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The Development of Critical Thinking at Computer Science Lessons as the Basis of Information Preparing of Pupils and a Guarantee of Their IT Social Safety in the Information Society

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In modern scientific practice, there is a huge number of terms and concepts related to pupils' informational alertness such as "informational literacy", "bibliographic culture", "multimedia literacy" and others. Professor KemSUCA N.I. Gendina in order to concretize the process of informational education introduces the term "personal information culture", in which the individual is to be understood as the subject of search and choice of information. Without taking into account the fact that in the media world the individual becomes an object of manipulation rather than a media-entity.
The international scientific community proposes the term "informational literacy", which includes the ability to rationally seek, critically evaluate and creatively use information. In our opinion in this triad the ability to evaluate information critically is the most essential, because it is almost impossible to manipulate a critically thinking person.
The conclusion is that for an effective way of school IT preparation, as a guarantee of their social safety in the information society, we need to shift from the study of computer and information technologies to the development of pupils' critical thinking.

Keywords: critical thinking, information age, manipulation of consciousness, informational literacy, personal information culture.

Introduction

J. Martin, a veteran of "IBM" company (one of the largest computer firms in the USA), the renowned author of books on computing, three decades ago, pointed out the alarming trend regarding the advent of the information age: "Now we have reached such a level of knowledge, when the amount of information entering the industry, management and scientific world reaches alarming proportions. The media very softly and unsuccessfully calls it "an informational explosion". But the usual explosion rapidly breaks off its explosive growth. The growth of the information, however, in the future will have no end and will be increasing rapidly. Previously the total amount of human knowledge

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changed very slowly. In 1800, it doubled every 50 years; by 1950 it doubled every 10 years, and by 1970 – every 5 years" (Martin, 1981, p. 20). According to UNESCO, in the beginning of the nineteenth century there had been issued about 100 scientific journals worldwide, in 1850 – 1000, in 1900 – more than 10 thousand, at the present – more than 100 thousand. The number of books released over the past 25 years equals to the previous 500 years.

Even in times of J. Martin Soviet researchers warned that "the main dangers were not in the informational torrents themselves, but in their relation with the possibilities of their handling by mankind. Since the information explosion has changed this equation not in favour of mankind, the information crisis came. On the one hand, according to H. Arnttsa, the one who wants the happy future for humanity, can only welcome the further progress and, consequently, more rapid growth of information altogether. On the other hand, information is becoming a real burden. The avalanche of information is so devastating that people simply give up, unable to process it. Their interest in information weakens, and the information that is offered is regarded not as a vital aid, but as another difficulty" (Chursin, 1982).

Information crisis was complicated by the fact that the permanently expanding torrents of information include inaccurate and sometimes false information used to manipulate the mind with a view of commercial gain. The French philosopher who studies the role of language in a society, Ivan Illich writes: "Nowadays, the word has become one of the main products at the market that determine the gross national product. It is money that determines what will be said, who would say that and the people to be addressed with those words. Wealthy nations have turned the language into a kind of a sponge, which absorbs incredible sums". Illich refers to the research of linguists, held in Toronto before the Second World War. At that time from all the words that a person heard during the first 20 years of his/her life, every tenth word he/she heard was from some sort of «central» source – in church, at school, in the army. And nine words out of ten he/she heard were from someone who could touch and smell. Today the proportion has changed – 9 out of 10 words a person learns from the «central» source, and they are usually spoken through a microphone (Kara-Murza, 2009).

Mass-media manipulation

In the information age, mass and individual consciousness is formed under the influence of media – books, newspapers, radio, television, internet, etc. We think, say and do what we are advised by means of media or global communication. Along with the apparent diversity of attitudes, values, affirmations, society is unified by the influence of the media holders. G. Schiller, in his book "Mind Manipulators" noted: "The content and form of means of mass media – myths and the means of their transmission – fully rely on manipulation. Upon successful application, and this is undoubtedly true, they inevitably lead to the passive state of the individual, to the state of inertia, which prevents the action. It is that type of a state of the individual that the mass media and the whole system strives to achieve, since passiveness guarantees the preservation of the status quo <...> The reduction of mental activity is also a result of mind-numbing effects of an infinite amount of hours spent on television watching. It is difficult to measure, but, nevertheless, the soothing effect of television has a great impact on critical consciousness" (Schiller, 1980).

Preparations for the manipulation takes place through the language of words and images aimed "not only to destroy some concepts and ideas, but also to create, build new ideas, desires, and goals. These are temporary constructions aimed

to cause confusion in the mind, to make thoughts illogical and incoherent and cause a person to doubt the genuine truths of life. This makes a person defenseless against the influence <...> Say *communication* instead of the old *conversation* or *embargo* instead of *blockade* and your thoughts seem to be backed by the authority of science. You even start thinking that these exact words express the most fundamental concepts of our thinking" (Kara-Murza, 2009).

Manipulation is based on the oppression of the individual. Subjects of manipulation create such conditions in which the individual accepts that what is advantageous to the manipulator as the truth. And doing so, the individual sincerely believes that his deed is the only right one. From the mass media, to the social environment which surrounds it, the person acquires certain patterns of behaviour, which then unfolds in person's own life. In this way "in the process of human development and the establishment of numerous contacts the formation of personality takes place, reflecting the social side of person's development and its public nature" (Babansky, 1983).

In modern urban areas human exposure to the media exceeds eleven hours a day; TV is on in the flats / houses on average of 7 hours 38 minutes daily, while children from two to twelve watch television 25 hours a week on the average (Semali, 2000, p.13). According to the National Union of Family Associations (UNAF – Union National des Associations Familiales), young audiences annually spend on average of 154 hours of quality time (i.e. during the alertness period) with their parents and 850 hours – with teachers, while children spend up to 1400 hours in the contacts with different screen medias (Frau-Meigs, 2003, p.26). Thus, children and adolescents are the most vulnerable categories in the global media manipulation. Spending their free time in front of television and computers, they lose the ability to reason and evaluate information critically.

Here are just a few obvious indicators of the negative impact of media on children and teens. According to WHO, out of the 100 boys-school graduates in 2009 – only 90 will live up to their retirement, while in Russia – only 40. The main reason, according to WHO experts is alcohol (Database of the World Health Organization…). According to the nationwide survey of youth conducted by the Russian Education Ministry in 2002, alcoholic beverages (including beer) are consumed by 80.8% of teenagers and young adults. For the decade from 1993 to 2003 age of alcohol initiation has dropped from 16 to 13 years (Sheregi, 2003). According to the Russian Home Affairs Ministry in 2007, more than 78.5% of crimes committed by juveniles while intoxicated; the number of juvenile convicts for crimes committed while drunk is about 30 thousand people per year (MHA's site…). The statistics associated with drugs addiction, the problem of abortion, etc. is not taken into account.

It is obvious that contemporary social reality demonstrates the complete failure of school and family to prepare a child to oppose the media world, which transmits values and ideals that oppose not only to the universal ideals and values, but also to the common sense. Many researchers discuss implementation of special courses at schools for developing the abilities which could help students to function effectively in the information age. But the question of how to help students not to choke and not get poisoned by the modern information flows still not answered.

Searching for the exact term

KemGUKiS professor N.I. Gendina, who is responsible for the problems of informational training of schoolchildren, students and teachers, notes that: "The complexity of identifying the subject of informational training is conditioned by the diversity and many values of new terms and concepts, used in this area. In particular

there are similar concepts, characterizing the attainments and skills of people working with information in the Russian language, such terms as "bibliographic culture", "reading culture", "bibliographic attainments", "bibliographic literacy", "information literacy", "and computer literacy" are widely used. The same situation is typical for the English terminology, where informational training is associated with the use of such terms as: "Hypertext literacy", "Information retrieval skills", "Multimedia literacy" and others. The term "information culture" has appeared at the center of the terminological field in Russian literature in the recent years. At the same time in the English language the term "information literacy" has the leading position (Kalinnikov, 2003).

N.I. Gendina sums up: "The term "information literacy" is widely used on the international level, however, its usage in the Russian language is associated with restrictions which have psychological and linguistic nature. The thing is that in Russian the word "literacy", meaning the ability to read and write is associated with the most simple, beginner's level of education. Thus, the complicated phenomenon of interaction between the person and information has a hint of elementary, primitive meaning. In addition, the orientation toward the identity of a person who has a clear understanding why the information skills are needed and how they can and should be handled is not clearly expressed".

Instead of the information literacy N.I. Gendina offers the term "Personal Information Culture," which means "one of the components of the general human culture, the total sum of information outlook and system of knowledge, skills, providing a focused independent activity with the optimal satisfaction of individual information needs, with the use of both traditional and new information technologies. This component is supposed to be essential for successful professional and nonprofessional activities, and also for social safety of a person in the information society" (Gendina, 2006). According to this definition, the individual is understood as a subject in relations with the information. A subject formulates the need of information, and then satisfies it at the best of his ability. However, we recall that 30 years ago, G. Schiller, in his book "mind manipulators" unambiguously called the information age a world of manipulation, which is ruled by the media and means of mass culture. In such circumstances, the individual becomes a target, a passive observer, without formation of information requests, but silently consuming the ongoing information from the media and MMC.

The real aim of informational education

"There is still a popular belief that the process of informatisation of schools, and practically the entire system of education, is associated with the process of equipping it with computers. This is probably true at the initial stage of informatisation of school" (Kasprzhak, 2008). In fact, teaching children to work with computers and modern information technology is only a small part of the informational training of the individual. Returning to the concept of information literacy, for which the international community today has identified three basic standards, we can see that a person with informational literacy, "selects information efficiently and effectively <...> estimates the information rationally and competently <...> applies and uses information accurately and creatively" (Hesus, 2006, p.13). The ability to think rationally is, in our opinion, the most important out of the three components.

The New Encyclopedic Dictionary gives the following definition of criticism: "Research, testing of the reliability, authenticity of something (e.g. text criticism, criticism of historic

sources) (New Collegiate Dictionary, 2007). A.P. Korochenskiy points out that "criticism is not confined to the denial and disclosure of the nature of negative and its transitory nature. Evaluation of criticism means not only the ability to judge and reject through the rejection critical examination ... phenomenon, but is even more focused on the identification during the critical knowledge and approval of positivity" (Korochenskiy, 2003, p.19-20).

Philosophical treatises of India divide the process of assuming information in three stages: *sravanam* (hearing), *mananam* (comprehension) and *nididhyasanam* (awareness or implementation) (Vedic University). It is the last step that, according to this theory, generates knowledge – not just a set of data, but the implemented information. "One of the main features of *critical thinking* is an indispensable presence of *transcendental reflection*, which demands from the thinking subject the understanding for what function of the consciousness thinking is used: for value orientation, for knowing or search of the means to achieve an objective" (Kalinnikov, 2003, p. 40). "Critical thinking in general is characterized by a practical orientation" (Sorina, 2003). "A person with the ability to think critically almost cannot be manipulated at all" (Klooster, 2005, p.7-11).

Thus, we can conclude that the main task of informatisation and informational education for children and adolescence is reduced to the development of their critical thinking as a mean to resist manipulation by the media structures. Computer science should be socially-oriented subject, because today the informational training of a person, according to N. Gendina, is becoming "the most important factor for successful professional and nonprofessional activities and social safety of a person in the information society" (Gendina, 2006).

About critical thinking

A.V. Fyodorov, in his monographic research "The development of the media competence and critical thinking in students of pedagogics", analyses the term "critical thinking" in the scientific literature. With a certain conventionality, he divides the found definitions into concise, but devoid of specific wording (Johnson, 1985, p.1), philosophically oriented definitions, emphasizing theoretical aspects (Kalinnikov, 2003; Sorina, 2003; Halpern, 2000 etc.), definitions of psychological orientation that focus the attention on the motivational aspects of the development of critical thinking abilities (Noel-Tsigulskaya, 2000). The separate block of determinations of pedagogical orientation, which emphasizes teaching and practical aspects of critical thinking abilities (Fedorov, 2007, p. 53-55). According to D. Klooster, critical thinking is social and independent thinking. Information is not the final but the starting point of critical thinking. Critical thinking begins with asking questions and understanding the problems to be solved. Critical thinking tends to persuasive arguments (Klooster, 2005, pp. 10).

M. Lipman identifies the following components in the structure of critical thinking: the assumption of different interpretations of information; understanding of the principles and mechanisms, construction of hypotheses; reasonable classification of facts, events; statement of a reasonable opinion; evaluative judgment, formulation of judgments on the basis of criteria; logical formulation of conclusions as the result of preliminary critical analysis of facts and/or phenomena (Lipman, 1988, pp.38-43).

Educators, developing critical thinking in the classroom audience are invited to consider different opinions, points of view on the problem and create conditions for the development of personal opinion, solution and conclusion by pupils/ students, "try to use all kinds of pair and

group work, including debates and discussions at their lessons ... take a great care to develop the qualities needed for a productive exchange of views: tolerance, ability to listen to others, responsibility for their own point of view" (Kluster, 2005, p.11).

D.M. Shakirova gives the list of effective techniques and methods related to the technology of critical thinking formation: the study of the concepts of critical mind, criticism of the mind, criticism and self-criticism, as well as the experience of their application in life (at home, at work, in the process of studying, scientific research, policy, etc.); academic critical analysis and evaluation of political, economic and social situation in the region, country, in foreign countries and in the world (in management, manufacturing, financial matters, education, health, sport, culture etc.); discussion of the mistakes in the tasks and problems (in selecting the most rational way to address) by organization of discussions, debates and disputes; review their own and other literary works, essays and dissertations (text critical analysis), etc. (Shakirova, 2006, p.289-290).

The issues of definition and formation of critical thinking will be more thoroughly addressed in further studies.

Example

As previously mentioned, the critical thinking involves a research position towards information. It is very important to note that this type of thinking is characterized by practical orientation. Critical thinking should not be limited to demagoguery or observing the truths which are already known. Ultimately, the knowledge should be pragmatic and positive, its goal is to improve the conditions under which person exists, otherwise the process of learning becomes fixed on its own. According to this, in our opinion, it's very important that at any stage of learning a child should be able to answer the question – "what is the purpose of study". Whenever performing a particular task, the child's action should be deliberate: what I'm doing now – I am thinking over an important question, I am developing memory, I am helping someone and thereby improving my moral qualities. Complete learning process always involves acquiring knowledge, developing skills and education.

Thus, when a practical aspect is put to the first place in the educational process, any information is no longer something that is taken away from reality, something abstract and perceived as a tool to solve a specific practical problem. For 6 years we have been having developing programmes in children's camps of the Krasnoyarsk Region. For the last three years this programme was named "The City of Outlook". Its main idea is to give children the opportunity to see the prospects of their own intellectual, creative, social and other type of growth. This result is achieved by creating a "place of trial", where a child is given a minimal set of information, tries to implement the information into practice at once.

The basic developing unit in this programme is a "workshop". With sessions lasting one and a half hour a day for five days, which result in an action or a project prepared jointly with the children where they implement the acquired knowledge. To prepare such a project children have to draw additional information from other sources: an action plan, the views of their peers, libraries, etc. In this way the fact that there is a practical purpose in the learning process which encourages the subjects of learning to develop their own informational culture by themselves, in particular, to seek and sought out information according to the tasks.

Conclusion

It is obvious that the critical approach to information is possible only if a person being in the process of learning, is aware of the purpose of

his/hers activities. According to Kant the process of learning is the perception of information by the senses, and then processing this information through the mind. This means that the person's process of learning begins at birth and lasts until death. Using Kant's definition, we may conclude that critical thinking might be attributed to the ability to reason, and then leading us to the conclusion that critical thinking and reasoning as a part of the person's intellectual activity is the original characteristic of the person and therefore needs no special formation. In this case, critical thinking is entirely based on the outlook of the person.

On the other hand, we consider critical thinking as the found match of the received information with the authoritative source of information that may be a scientific publication, scientists' opinion, our own opinion or social stereotypes. If the information is confirmed by a source we trust, then we take consider it to be the truth, otherwise it is either rejected or the search continues for consistency with other sources. It is worth noting that in addition to the means of knowledge mentioned by Kant (sensuality and reason), most of the information we get is just by listening. The progress of culture and science is based on the fact that the person generally does not explore what has already been found before by other scientists, but simply continues their work, taking as a fact the results of their scientific research.

The discussion of these philosophical aspects is very important, since the present scientific practice development of critical thinking is mostly focused on teaching the individual how to calculate and to avoid various manipulative techniques (Butenko and Hodos, 2002 etc.). Ultimately, however, it cannot provide complete protection from manipulators, as the manipulation of consciousness is not only known to us throughout media channels, but also in the process of informal communication with others through a social, domestic and economic situation in the country.

Thus, we conclude that the basis for effective critical thinking, which includes the search, evaluation and the selection of relevant information as the presence of a person's point of world view, which is formed in the process of practical interpretation of the results of learning. In this way the criterion of critical thinking is the acceptance or the rejection of information (i.e. the use or non-use of it in person's life) on the basis of one's own practical experience or the experience of other people we trust.

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Развитие критического мышления на уроках информатики

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В современной научной практике существует огромное количество терминов и понятий, связанных с информационной подготовкой школьников: информационная грамотность, библиографическая грамотность и др. Профессор Гендина для конкретизации процесса информационного образования вводит термин «информационная культура личности», в котором индивид понимается как субъект поиска и выбора информации. Однако не учитывается тот факт, что в мире масс-медиа индивид становится скорее объектом манипуляции, нежели медиасубъектом. Международное научное сообщество предлагает термин «информационная грамотность», который включает в себя способность рационально искать, критически оценивать и творчески применять информацию. В этой триаде важнейшей, на наш взгляд, является способность критически оценивать информацию. Вывод заключается в том, что для эффективной информационной подготовки школьников как гаранта их социальной защищённости в информационном обществе нам необходимо перейти от изучения работы с компьютером и современными информационными технологиями к развитию у школьников критического мышления.

Ключевые слова: критическое мышление, информационная эпоха, манипуляция сознанием, информационная грамотность, информационная культура личности.