18th PCSF 2018
Professional Culture of the Specialist of the Future

FORMATION OF THE SPECIALIST'S INTELLECTUAL CULTURE IN THE NETWORK SOCIETY

Olga D. Shipunova (a)*, Irina P. Berezovskaya (b)
*Corresponding author

(a) Peter the Great St. Petersburg Polytechnic University (SPbPU), Polytechnicheskaya 29, Saint Petersburg, 195251
Russia, o_shipunova@mail.ru, +79111945042
(b) Peter the Great St. Petersburg Polytechnic University (SPbPU), Polytechnicheskaya 29, Saint Petersburg, 195251
Russia, iberezovskaya@mail.ru, +79095806651

Abstract

In the network society, the problem of a future specialist intellectual culture formation is exacerbated by the constant increase in information flows. In this term, the authors consider ways of intellectual filters formation as a rational tool for information flow perception and processing. Irrelevant information hampers cognitive orientation in the flow of messages, leading to an inadequate evaluation of social relations. The authors carry out the search for an effective resource of counteracting information noise and network manipulation of individual consciousness on the basis of an interdisciplinary analysis of the technology of the individual attention management in the information field. The authors' research position is determined by the cognitive paradigm, according to which it is the forms of knowledge organization that play the basic role in specialist professional training. The authors examine practical application of the object summarization algorithm that would facilitate formation of textual information selection and systematization skill. A data transformation algorithm according to the method of documentary object analysis is realized as the universal tool for using in educational practice, implementing which one could develop the skill of information flows summarizing and filtering. In conclusion, authors emphasize the increasing need for development a cognitive ability of critical thinking representing an effective resource for individual orientation in the information field.

Keywords: Critical thinking, documentary object analysis, educational activities, information noise, intellectual filters.

1. Introduction

Education is urged to form the level of the individual's awareness necessary for his social adaptation and successful self-realization. In general such level of awareness corresponds to the intellectual capital which exhibits through the individual's ability to maintain his own social and professional competence at the certain level set by society (Klochkova et al., 2016). A new dimension of the education quality control analysis in modern practice emerges from the interrelation between such components as cognitive motivation, personal development and student satisfaction (Razinkina et al., 2018).

Process of coordinating society information field dynamics and person's own mental activity, structurally including reasoning, understanding and estimation, relates with intellectual filters formation which function consists in a certain selection, limitation, structuring of information streams (Bylieva, Lobatyuk, & Rubtsova, 2018). The interactive and hyperactive communicative network capable to transform an information field and messages' meaning puts basic mental structures of understanding at risk of destruction at levels of collective unconscious, practical and discursive consciousness. (Brooks & Longstreet, 2015; Evseeva et al., 2017; Fox & Moreland, 2015). In the conditions of growing information environments, widespread use of social networks and multimedia pedagogy, the young people thinking becomes being of mosaic type, what creates additional cognitive barriers in the future specialist's intellectual potential formation (Berezovskaya & Shipunova, 2015).

Classical (technical) definition of information noise as channel disturbance that makes the signal irrelevant was given by Shannon, 1963. In the social humanities, there are variable treatments given to this phenomenon. In cultural science, information noise is defined as information which is conditionally indifferent for an individual (Galkin & Popov, 2001). In sociology, it is accidental low-quality information. Communicative scientists define this phenomenon as such information redundancy in the communicative environment which causes functional failure of its systems (Yeyger, 2007). Despite the lack of terminological definiteness, it is possible to note that all interpretations of information noise reflect one common feature, namely that information noise is the disturbance originating from external factors and distorting the message, breaking its integrity, reducing its usefulness and possibility of recipient perception.

Irrelevant information prevents obtaining socially important messages for the person, complicates his orientation in information space. This, in turn, leads to discouragement for person's orientation in the world around, breaking of social communications, increasing of consciousness manipulation level.

Two types of information noise can be indicated, these are deliberate and inadvertent ones. Disturbances influencing recipient's perception of information without purposeful outside intervention, create inadvertent information noise. In case of deliberate information noise, so much information overload is created around the event that it becomes difficult for recipient to distinguish between true and false. Thus, the phenomenon of information noise promotes formation of new channels of network manipulation with individual consciousness.

For example, Swedish scientists Bard & Soderquist, having carried out a peculiar insight from the feudal past to the information future, showed that the main value of information influence consists not so much in information itself, as in access to its sorting and manipulation. Social control is maintained through imposing behavior and products consumption stereotypes. They marked following features of network society: tendency to a new class differentiation on account of access to information, and emergence of

netocracy power through the hierarchy of relationships in modern social networks. The lower stage of the system is united into a network of unlimited consumption, of which anyone can become a member. At the top of the hierarchy, there are Netocrats keeping knowledge and a network of links that can be useful for creating a specific information field in a given network and consciousness manipulating (Bard & Soderquist, 2004).

2. Problem Statement

The problem of the information society formation and its various components evaluation is one of the most discussed topics in modern humanitarian science from the end of the 20th century onwards. In the 2010s, information revolution continues changing the world, offering to mankind some essentially new decisions and opportunities in many spheres. At the same time, revolutionary influence of information and communicative technologies on all aspects of social life provokes the danger of fundamental shift in ideas of space, time and social order, creates a threat to cognitive resources of individual action. The pragmatics of computer-mediated communication is updated (Herring et al., 2013). Information flows are emphasized to act transforming role in shaping social reality. The Internet is treated as a special type of space (Bylieva, 2016).

However, one should note a lack of interdisciplinary works which would harmoniously unite the achievements of various scientific branches and offer research methodology invariantly to the type of person's activity handling modern information streams. There is still the lack in studies aimed at developing tools that promote an effective intellectual activity of the individual in the information society, and identification of the possibilities of this toolkit in the educational sphere. In the context of our research, the analysis of cognitive stability in digital culture is not without interest (Bruni, 2011). This proves the actuality of an educational practice focused on the cognitive activity, which is connected with information search, accumulation, analysis and optimum presentation. The focus of individual development and training tasks will involve the level of mental activity which researchers associate with informal logic and critical thinking (Paul, 1993). According to the coordinated statement of the American philosophical association and the group of experts, critical thinking is treated as purposeful, self-regulating system of judgments used in processes of interpretation, analysis, assessment and conclusions formulation, and also for the aims of explanation evidential, conceptual, methodological, contextual reasoning on which the system of judgments itself is founded (Facione & Facione, 2013).

3. Research Questions

The aspiration to impart added, verified, increased knowledge to future generations has been contributing to invention of new technologies for information preservation, processing and broadcast throughout history.

First information technologies have emerged at the pre-verbal stage of social development. Usage of durable carriers, such as rocks and other massive strong objects, became the most reliable technology for coded knowledge storage. However, having provided reliable broadcasting in time, they made information transfer at distance almost impossible; therefore "mobile" data carriers appeared (plates, parchment, and later - books).

Development of science, where traditionally technologies of the accumulated knowledge coding have come into use, resulted into coding systems universalization and, therefore, into a possibility of learning these systems. For training to be passed easier, its procedures have been formalized.

Formalization, and later systematization of information saved up by mankind, demonstrates that at a certain stage of social development the total volume of knowledge begins to exceed individual opportunities of a person for perception/processing/broadcast of information. Further improvement of information formalization and systematization processes leads to the fact that procedures of information coding/decoding eliminate from the user's attention; so he has no need to know the mechanisms that calculating machine or computer operates, it's enough to only learn a set of procedures of device handling. This facilitates person's informational activity; but collective access to computer networks becomes one of the reasons for dynamic increase of available information volume.

At first sight, simplified access to information resources provides the person less psycho-physiological load, as demands less intellectual and physical effort. Nowadays, access to network resources requires only presence of quite available certain technical means. But alongside this, information noise pressure amplifies, creating new problems in knowledge broadcasting and perception.

4. Purpose of the Study

Operating constantly increasing information funds becomes a really difficult task. The trend appears to simplify the access to information resources. In literature, shift to content simplification, transition from strict scientific documents to popular articles, diaries, forums is also noted. On this background, the value of information becomes relative, that results into a serious problem of communicative semantic barriers emergence and information noise arising in a network.

Our purpose is:
- to identify the cognitive resources for intellectual filters formation,
- to determine the toolkit, which promotes increase of efficiency of the individual educational and intellectual activity, taking into account the information influence of the network.

5. Research Methods

This work uses the method of interdisciplinary synthesis; its origins can be found way back in Greek philosophy, in its aspiration to construct uniform science as encyclopedic knowledge about the world. Modern philosophy distinguishes three types of interdisciplinary interactions in synthesis of knowledge the. The first relation type is called ontological taxonomy; it is characterized by subject reduction. In this case, knowledge from more advanced scientific discipline is used in another discipline carrying out methodological function. The second relation type is methodological dependence; in this case, schemes and norms of scientific knowledge accepted in one discipline are reproduced in another one. The third relation type is scientific and practical mutual justification; in this case, aspects of knowledge from different scientific branches supplementing each other, practically and axiological prove subject specifics for each of the interacting sciences. In our work, we mostly lean on the third type of interdisciplinary interaction which assumes scientific and practical mutual justification of philosophy, psychology, sociology, and informatics.

An interdisciplinary methodology of our research is presented with informational paradigm. We proceed from the fact that information is a key backbone factor of social and individual development. This is convincingly proved by modern practice of public life - whether science, economy or culture.

In analysis of the intellectual potential formation, we rely on the cognitive paradigm that emphasizes the basic role of knowledge system formalization in the educational process, ensuring the translation of knowledge through its perception and perusal.

6. Findings

6.1. The problem of intellectual filter formation

The issue on effective intellectual filters formation in educational practice becomes especially relevant against the backdrop of information channels diversity. Intentional noise pollution of information streams, switching individual attention to sophisticated information cases, and the whole range of other measures – all of them compose the technology of public attention management. As a result, the mass consumer receives either lack of valuable information which he could use as the basis for building his effective activity, or excessively noisy information stream, so detaching valuable information from it becomes a rather complex challenge. If it's impossible to independently change the content of information streams, information consumer should develop some countermeasures to information manipulations using any certain set of principles or rules of selecting valuable information from the flow.

Processes of information structuring, limitation, compression, coding can be considered as an intellectual filter operating. Bergson used this term in his work "Creative Evolution" (Bergson, 2015) claiming that human is almost not capable to sustain the thoughts, without passing them through the intellectual filter. Bergson has actually equated intelligence itself to the intellectual filter, as from his point of view intellectual activity is limited to the process of thought coding/decoding. In modern literature, the *intellectual filter* term represents a special tool kit of rational activity which includes a set of procedures for messages analysis, selection of information quanta from them according to preset criteria and rules.

Specialized toolkit providing rational activity on messages selection indicates the fact that throughout the historical development of society, a huge array of data have been accumulated, and its volume exceeds psychophysiological resources of the individual's perception. Since the moment when the whole information array accumulated in society had separated into sectoral knowledge, a person, due to his limited perception, have been forced to search for the necessary information, to scan data sets in accordance with a specific request. Along with the development of the information accumulation and storage technologies, the procedures for selecting data were being upgraded, improving the quality of rational activity, preparing the ground for the growth of knowledge and human cognitive evolution.

Division of labor has led to emergence of specialization and crafts; accumulation of data about the world has reasoned emergence of scientific knowledge; and the need to broadcast it in time has resulted into development of educational practice by means of which the complex system of information streams filtration started to form. During the process of education, the individual gets a certain invisible intellectual "space suit" via cutting off information messages which have no value or blocking undesirable invasion into individual information space. Note that flexibility and density of such "space suit" depend on type and severity of criteria making constituting the intellectual filter which functions are realized when critical

thinking activates. In order to provide the growing-up person with the mechanism of intensity and quality regulation for information exchange with surrounding information systems, the purposes of education have to be adequate to socio-cultural and technological model of information network.

Intellectual filter efficiency during cognitive process is especially important in the system of science and education. Scientific communities have long ago realized the need to standardize rational procedures for the information field filtration into a methodological complex that is independent of the individual consciousness but limits the information field of a scientific discipline. As an example of such a complex of rational procedures, one can consider Lomonosov's requirements to summarizing process stated in his article "The Reasoning on Journalists' Duties When Stating Compositions Intended for Maintenance of Philosophy Freedom" (Lomonosov, 1957).

Let's emphasize that both in network and in educational practice person obtains information about facts and objects which is already processed and represents the result of intellectual filters usage by the third parties. The intellectual filter functions delegation, which is often carried out with involvement of independent professionals performing information analytics, can be indicated as intellectual filtration outsourcing. For example, the politician reading at sight the speech text written by the expert can have no relevant knowledge to create such a document or to understand its meaning. In the conditions of information society, such outsourcing service becomes abstract, uncertain, but highly demanded because of program complexity of network. At the same time, information customers have no opportunity to check the quality of rendered services.

6.2. Cognitive resources for the specialist's intellectual culture formation

Along with technical means implementation into everyday life and business practice, information invasions into individual information space became more aggressive, taking the form of direct advertizing, spam, advertising introduction into free products. Also, technical capabilities of countering unauthorized invasions into individual and collective information space simultaneously increased by means of authorization, installation of filters and antispam software on e-mail servers.

In the network society, information expansion implicitly stimulated an appeal to the cognitive resources of society and individual consciousness in the matter of the specialist's intellectual culture formation. This difficult task includes two aspects: phenomenological and symbolic. There are two levels of cognitive structures, carriers of values and meanings, corresponding to them. Combination of cultural and phenomenal meanings, necessary for knowledge broadcast, would only occur in individual consciousness. Extra-personal structures of knowledge and principles of its organization fail to carry out the intellectual filter functions beside the mental activity in the form of reasoning and understanding.

In the context of our study, the level of understanding is characterized as evaluative assignment of meaning (Betti, 1962) and concerns to the critical thinking activity which combines affective (emotional) features and cognitive skills, in particular such as interpretation, analysis, assessment, conclusions formulation, explanation, self-regulation. The main accent in critical thinking is put on the fact that estimated judgment formulation is preceded by hard intellectual work which implicitly assumes logic of analysis and logic of interpretation (Paul, 1993). Thus, we argue that the intellectual potential of a person

should be determined not only by the sum of knowledge and a set of competences, but also by the developed ability of critical thinking.

Concerning extra-personal cognitive structures, the question arises, whether the universal complex of rational procedures is possible, providing the highest efficiency of information streams intellectual filtration and fully independent on person's cultural, disciplinary, professional specifics. Characteristics of personal thinking fixed in formal logic and person's psychophysical and biometric parameters, such as the volume of recent and long-term memory, throughput opportunities of sense organs (information channels), physical and physiological capacities defining limits of personal ability to generate, store, process and broadcast information – a set of these data can constitute the basis for such a universal intellectual filter.

6.3. The semantic matrix of information flow filtration

Extra-personal cognitive structures, represented by frames encoding cultural forms of knowledge and perception stereotypes, form certain reference points for intellectual filtration in cognitive and educational practice. The method of object referencing of information operates such structures, activating mental activity. In this case, the individual's attention and cognitive actions are guided by the algorithm of information transforming in a special sequence of documentary object analysis (Guzev, 1990). The information flow structuring assumes its fragmentation into information quanta and rearrangement of the selected quanta into 4 categories (supra-objects, objects, sub-objects and related objects). Supra-objects are determined by degree of their importance as answers to the appropriate questions asked by the researcher when studying the message in general - what? (Is made, analyzed, and developed). Objects are defined by the question – what for? Sub-objects are defined by the question – by what means? Connected objects are defined by the question - what else is known on this subject? Such optimization and resulting representation of information filtered on its basis most closely reflects natural principles of human intelligence action. The optimization structure for the process of knowledge and understanding is fixed in a sequence of questions:"what / what for / by what means / what else is known". In science system, similar structure of information presentation is applied: "subject / object / task / extent of research".

6.4. The universal method of the intellectual filter formation in educational practice

The algorithm of object summarizing, turning on information perception optimization natural to human can be considered as the universal method of the intellectual filter formation in educational practice. Format of the algorithm "supra-object / object / sub-object / connected object" assumes involving only universal logical procedures characteristic of abstract thinking forms, and also allows accounting of parameters which lay beyond the limit of formal logic but influencing logical conclusion. We believe that the algorithm of documentary object analysis can constitute the basis for personal intellectual filter formation of any representative of information community. Distinction will only consist in level of algorithm comprehension and its practical application.

So, within the frames of data transformation technology according to the method of documentary object analysis information units (objects of different types) correspond to a standard set of questions (What? / What for? / by what means? / What else is known?), which are always present at consciousness of any person in problematic situation. Thus, the format "supra-object / object / sub-object / connected

object" reproduces the structure of natural person intelligence. The result of such intellectual filtration represents the full set of info-quanta united into the document made by special rules (the object paper).

Universality of the format "supra-object / object / sub-object / connected object", in addition to the developed hypertext communications, creates a kind of increased intellectual "conductivity". This promotes higher technological effectiveness of created database, more accurate fixing of novelties in a source text, and helps to optimize cogitative skills of the modern professional.

6.5. Experience in application of data transformation technology by the method of documentary object analysis

In the network society, the format of information optimization presented above can improve the effectiveness of the individual's intellectual activity in educational process. To be convinced of this assumption practical validity, the data transformation technology according to the method of documentary object analysis has been applied in the educational process during seminar classes on philosophy and cultural science. The theoretical basis of this technology was explained to students in the beginning of the course, then everyone got the fragment of specialized text from 0,5 to 3 pages and the task was to transform linear text structure into the format with developed hypertext communications. At the first stage, method practice was performed by students and the teacher altogether; during the later classes the additional text material was offered to students semantically connected with the studied subjects for preliminary homework and subsequent class study. Firstly, this provided more serious preparation for seminar classes; secondly, this provided practicing of data transformation technology according the method of documentary object analysis. Total course work represented the initial task variation including the analysis of any specialized text of enough volume (15-20 pages) and constructing documentary object scheme of it. Thus, students were forced to read and revise a text source, but not just to get it printed.

It is necessary to add that the presented method introduction into educational practice intensifies formation of critical thinking ability. Specifics of critical thinking are defined by understanding position, where issues of arguments and their components analysis, issues of interpretation and understanding possess the most essential value (Paul, 1993). As to the critical thinking definition, it corresponds to three levels of complex intellectual activity: research, interpretation, and conclusion. Critical thinking strategy is characteristic of aspiration to significant logic with obligatory correction of informal logic mistakes in the process of interpretation and assessment of judgments and events.

7. Conclusion

Increase of information noise in network and social space aggravates the problem of effective intellectual filters formation which would optimize information flows in educational practice. Research of cognitive resources for intellectual filters formation leads to a conclusion that ability of critical thinking which creates intellectual potential of self-control in the process of judgments systems assessment is the most important condition for coordinating information field dynamics and person's mental activity in agile environment of network society.

Experience in application of data transformation technology by the method of documentary object analysis application in educational process of humanitarian disciplines (philosophy and cultural science)

have shown that the algorithm of object summarizing forces students to work with text information, carrying out its intellectual filtration. As a result of algorithm implementation, an ability of critical thinking develops that allows speaking about universality of this method as the future mechanism forming strong professional skills of any textual information analysis.

Growing importance of critical thinking as universal and highly effective tool of intellectual filtration of semantic information streams raises a question of revision of an education ideal which is by now defined with the sum of professional competences.

References

Bard, A., & Soderquist, J. (2004). *Netocracy. The New Power Elite and Life After Capitalism*. St. Peterburg, Russia: Stockholm school of Economics in St. Petersburg.

Berezovskaya, I.P., & Shipunova, O.D. (2015). Reverse side of Multimedia Pedagogics: Clip Thinking. *Mediterranean Journal of Social Sciences* MCSER Publishing, Rome-Italy, 6(6), 277-280 Doi:10.5901/mjss.2015.v6n6s1p277

Bergson, A. (2015). *Creative Evolution*. Moscow, Russia, Publisher: Academic project. .

Betti, E. (1962). *Die Hermeneutik als allgemeine Methodik der Geisteswissenschaften [Hermeneutics as a general methodology of the humanities]*. Tübingen: J.C.B. Mohr.

Brooks, S., & Longstreet, P. (2015). Social networking's peril: Cognitive absorption, social networking usage, and depression. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *9* (4). https://cyberpsychology.eu/article/view/6094/5922

Bruni, L.E. (2011). Cognitive Sustainability in the Age of Digital Culture. *Communication, Capitalism & Critique.* Vol 9, No 2. http://www.triple-c.at/index.php/tripleC/article/viewFile/301/287

Bylieva, D.S. (2016). The internet as a new type of space. *St. Petersburg State Polytechnical University Journal. Humanities and Social Sciences, 2* (244), 124-130. DOI 10.5862/JHSS.244.15

Bylieva, D., Lobatyuk,V., & Rubtsova A. (2018). Homo Virtualis: existence in Internet space. *SHS Web of Conferences, 44*, 00021. CC-TESC2018. https://doi.org/10.1051/shsconf/20184400021

Evseeva, L., Obukhova, J. & Tanova, A. (2017). Network technologies and the new perception of communication. *4th International Multidisciplinary Scientific Conference on Social Sciences and Arts.* SGEM. Book 6, Vol.1, 57 – 64. DOI:10.5593/SGEMSOCIAL2017/HB61/S7.07

Facione, P.A., & Facione, N.C. (2013). Critical Thinking for Life. *Inquiry* 28 (1), 5-25 DOI 10.5840/inquiryct20132812

Fox, J., & Moreland, JJ. (2015) The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances. *Computers in Human Behavior*, 45, 168–176. doi: 10.1016/j.chb.2014.11.083

Galkin, V. P., & Popov, Yu. A. (2001). Noosphere: the information noise and human qualities. *Philosophy of culture at the beginning of the third Millennium.* Cheboksary, 21–27.

Guzev, Y.S. (1990). *Development and implementation of methods and technology of information support of the process and preparation of decision support: the author's abstract dis. drops tech.* Moscow: VIMI

Herring, S., Stein, D., & Virtanen, T. (Eds.) (2013). *Pragmatics of Computer-Mediated Communication*. Berlin, Boston: De Gruyter Mouton.

Klochkova, E., Volgina, A., Dementyev, S., & Klochkov, Y. (2016). Human Factor in Quality Function Deployment. In I.Frenkel & A. Lisnianski (Eds.) *Second International Symposium on Stochastic Models in Reliability Engineering, Life Science and Operations Management* (SMRLO) (pp. 466-468). Beer-Sheva, Israel: IEEE. DOI: 10.1109/SMRLO.2016.81 1

Lomonosov, M.V. (1957) *Works*. Moscow, Russia: Nauka, T. 5.

Paul, R. (1993). *Critical thinking.* Santa Rosa, California, USA: Foundation for critical thinking.

Razinkina, E., Pankova, L., Trostinskaya, I., Pozdeeva, E., Evseeva, L., & Tanova, A. (2018). Student satisfaction as an element of education quality monitoring in innovative higher education institution. *E3S Web of Conferences*, *Vol. 33*, 03-43. doi:10.1051/e3sconf/20183303043

Shannon, C. E., & Weaver, W. (1963). *Mathematical Theory of Communication*. Chicago, USA: University of Illinois Press.

Yeyger, V. G. (2007). *Informational aspect of speech acts: towards a qualitative theory of information.* Retrieved from http://homepages.tversu.ru/~ips/JubEiger.html