

Methods of Critical Thinking in Classes of Philological Disciplines in Higher Education Institutions: Neuroscientific Approach

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Abstract: *The relevance of the research in the context of determining an importance of critical thinking lies in the excessive informatization of a modern society. The Internet is becoming a source of a large flow of an information, which is spread through the intensive use of an information and communication technologies in almost all areas of human life. The article highlights features of a digitalization in the modern world, as well as the main methods of critical thinking for an analysis and an evaluation of an information.*

The research work is based on theoretical and methodological approaches of researchers of critical thinking as a method, in particular in the field of philology. Theoretical and methodological approaches of the research became the basis for determining results of an effective implementation of critical thinking methods in philological classes in higher education institutions in the context of a neuroscientific approach.

In order to study the effectiveness of the use of critical thinking in philological specialties some research, descriptive and scientific methods were used. The method of an analysis was also used in the context of distinguishing the concept of a method, critical thinking, specialties of philology and a neuroscientific approach. To determine the main results of the research, a generalization method was used.

Results of the research became the basis for a need to think critically in the modern historical space, as digitalization of the society has led to a continuous flow of an information, which causes the infodemia as destabilizing factor in a public life. Also, future professionals in obtaining a qualification must clearly distinguish the true information from an inaccurate, which can be realized in the presence of a critical perception of an information flow.

Keywords: *Competent qualification; self-realization; self-affirmation; neuropedagogy; media resources.*

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Introduction

The modern society is at the stage of globalization, integration and development in the context of an informatization. A social process in the context of introduction of digital technologies in almost all spheres of human activity are developing rapidly and changing. This aspect leads to the need to improve a level of competence of specialists in various fields. A qualified specialist can succeed in various fields of professional activity (Ananyev, 1980). Therefore, the task of higher education is to form highly qualified specialists who can realize their abilities, using achievements of the modern society and at the same time are able to generate ideas for a future development.

The main task of the education is the formation of a competent socialized personality with value orientations, who is able to determine their priorities for achieving goals and a self-realization (Bern, 1992). The digitalization of all spheres of a social life has led to the transition of man from the physical environment to the virtual, which requires a critical perception, i.e. the ability to separate a necessary and unnecessary information, which becomes total in all spheres of a human life. Another important aspect of the critical perception of an information is the emotional distraction from the psychological impact of information on a person, which can cause panic or lead to wrong decisions, which can be even fatal. That is, informatization can often lead to such a phenomenon as infodemia. In modern conditions, infodemia is a common phenomenon (Bibik, 2002). Infodemia is spreading a fake information about the coronavirus, which has a negative impact on the health of many and is an example of critical thinking. This trend has determined the relevance of the research in the context of higher education, including philology.

The research has analyzed theoretical conclusions of scientists on the method of critical thinking. The definition of an education as a process of acquiring knowledge and skills, the result of assimilation of acquired experience by an individual in order to develop, form competencies and values. It is determined that the method of critical thinking is effective for the formation of the qualification level in the modern post-industrial information world. Critical thinking in the research is seen as a set of mental operations that demonstrate a person's ability to analyze, evaluate an information from different sources, synthesize, compare, solve problems, find a way out, make decisions, see alternatives to the situation. Since the key factor of critical thinking is brain activity, it is necessary to analyze the

neuroscientific approach to the analysis of the effectiveness of critical thinking to acquire a personal competence for a self-realization.

The research has analyzed media resources as one of the factors that determine the development of an innovative society in the context of digital transformation (Dewey, 1938). Media resources and information and communication technologies are the main source of an information in modern times. In order to form an idea of critical perception of an information, the exercises were analyzed on the example of philological specialty.

Thus, it is established that the method of critical thinking is effective in the context of a mental complex of actions in educational activities, which prevents the manifestation of a negative phenomenon in the informatization of society.

Objective of the article- to analyze and investigate an effectiveness of the method of critical thinking in classes on philological disciplines in higher education institutions in the context of a neuroscientific approach.

To achieve this objective it is necessary to implement the relevant tasks:

- To determine the essence of the method of critical thinking in conducting classes in philological disciplines;
- To analyze the main theoretical and methodological approaches to the formation of critical thinking in the context of the neuroscientific approach;
- To Investigate the effectiveness of the method of critical thinking in the era of an information and communication technologies as a basis for forming awareness for students of the correct perception of an information and making informed decisions.

Methodological principles of the research are the analysis of conclusions of researchers on the principles of conceptual categories and definitions (Bortoletto et al., 2014). The research work proposes a systematic integrated theoretical and methodological approach to the analysis of an essence of the method of critical thinking in the context of the neuroscientific approach as effective in the era of an informatization and digitalization of a social development, in particular, defining concepts that reveal the content of the research.

The scientific views of representatives of various social sciences are generalized, which gave the opportunity to clarify the concept: "A method of critical thinking"; "A neuroscientific approach to the formation of critical thinking in students", "Informatization - as the main components of the

progress of the modern society", "Pedagogical methods of forming critical thinking in students of philological disciplines".

The method of critical thinking has been found to be effective in the context of selecting the right information that will be useful in making the right decisions (Duane et al., 2018). Critical thinking is formed as an integration of brain work and awareness, which is a manifestation of a set of mental actions that are effectively used in teaching, so it is necessary to identify the main manifestations of critical thinking as a method of forming a competent approach.

In order to analyze in details the scientific work are used research and descriptive methods in the context of science. In order to define concepts that cover the main content of the research, a method of synthesis of a figurative structure, generalization and classification, methods of a formation of socio-cultural values were used. Also, in order to accurately research the theoretical foundations of this issue, a content analysis was conducted, based on which the results of the article were determined using the conclusions of scientists on this issue.

The work is based on theoretical statements of scientists in the context of the neuropsychological research, which highlights scientific approaches to self-regulation of a personality (Berbets et al., 2021; Demchenko et al., 2021; Karasievykh et al., 2021; Kosholap et al., 2021; Prots et al., 2021; Sarancha, et al. 2021). Some researchers claim that the idea of developing critical thinking originated in the United States, Kaplan & Norton (2005) and Dewey (1938a). Cavell (1990) characterized critical thinking as qualified, responsible thinking that generates correct judgments. Bortoletto et al. (2015) argues that the function of critical thinking is to solve problems and establish the right conclusions. Kovaleva (2019) believed that the key skill is to determine hypotheses in critical thinking. Maksymenko (2000) defined critical thinking as a complex process that begins with the processing of an information and ends with decision-making. Based on the analysis of conclusions of scientists, it can be argued that critical thinking has certain characteristics: self-esteem, responsibility, determination, etc. (Ananyev, 1980; Bern, 1992).

Modern scientific discourse intensifies the research of a wide range of domestic scientists on various aspects of axiological issues, in particular, devoted to the disclosure of: conceptual ideas of the axiological approach (Sikorska, 2006); pedagogical and educational values in the format of a pedagogical axiology, etc.

Theoretical principles of the essence in the method of critical thinking in the context of studying philological disciplines

Modern society is formed in conditions of informatization and radical changes that require a constant development of a new knowledge and skills. Such trends in the social development determine an importance of a person who is able to show their individual abilities in the process of a self-realization, which can learn, develop skills and knowledge, generate new ideas and put them into practice. Young people should appreciate innovations, discoveries that can improve a well-being of the society, ignore an unnecessary or harmful information. Since modern reality is full of an information and facts, it is necessary to form in the individual awareness of the correct orientation in the information flow.

To determine the right information, it is important to develop practical skills that help process an information into new ideas that can be put into a real life and succeed. Substantiated information can be an important factor in the formation of new approaches to social development. Today, human life is changing very quickly and there are prerequisites for the value of an information, as a factor in the innovation of society, rapid progress, continuous improvement of a technical equipment.

The educational process is one of the most important instrumentality, which forms a modern competent person capable of self-realization in the information society. Therefore, an important role in educational activities is given to the method of critical thinking (Padalka, 2008). The method of critical thinking is introduced in order to form analytical skills, the ability to analyze sources, compare concepts, calculate risks in decision-making, determine the right approaches in the process of success.

Hence, the current stage in the learning process is marked by the formation of critical thinking in a person who can properly assess environmental events, their role in the society, as well as the impact of socialization on the formation of a personality. This approach is implemented in the process of forming human qualities that are improved in the process of mental activity.

Philological disciplines in higher education are the basis for the formation of values towards oneself, society and the state. Upon obtaining a certain level of philological specialties, a person develops his speech and communication skills. Such abilities are decisive in the process of an information processing. That is, the process of obtaining an information, analyzing it, as well as reproduction and dissemination are important. With

the speech and communicative methods of presenting an information, a modern information environment is formed.

Philology is a science that has been studying the cultural, folklore and historical heritage of people for many centuries. The basis of philology is a text that can be interpreted as source, as cultural monument that forms stylistic features, is a subject for the study of etymology of words, and others. There are research, descriptive, comparative-historical, transformational and other methods to study philology (Sikorska, 2006). Thus, philology is an important component of the information society. Students of philological disciplines acquire competencies in the processing of information contexts and receive a qualification that plays an important role in the process of digitalization of a social life in the modern post-industrial world.

The method of critical thinking is especially important in the process of conducting philological disciplines, as students - future discoverers of information sources in social sciences, must critically comprehend an information, identify essential features of concepts, understand the functionality of an information flow, responsibly disseminate the information, prevent an infodemia and disinformation (Duane et al., 2018).

In order to effectively form a method of critical thinking, it is necessary to introduce innovative learning technologies that promote the acquisition of an experience, development of knowledge and skills, formation of personal growth to gain competence in their field.

The method of critical thinking in the conduct of philological disciplines is effective because students acquire the competence to critically evaluate facts, analyze information and acquire speech and communication skills, which is a key component of the modern information society.

Theoretical and methodological approaches in neuroscientific features of critical thinking of the individual

The formation of an innovative society takes place in the context of an intensive development of information and communication technologies. Man is a leader in the development of innovative technologies, as well as identifies new opportunities for the information society. In order to determine the role of man in the progressive development of the society and continue the process of evolution, it is necessary to analyze a set of mental actions and awareness of the relevant life processes of the individual, which is reflected in the analysis of brain activity.

Researchers Dewey (1938a) and Giddens (1991) studied the features of educational activities as a neurological phenomenon of a personality.

According to some researchers (Peha, 2011), education shapes the long-term development of the future. Thus, it is important to implement a competency-based approach to educational activities and the formation of value orientations of the individual in terms of thinking.

Neuroscience is the scientific study of the human brain, it identifies key trends in the context of the research of a thought process of the human brain (Vdovichenko, 2017). The researchers define thinking as a systemic conscious manifestation of mental activity in the period of personal goals (Virna, 2017). Such conclusions became the basis for determining the neuroscientific approach to the formation of critical thinking.

Neuroscience explains key positions of a thinking process and activity of the brain in general. The main component of the thinking process is mind. Mind is a physiological ability to comprehend everything necessary for human activity, the ability to analyze, interpret an information as one of important factors of a modern human progress (Gray, n. d.). Another factor in the brain process is consciousness, i.e. mind. Consciousness is a certain interpretation of the mental analysis.

The brain process works in parallel: areas of the cortex are responsible for similar functions (for example, for mathematical abilities), located in different parts of the brain - from the front to the occipital lobes. Neuroscience interprets consciousness as a phenomenon of nervous activity in the combination of large areas of the cerebral cortex. That is, there is a certain "working process" of a brain action, where the consciousness is activated by the mass dissemination of an information.

Critical thinking as one of complex manifestations of a mental activity is considered in the context of a human awareness of various factors of its successful life. At the same time, an important element is the presence of mind as physiological feature, as well as actual process of a critical perception as an acquired level of an awareness and erudition in the educational process. Thus, the neuroscientific approach to the formation of critical thinking is based on the study of human brain activity, which has complex physiological features that determine its behavior, character and temperament (Zhavoronkova, 2019). The brain work is a complex process that determines features of a human development in the society (Padalka, 2008).

The research of an efficiency of critical thinking in the process of philological classes in higher education institutions

The present era is at the stage of formation of the information society, which can realize new perspectives for the future, which can be

unpredictable, because the total digitalization and informatization of a social processes is a stepping stone to unknown discoveries (Vuckovic, 2019). However, the most important component of an intensive progress is a person who can become a pioneer of new perspectives, provided the effective development of achievements of the past and the challenges of the present. A developed personality can be a driver of change and successful realization of the goal of both society and their own, an individual.

A successful personality is formed in the process of educational activity. A particularly important stage of the educational process is obtaining higher education (Padalka, 2008). Higher education implements a certain level of knowledge required for professionals in the context of qualifications. Philological disciplines in higher education institutions are taught to humanities specialists, teachers, foreign language specialists, etc.

Based on the research, it is determined that philological disciplines form the competence of students to operate with information resources that are leading in the modern innovative society (Maksymenko, 2002). For conducting classes in philological specialties, it is necessary to introduce a method of critical thinking, which is effective for the competency analysis of information sources.

In order to apply the method of critical thinking in the context of conducting philological classes, we propose an indicative structure of a fragment of the academic class:

- The organizational part. Greetings in the native language used in the history of the Ukrainian people at different times.
- Actualization of basic knowledge. Summing up the key problem of the lesson.
- The main part. Hypothesis. Information sources analysis.
- The final part. Generalization of discursive statements. Formulation of a conclusion-judgment.

Examples of tasks for students of philology to form critical thinking (Kaplan & Norton, 2005). The topic of the lesson is on the culture of oral and written speech "Etymological significance of language units":

Task 1: What is the difference between etymological explanations of the word "road" in Soviet and European linguistics? Evaluate this approach from a linguistic point of view.

Task 2: Create an essay on "The Revolution of Dignity for me as a person." One of the theses is to use the phrase "Slaves are not allowed into paradise".

Thus, the students express their ideas about various historical events, explain the etymology of words, using their own assessment (Smith &

Schwartz, 1997). In order to competently solve the problem, they must analyze the information that covers the content of tasks, conduct a synthesis, integration methods, comparative the history and make their decision, which is the result of critical thinking.

Conclusion

The conducted research work has determined the basic meaning of the concept of critical thinking. Theoretical and methodological approaches to using the method of critical thinking as a basis for the formation of a person capable of a self-realization in the today's innovative world were analyzed. It is determined that critical thinking is a factor in shaping the correct perception of an information that will be useful for a life.

In the research was analyzed the neuroscientific approach to the definition of critical thinking. Brain activity is a complex process that combines mind and awareness. Neuroscience studies the action of the brain and determines the components of the thought process.

In order to determine the effectiveness of critical thinking, the research was conducted on the application of the appropriate method during classes in philological disciplines in higher education institution. Philology students, future specialists, must competently analyze an information, because they are carriers of a speech and communication culture in the society.

Thus, the study showed that critical thinking is an important factor in forming a competent approach in the context of self-realization of the individual in the information society.

References

- Ananyev, B. G. (1980). *Izbrannyye psichologicheskie trudy* [Selected psychological works]. GNPBU.
- Berbets, T., Berbets, V., Babii, I., Chyrva, O., Malykhin, A., Sushentseva, L., MEDYNSKII, S., Riaboshapka, O., Matviichuk, T., Solovyov, V., Maksymchuk, I., & Maksymchuk, B. (2021). Developing Independent Creativity in Pupils: Neuroscientific Discourse and Ukraine's Experience. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(4), 314-328. <https://doi.org/10.18662/brain/12.4/252>
- Bern, E. (1992). *Iгры w kotorye igrajut ludi. Psihologia chelovecheskikh vzaimootnoshenij* [Games that people play. Psychology of human relationships]. University Book.

- Bibik, N. M. (2002). Systema formuvannya piznavalnyh interesiv molodshyh shkolyariv [System of formation of cognitive interests of junior schoolchildren]. *Rozvytok pedagogichnoi i psykholohichnoi nauk v Ukraini* [Development of pedagogical and psychological sciences in Ukraine], 2(10), 410-423. http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?I21DBN=LINK&P21DBN=UJRN&Z21D=&S21REF=10&S21CNR=20&S21STN=1&S21FMT=ASP_meta&C21COM=S&2_S21P03=FILA=&2_S21STR=peddysk_2011_10_13
- Bortoletto, M., Veniero, D., Thut, G., & Miniussi, C. (2015). The contribution of TMSEEG coregistration in the exploration of the human cortical connectome. *Neuroscience & Biobehavioral Reviews*, 49, 114-124. <https://doi.org/10.1016/j.neubiorev.2014.12.014>
- Cavell, S. (1990). *Conditions Handsome and Unhandsome: The Constitution of Emersonian Perfectionism*. University of Chicago Press.
- Demchenko, I., Maksymchuk, B., Bilan, V., Maksymchuk, I., & Kalynovska, I. (2021). Training Future Physical Education Teachers for Professional Activities under the Conditions of Inclusive Education. *BR/AIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(3), 191-213. <https://doi.org/10.18662/brain/12.3/227>
- Dewey, J. (1938). *Experience and Education*. Collier-MacMillan Canada Ltd.
- Duane, E., Haines, G., & Mihailoff, A. (2018). *Fundamental Neuroscience for Basic and Clinical Applications E-Book*. Elsevier.
- Giddens, A. (1991). *Modernity and self-identity. Self and society in the late modern age*. Polity Press.
- Gray, P. (n.d.). *A Brief History of Education. To understand schools, we must view them in historical perspective*. Psychologytoday. <https://www.psychologytoday.com/us/blog/freedom-learn/200808/brief-history-education>
- Kaplan, R. S., & Norton, D. P. (2005). Creating the Office of Strategy Management. In *Working Knowledge. Business Research for Business Leaders* (pp. 5-71). Harvard Business School. <https://www.hbs.edu/ris/Publication%20Files/05-071.pdf>
- Karasievych, S., Maksymchuk, B., Kuzmenko, V., Slyusarenko, N., Romanyshyna, O., Syvokhop, E., Kolomiitseva, O., Romanishyna, L., Marionda, I., Vykhrushch, V., Oliinyk, M., Kovalchuk, A., Halaidiuk, M., & Maksymchuk, I. (2021). Training Future Physical Education Teachers for Physical and Sports Activities: Neuropedagogical Approach. *BR/AIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(4), 543-564. <https://doi.org/10.18662/brain/12.4/264>
- Kosholap, A., Maksymchuk, B., Branitska, T., Martynets, L., Boichenko, A., Stoliarenko, O., Matsuk, L., Surovov, O., Stoliarenko, O., & Maksymchuk,

- I. (2021). Neuropsychological Bases of Self-Improvement of Own Physical Health of Future Teachers in the Course of University Education. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(3), 171-190.
<https://doi.org/10.18662/brain/12.3/226>
- Kovaleva, A. V. (2019). *Neyrofiziologiya, fiziologiya vysshey nervnoy deyatel'nosti i sensorykhn sistem* [Neurophysiology, physiology of higher nervous activity and sensory systems]. Ruslania. <https://ruslania.com/ru/knigi/1535861-nejrofiziologija-fiziologija-vysshej-nervnoj-dejatelnosti-i-sensornyh-sistem-uchebnik-dlja-spo/>
- Maksymenko, S. D. (2000). Myslennya [Thinking]. In *General psychology: a textbook for university students* (pp. 202-217). Univer.
http://univer.nuczu.edu.ua/tmp_metod/875/Maksimenko_S.D._Zagal%27na_psihologiya.pdf
- Padalka, G. M. (2008). *Pedahohika mystetstva. Teoriya i metodyka vykladannya mystetskykh dystyplin* [The theory and methods of teaching artistic disciplines]. Kherson.
- Peha, S. (n.d.). *Agile Schools: How Technology Saves Education (Just Not the Way We Thought it Would)*. Infoq. <https://www.infoq.com/articles/agile-schools-education>
- Prots, R., Yakovliv, V., Medynskyi, S., Kharchenko, R., Hryb, T., Klymenchenko, T., ... Maksymchuk, B. (2021). Psychophysical Training of Young People for Homeland Defence Using means of Physical Culture and Sports. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(3), 149-171.
<https://doi.org/10.18662/brain/12.3/225>
- Sarancha, I., Maksymchuk, B., Gordiichuk, G., Berbets, T., Berbets, V., Chepurna, L., Golub, V., Chernichenko, L., Behas, L., Roienko, S., Bezliudna, N., Rasskazova, O., & Maksymchuk, I. (2021). Neuroscientific Principles in Labour Adaptation of People with Musculoskeletal Disorders. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(4), 206-223.
<https://doi.org/10.18662/brain/12.4/245>
- Sikorska, I. M. (2006). *Zubyskyi Volodymyr Danylovych* [Zubitsky Vladimir Danilovich]. Encyclopedia of modern Ukraine.
https://esu.com.ua/search_articles.php?id=13946
- Smith, M. B., & Schwartz, S. H. (1997). Values. Handbook of CrossCultural Psychology. *Allyn & Bacon*, 3, 77-118.
https://www.researchgate.net/publication/289252331_Values
- Vdovichenko, O. V. (2017). Ryzky osobystosti yak faktor motyvatsiyi dosyagnennya ta gubrystychnoyi motyvatsiyi na kryzovykh etapakh ontogenezu [Individual risk as a factor of an achievement motivation and humorous motivation at crisis stages of ontogenesis.] *Bulletin of H.S. Skovoroda Kharkiv*

National Pedagogical University, 41-51.

<http://journals.hnpu.edu.ua/index.php/psychology/article/view/19>

Virna, Z. P. (2017). Gubrystychna determinatsiya strukturnoyi orhanizatsiyi emotsiynoho intelektu osobystosti. [Hubristic determination of a structural organization of the emotional intelligence of an individual.] *Scientific Bulletin of V.O. Sukhomlinsky Nikolaev National University*, 2(18), 17-21.

<http://mdu.edu.ua/wp-content/uploads/psihol-visnik-18-2017-5.pdf>

Vuckovic, T. (2019). The Overall Goal of Education and General Purpose. *International Journal For Empirical Education and Research*. 3(20), 53-66.

<https://doi.org/10.35935/edr/33.6653>

Zhavoronkova, L. A. (2019). *Neyrofiziologiya: mezhpolusharnaya asimmetriya mozga cheloveka (pravshi-levshi)* [Neurophysiology: interhemispheric asymmetry of the human brain (right-handed-left-handed)]. Urait.