitonics takes into account the values of students in order to create an inspiring and creative atmosphere at the lessons. If the students share lofty ideas and sublime values, have aspiration to think and act in terms of public good and benefit to the society, then it is advisable to show, for example, the beauty of mathematical solutions and equations, the beauty and value of a thought, a metaphor, to show how one and the same idea is expressed by the language of painting ("Twilight. Moon" by I. Levitan) and natural language (the moment when Alice is dozing off in the book by Lewis Carroll "Alice in Wonderland").

If the students seek for pleasure and share the commercialized values, then their motivation is different: they take a decision here and right now without awareness of their responsibility for next generations and without gratitude to previous generations. It means that they don't consider themselves as a link between generations.

In this case it is advisable to be logical, give clear solutions to the equations, do not give the so called "additional information", do not quote poetry. E.g., while explaining mathematics, try to avoid establishing the links between various languages and natural language.

The atmosphere of a lesson and the way of presenting information will meet the expectations of the audience, and the process of information processing will be successful and arise curiosity [15].

7.2 The main parameters of the values assessment

The process of assessment is very delicate and can't be called a precise one. The main question the students have to answer to let teachers guess the direction of their way of thinking is as follows: whether it is my cup of tea. If Yes then whether it is good for me; if Yes then it evokes emotions and becomes thought and interest provoking. In case with the young, 6-8-year old children it is helpful to listen to their answers and considerations, paying special attention to the way they put the ideas, answering the following questions:

(a) where did you spend your summer holidays; (b) what is your favourite dish cooked by your Mam or Great Mam for you; (c) what do you do when it is raining outside; (d) do you remember the gift Santa Claus presented you with last Christmas? (e) Do you have free time; (f) what is your favourite book: (g) can you give an example of your brightest impression; (h) what is beauty for you? (i) when do you feel yourself happy; (j) what you like to draw?

The given answers, the way they are considering, the language they use reveal the atmosphere in which they brought up, the way they view the world around, the point of their interests, the things they are impressed by (remember the song "My favourite things" from the film "Sounds of Music").

While analysing the answers to questions, it is important to pay attention to the following: (a) whether they like dishes cooked by the mother or take away dishes? (b) if they spend summer in one and the same place, whether they are impressed by something? (c) whether children notice the change in the weather, whether they see only dirt (for example, in early spring) or notice dripping roofs, soaked roads, bluish-grey snow, and lots of "mirrors" scattered everywhere by the spring to make the trees prepare for the spring blooming? (d) what kind of life situations do they appreciate, what makes them think, laugh, cry, feel compassion; (e) what impressed them and what makes them excited and expired; (f) what makes them happy? [15].

8 How to split children into groups and let them shift from one group to another

Let us start with an example. We have received two descriptions of the late autumn. The first one: "It is the time when the weather is getting colder, the day – shorter, the night – darker and longer, but there is no snow". The second one: "It is the time when the water is getting tired, and it means that the snow is near. "What is up?" – "The snow is up or perhaps down".

The first child enumerates the signs which help him to understand that the winter will come soon. He acts as a observer, as a researcher, discovering the changes and establishing the links between a cause and a consequence.

The second child reveals a poetic way of observing the nature, he uses the metaphor "tired water" in case he knows nothing about metaphors. It is just his way of viewing the world and establishing another kind of links, endowing everything with feelings.

The way children perceive the world influences the type of material presentation: so called poetical or scientific. In both cases the curiosity is aroused, information processing ability and sound creativity are improved. Both cases aim at paying a special attention to improving the language skills.

It is possible for children to shift from one group to another if the changes in the world perception are revealed.
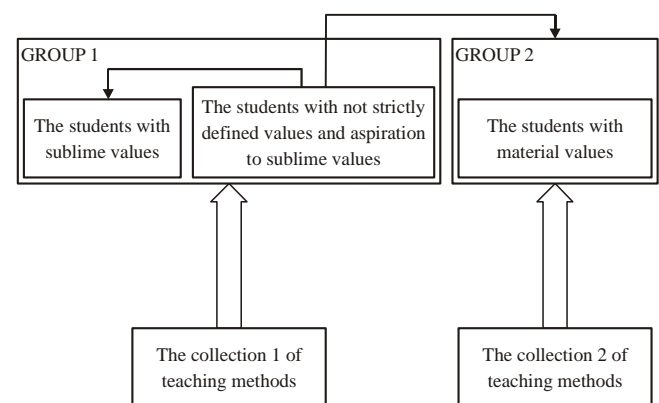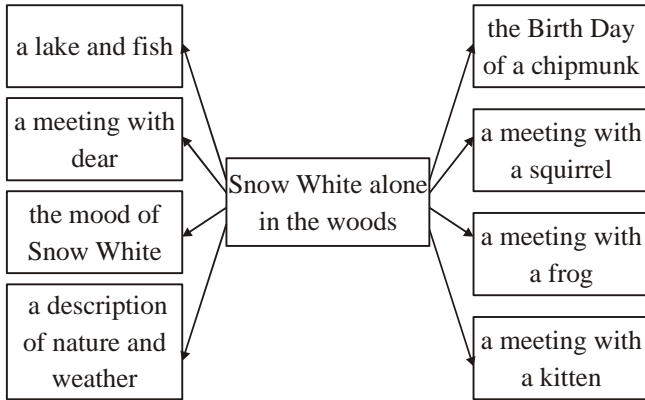
Figure 3: The impact of value system on teaching methods and on a shift (concerning a part of students) from one group to another group.

9 Methods of assessing educational progress

The swiftness of establishing the conceptual links between different thematic domains reflects the maturity of a cognitive mechanism. The process of studying and socialization aims, in particular, at constructing a great number of thematic subspaces in the world's conceptual picture of the child [15].

If the conceptual links are not activated while discussing various books, stories, while analysing information, taking a decision, then the child can't use his/her background knowledge. As a result, the processes of information processing, of taking a decision, of socialization become more complicated and very often mislead the child.

The examples of constructing conceptual links between different thematic domains at the lesson during a 20-minutes active creative work are given on Figure 4 and Figure 5.

After the fifth year of studies in experimental groups, the speed of forming conceptual links during one lesson exceeds the value 1. It means that during 20 minutes a group consisting of 21 - 23 students generates over 20 links between different thematic domains.

In order to better understand the difference between computer-dependent and computer-independent thinking, we'll consider the essence of creative thinking with the help of a scheme of constructing creative cognitive pinnacles.

Creative thinking suggests the ability of the student to create a new reality or transfigure the existing one. Computer dependent thinking means following the logic of the computer. In case of establishing the conceptual links between various application domains, the qualitative characteristic is defined by the quantity of the application domains linked together, on the one hand, and the remoteness of these application domains from one another (that is, the lack of the evident ties between the domains), on the other hand. A study of metaphoric thinking was carried out according to the logic described
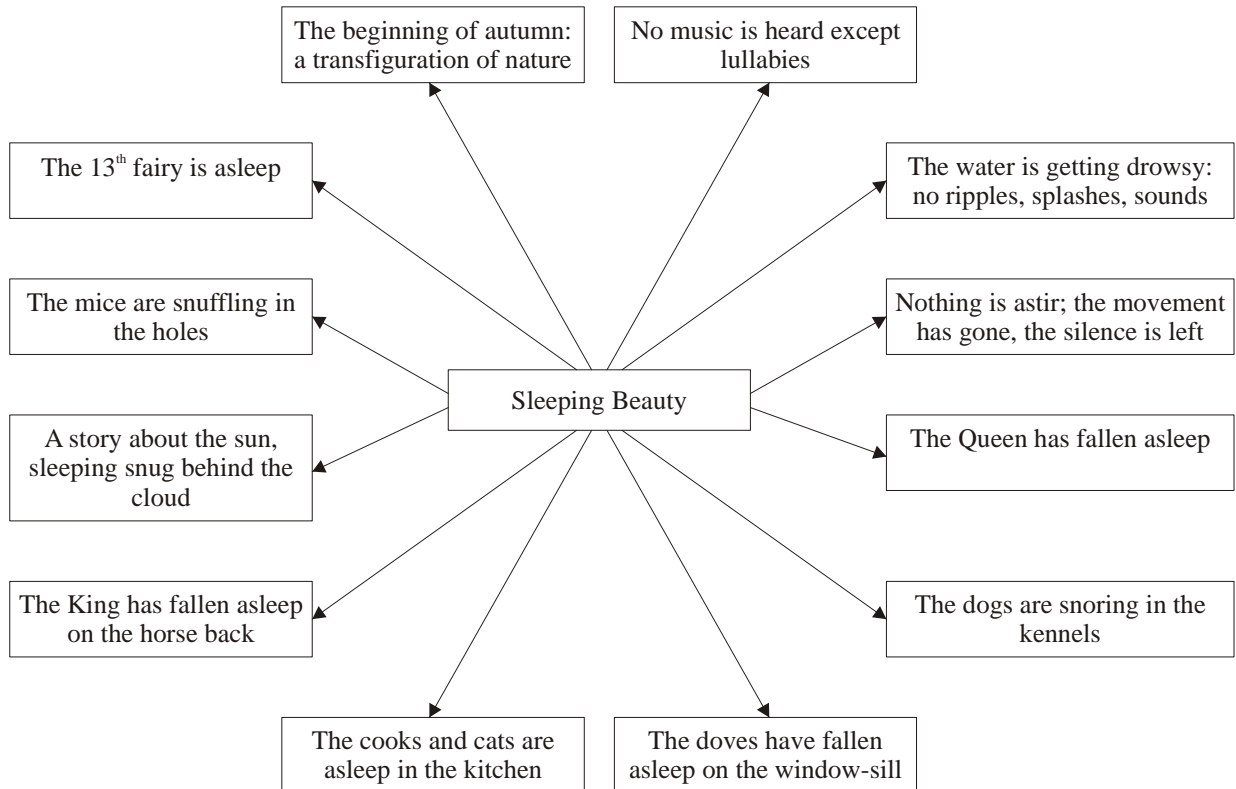
Figure 4: The speed of forming conceptual links during one lesson (the first year of studies, the age of children is 6 years).

$$V = 8/20 \text{ min} = 0.40$$

Figure 5: The speed of forming conceptual links during one lesson of the second year of studies; the age of children is 7 years; $V = 12/20$ minutes $= 0.60$.
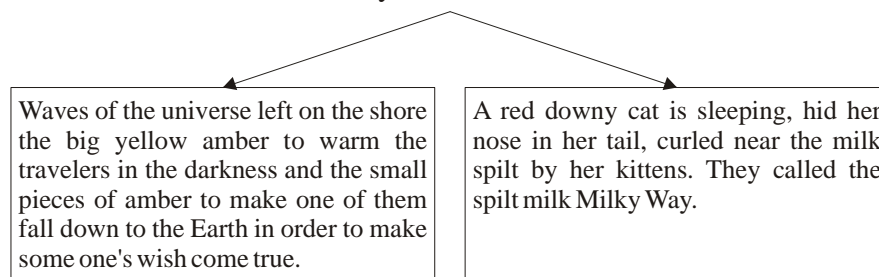
Figure 6: The examples of secondary creative pinnacles

below.

Step 1. Taking into account the initial metaphor and the number of the metaphors created in accordance with the initial model, the students reach *the first creative pinnacle*. It corresponds to a new metaphor being very different from the initial one. It is a result of the unexpected coincidence of the phenomena from two application domains.

Example. Suppose that the initial metaphor is "The moon is a piece of cheese for the mice". Following this model, the young students generate a lot of metaphors, for instance, "The moon is a big round ice cream", "The moon is a pancake with a sour cream", "The moon is a piece of melon". Then one student reaches the following *first creative pinnacle*: "The moon is the silvery ball under the circus cupola. In the circus everyone is awaiting for his/her turn to appear on arena lit up with the millions of the sparkling starts scattered from that silvery ball. In the morning the moon will disappear, the stars will fade, and everyone will go for a work. The miracle happens only night".

Step 2. The *secondary creative pinnacles* designate the appearance of a principally new metaphor based on the independent creative pinnacles (see Figure 6). The initial metaphor usually is a response to the request of a teacher. Then the process of creating metaphors goes on until a principally new conceptual metaphor is created (a creative pinnacle). For the researchers, the creation of secondary creative pinnacles is much more interesting. The existence of the tendency of the emergence of the secondary creative pinnacles and the development of the process of the creation reveal the speed and the quality of the development of the cognitive mechanisms. The maturity of the cognitive mechanisms is revealed in the ability of using metaknowledge.

Unfortunately, computer dependent thinking reveals only the initial metaphor suggested by the computer and the process of creating metaphors according to a model. But it doesn't reveal creative pinnacles of any other levels, because of the lack of a vivid, lively, inspired atmosphere of discussion without computer support. Computer dependency blocks the ability of creating a new reality as a result of considering this activity as an excessive activity.

The digital reality makes the computer and ICT overwhelming in numerous spheres of human's activity. It creates the illusion of a new step on the way of civilization. But the development of the civilization without spiritual development is the greatest distortion that diminishes the creative ability of the mind or transfers it into another form, a form of adjusting but not a kind of breakthrough.

There should be two clear, well-balanced main subjects of the educational process of any level: (a) computer literacy, because ICT can directly contribute to human capabilities; computers and the Internet have a crucial influence on individual economic achievements and carrier development in the information society; (b) the development of the cognitive mechanisms of information processing and the improvement of the ability of metaphoric thinking, it leads to improving the serendipity.

10 How to achieve cognitive engagement of the students

Cognitive engagement can be defined as the process of highly motivated intellectual activity when the interest towards the subject under discussion is so strong that the students loose the track of time and, as a result, they are not tired. The students' interest determines the level of involvement. The emotional response is very close to inspiration, because they are making their own discoveries, and their mental efforts are appreciated. It helps to provide a conceptual learning environment instead of a memorization based one and enhances the motivation [15].

Cognitive engagement is characterized by the following things:

- *focused attention*; it means that within the first five minutes of a lesson the students have come to the conclusion: it is my cup of tea;

- *positive effect* (how do you feel about it); it means that the second conclusion is as follows: "it is good for me";

- *aesthetics*; it means that the way the material is presented meets the expectations of the students, it can be compared with various communicative styles: while communicating, it is better to stick to one style; in this case, it won't disappoint the partner of communication and make the conversation an easy and pleasant business; if the values of the students are clear and they are split into the groups according to their values, then it is easier to arrange the presentation either in a more pragmatic or a more poetical way (metaphorical way);

- *endurability*; it means that a student remembers a good experience and wants to repeat it;

- *novelty*; it is present at every lesson and provides intellectual and spiritual nourishment;

- *reputation, trust, and expectation*; the reputation of a teacher (his/her personal reputation and the professional one) suggests the situation when the students trust the teacher, appreciate his/her time and knowledge and act as the colleagues in the process of co-creation, still being aware of the distance between the teacher and the students, they respect this distance due to reputation of the teacher; in this case, the actions of both sides of the educational process meet the expectations of each other;

- *motivation*; the motivation of the students is closely connected with their values; the human being can be called a biological anticipatory system; everyone answers the questions: "What is good for me and how to achieve the state of complete happiness?"; but everyone defines happiness in his/her own way according to his/her understanding of values; some students are happy if they receive excellent marks; others need not only excellent marks but the awareness of intellectual and spiritual maturity, broad outlook (unconsciously, they are searching for their calling); and only in this case their level of happiness is changed [15].

To achieve cognitive engagement is very important. On the one hand, it is a marvel, because the teacher and the students become colleagues in the process of co-creation and making decision and keep the distance between the students and the teacher which is underpinned by trust, respect, and appreciation. On the other hand, it is a well managed process of knowledge acquisition. This process is underpinned by the described above mechanism of starting up the creative process in the heads of the students and creating at a lesson a special, thought-provoking atmosphere providing an opportunity for the most effective knowledge acquisition and information processing.

We have discovered the conditions under which this mechanism works well. The main condition is splitting students into different groups according to their values. The values are taken into account for creating an inspiring atmosphere, it is the most comfortable for knowledge acquisition. The students step by step receive serendipitous information: it is not expected but desirable and conduces to making their own discoveries.

11 Related approaches

One of the central ideas of our approach to early socialization of children by means of introducing them, in an original way, to the humanities is to teach young children and adolescents to appreciate beauty in all its manifestations, in particular, the beauty of nature, painting, poetry, music, classical dance. The first additional level of consciousness (LOC) development introduced by us in comparison with the LOC model by P.D. Zelazo [32] is called the level of broad beauty appreciation (see Figure 2 in Section 6).

This idea and very positive educational results obtained during 24-years-long study excellently correlate with the conclusions of a three-year study carried out by cognitive neuroscientists from seven leading universities in USA [17]. The latter study was led by Dr. M.S. Gazzaniga from the University of California at Santa Barbara. This study included, in particular, the following conclusions [4, 17]:

An interest in a performing art contributes to the development of the sustained attention, and it is necessary both for improving performance and for the training of attention as a precondition of the improvement in other conceptual domains.

There are special links (extending far beyond the music) between high levels of music training and the ability of processing information in both working and long-term memory. In particular, as concerns children, the success at the lessons of music develops the skills of solving geometrical problems.

There are positive correlations between the regular lessons of music and both reading acquisition and learning of sequences.

The training of complex actions improves the memory due to the learning of general skills for manipulating semantic information.

The process of learning to dance by means of attentive and effective observation is close to the process of learning with the help of physical practice. The effective observational learning may contribute to the development of other cognitive skills.

The educational program realizing the ideas of our informational-aesthetic conception of developing cognitive-emotional sphere of the learners includes, in particular, every-semester performance in each group. The significant components of each performance are classical dances, musical pieces, and songs. The observations accumulated during 24 years confirm the listed conclusions of the three-year long study described in [17].

However, some our theoretical ideas and obtained results considerably expand the conclusions formulated in [17]. First of all, it applies to the following discovery in cognitive biology, cognitive psychology, and cognitive linguistics done in the end of the 1990s: the consciousness of normal, average child at the age of five – six physiologically needs a rich language (much richer than it is broadly accepted to believe) for expressing the impressions from the beauty of nature (see [6, 7] and Section 4 of this paper).

The next significant result is an original method of supporting and developing metaphoric thinking of the child (at lessons devoted to foreign language and to studying the symbolic languages of poetry and painting) as a basic tool for supporting and developing creativity of the child, for the realization of the child's Thought-Producing Self [8, 13, 14].

The method of reaching LOC7 (the level of enhanced awareness of social agreements and social responsibility) proceeds from the central idea of J.R. Searle [26] about natural language as the primary means of constructing social reality and considerably expands and works out in detail this idea, inscribes it into educational practice.

12 Conclusions

This paper grounds the necessity of much earlier socialization of children in modern information society than it is usually done throughout the world. The paper sets forth the deep connections of cognitonics with the positive psychology movement. It is shown that cognitonics suggests a system of original, mindfulness-based educational methods supporting well-balanced cognitive-emotional development of the personality in modern information society, it is called the system of the methods of emotional-imaginative teaching (the EIT-system). The analysis of central ideas of the EIT-system provided the possibility to enrich developmental psychology: the basic model proposed by P.D. Zelazo (2004) considers 4 levels of consciousness development (corresponding to the age from one to four years), and this paper introduces three new levels (they cover the ages from five – six to 13 – 14 years).

The paper presents a new look at the process of education when the values of the student act like a lighthouse for the teacher at the moment of presenting material and arranging the process of education, the process of acquiring knowledge. Four discoveries

underpinning the proposed way of solving this problem are shortly described. This way is provided by the EIT-system belonging to the constructive core of Cognitonics. The described methods have been successful tested in the course of a longitude study covering 24 years of introducing young children and adolescents to the humanities.

The EIT-system has been mainly realized at lessons of English as a foreign language for Russian-speaking children and at the lessons of poetry and literature in English, at lessons devoted to explaining the symbolic language of painting, the culture of communication, and the symbolic language of classical dance. These kinds of lessons are considered in numerous countries as highly appropriate for young children and teenagers. The carefully selected collection of texts used at lessons is provided by a number of classical, world-known fairy-tales and novels, in particular, "Snow White", "Cinderella", "Sleeping Beauty", "Pinocchio", "Pollyanna", "The Life and Adventures of Santa Claus" by L. Frank Baum, "Alice in Wonder Land" by Lewis Carroll, "The Wind in the Willows" by Kenneth Grahame, "The Hundred and One Dalmatians" by Dodie Smith, etc. That is why the EIT-system may be used (after a certain adaptation requiring a small time) in English-speaking countries and in numerous countries where the English language is learned as a second language.

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