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# Visualization in the digital environment: from tradition to innovation

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Abstract — The article proposes to consider visualization as a special way of perception and representation of information by a person in the Post Literacy environment. Understanding of literacy has acquired a broad outline and extends not only to the interpretation of verbal texts, but also the texts of visual, auditory, media, as well as texts that have a multimodal character. Visualization as a method- is a common practice in the educational environment and has established traditions. The method of culturological interpretation of texts (in a broad sense) allows us to "squeeze" meanings and present them in the form of meaningful and logical text, since visualization involves the process of decoding. Visual literacy is considered as a result of the student's mastery of the skills of critical thinking, systematization and interpretation of data, information and communication technologies. An innovation is the possibility of representing data (visual and visualized) in a digital environment, which contributes not only to the inclusion of the student in the media context of modernity, but also to the professional development of their personality.

Keywords — visualization method, digital environment, cultural interpretation method, visual literacy, traditions and innovations in education.

### I. INTRODUCTION

The challenges of the information age are aimed at rethinking by a man of a complex and multidimensional reality (including virtual), building communication technologies in a social environment and shaping the mechanisms of personality adaptation in a rapidly changing world. The power of visual images has acquired a special significance for society in the knowledge of the surrounding reality. According to D.V. Kolesnikova, "reality becomes an archive of ideas about reality and a database for creating new images" [1]. They are distinguished by manufacturability and targets that are associated with the effect on the subject of perception, with the representation of the process of constructing an image, the actualization of meanings and values in new forms. Under the influence of hypertrophied visualization, the human perception of the 21st century changed. "Catching" reality in images and their immediate capturing has become a common practice in the field of Digital Art (digital painting, photography, vector graphics and animation, photo manipulation, animation design, etc.). The skills of visualization of images using technical tools and gadgets today have acquired the character of a mandatory element of communicative processes.

Education as a sphere of intersection of traditions and innovations actively responds to the changes taking place in

the culture of the 21st century. The principles of working with multi-layered and polysemantic information are important for all subjects of education, since they are associated with the development of a person's cognitive and creative thinking. The ability to reflect the surrounding reality in all its diversity, in its "fluidity" (Z. Bauman) and variability in the historical and cultural context, the ability to actualize the meanings in the images and express them in languages understandable to the contemporary (verbal, auditory, visual), giving the utterance integrity , - result achievable through continuous personal interaction. Today, it is increasingly organized with the help of technical tools and technologies, in particular, - digital ones.

#### II. RESEARCH METHODOLOGY

Educational practices of the Russian Federation provide the implementation of Federal state educational standards at different levels: from pre-school to university, – and involve the development of "soft skills" One of the main conditions is the implementation of practice-oriented and individualpersonal approaches. Communication and communicative areas are layered on each other, forming an information area where technological and substantive components require the student to dive into the material, to comprehend it and use presentation skills with the means available to it. In this sense, visualization is advantageous and optimal, as it is used by natural and human sciences for replication, popularization and representation of data.

It may be represented as

visual means,

- actions as a practice with multiple options (experiments),

- the process of translating verbal language into the language of images,

- a visual image designed for a special type of reading (for example, digital art),

– multimodal text combining video, sound, image, etc.

In all cases, visualization provides a special type of literacy that has developed in the Post Literacy environment [2]. The authors of the monograph "Communication trends in the era of post literacy: polylingualism and multiculturalism" define literacy as a complex system of possibilities for a subject of a culture to read all the texts generated by a culture, i.e., to perceive, decode and interpret them. This is the broadest and most universal interpretation of literacy - a new and productive cultural key to the description of the entire system of current (modern and postmodern) culture [3]. A new type of



literacy, emerging in the digital area, is necessary for a modern man along with traditional literacy.

The method of data visualization in the humanities correlates with the method of cultural interpretation of the phenomena of reality. They include ways of organizing the presentation of the text through verbal and visually perceptible images and its full and/or partial inclusion in the digital environment.

The specificity of the method of cultural interpretation is the essence of the process of reading texts of different modality:

- in the ability to overcome the boundaries of other sciences and disciplines and "indent" their methodological solutions (comparative historical, structural-functional, semiotic, synergistic, etc.) in order to maintain the contours of the studied and comprehended space;

- in a meta-scientific vision that opens a holistic view of the culture, the processes taking place in it, including social ones, about the place of a person in it;

in the appeal to descriptiveness (when characterizing typology) as a necessary methodological device in order to clarify and concretize the meaning of a particular cultural phenomenon;

 in dispersing on trifles, facts, specifics regarding, for example, works and phenomena of artistic culture in order to give an idea of their complex nature;

- in freedom from dogmas and canons of universalization in the description of cultural reality: the choice of the narrative scenario remains with the subject, and the phenomena that fall into the field of cultural analysis are situational in nature;

- in the ability to individualize a situation that is subject to scientific reflection: the subject beginning in the argument and the choice of its methods prevails in humanitarian studies [4].

Interpretation is one of the universal ways of working with cultural phenomena and texts: it represents the way in which words, things, events in their historical and cultural reality are explained and analyzed. Interpretation practices and their choice are determined by the type of activity of the interpreter and the scope of their actualization. The historian addresses facts by building logic from them that reflects the subjective perception of reality. The philosopher is interested in the movement of thought, key concepts and the reflection of society on them. Art critic -is interested in techniques and methods that are used by the artist in the process of creating a work. The philologist "reads" the era represented by literary texts, identifying their genre and style transformations.

Digital technologies greatly facilitate the work of humanities, but also largely oblige them. In particular, – to master information literacy skills and data representation technologies in the information environment under the conditions of the Post Literacy.

#### III. RESULTS OF THE RESEARCH

In the process of learning, the method of step-by-step learning of the representation of visualized information is important both in traditional communication practices and personal interaction, and in the digital environment. Note that the basis of innovative visualization practices are longstanding traditions that should not be neglected. Their mastering by students is one of the stages for finding a productive and creative solution in the field of visual practices. As examples, we offer:

 a compilation of mental maps and memory cards when working with information – the method of "folding" (reducing) text into visual images or concepts presented as a diagram,

- drawing graphs and diagrams;

- development of figurative thinking based on the "Image and Thought" technology [5].

Today, visual images can be represented as an area of meaning formation that is autonomous in relation to a language, having its own communicative and cognitive capabilities. Visual images are read according to the laws of linguistic text, since the information embedded in them has a semantic content, designed and structured, although the generative environment characteristic of the visual produces and disseminates intersubjective content other than by verbal means.

The innovative component manifests itself as a result of creative decision and manifestation of **visual literacy** skills, which we define not only as a way of meaningful and creative reading and interpretation by the subject of perception of information presented in the conditions of the 21st century videocracy, but also as a special level of a competent, professional approach to phenomena of cultural and social reality. Systematic, critically meaningful and representative research (not only scientific, but also personally meaningful) with technological effectiveness (including media in the widest aspect) of translation becomes a product and a result of the implementation of visual literacy skills in the digital environment.

#### IV. DISCUSSION OF RESULTS

The "challenge", thrown down by the technogenic environment, for a man became a field of search for the "answer" and key decisions. The methodology of instrumental interdisciplinarity combines the methods and tools of the natural and social sciences and humanities. The practice of reading texts, both linguistic and multimodal, requires special training of students and interpretation skills. This is necessary both for research creativity and for further activities related to the transfer of information from subject to subject. We agree with the opinion of Anne B. McGrail [6] stating that learning to read has the potential for disciplinary openness, with emphasis on the joint practice of cognition of reality and critical reflection on information. Digital humanitarian pedagogy is focused on developing reading platforms, as well as institutional spaces that implement the principles of integrated and interdisciplinary learning. Borsuk and Bouse claim that "Comparative textual media benefits from the collisions of old and new forms, as well as different instructional modalities" [7].

R. Buurma notes that the changes caused by digital technologies dictate "a new pedagogical challenge for teachers whose fundamental charge is to teach students 'how to read'" [8]. R. Davis marks that "digital projects, networks, communities, and resources provide ample opportunities for students to transfer their learning" [9, 36].

Back in 2010, it was noted that one of the intellectual problems –is the management of one's own learning [10]. The practice of reading multimodal promotes the development of cognitive thinking skills and the "restoration" of a holistic image of reality, which subsequently affects the quality of education and the professional development of the personality. As noted by V. E. Steinberg, N.N. Manko, "the methods and means of visual representation of knowledge need to be improved in order to align the levels of intellectual and professional activity in education [11].

Paul Fyfe, when describing the possibilities of digital humanitarian pedagogy in his article, claims about the feasibility of learning based on projects that require a sensible approach at all stages of its implementation, manifestation of cognitive thinking skills and visualization not only within the educational community, but also beyond. According to the author's logic, this contributes to the personal and professional development in the future [12].

In the history of foreign and domestic pedagogy, visualization was traditionally understood as a means of visualization and illustration, which is accompanied by a verbal text. This type of visualization is defined by S. Segenchuk [13] as static. The author defines a dynamic type of visualization as a process whose elements can change over time, which contributes to the demonstration of ideas to students about the presence of numerous variants of the process itself, the complexity of the phenomenon and the multitude of points of view on it. The simulation mainly used in the natural sciences may be an example: engine models, mixing liquids and so on. In this case, students can interact with such visualization, either directly participating in it during its execution, or independently modeling a simulation [14]. With this understanding of visualization, it is important that the action itself is viewed as the practice of "see vs act", in which the subject is directly involved.

Today, there are modern techniques that are focused on the development of imaginative and cognitive thinking among different age groups. In their fragmentary action, they represent only the stage necessary for developing the skills of systemic vision of reality and its representation. A systematic approach is needed to overcome the eclectic thinking and world outlook of a modern man. The basis of digital pedagogy is not the abandonment of traditional practices of working with visuality, but the transformation of methods that allow integrating the experience of digital technologies into the sphere of humanitarian knowledge. We agree with A.N. Ioffe who proposed to consider visualization in education as "a method of obtaining and summarizing knowledge based on a visual image of a concept, event, process, phenomenon, fact based on associative thinking and systematic structuring of information in a visual form" [15, p. 3]. Translation of information from a text format to a graphic form is not an alternative to the verbal approach in education, but contributes to improving the efficiency of teaching in their synergistic combination.

In this context, visual literacy and skills of its implementation through the presentation of texts and the results of their reading in visual images becomes important. Visual literacy was defined by Braden R., Hortin J. as "the ability to understand (read) and use (write) images, as well as to think and learn in terms of images" [16]. Formed at this level, the competence of the subject characterizes the professional approach to the analysis and interpretation of the visual imagery.

Traditionally, visual literacy is considered in a combination of three elements that are interconnected and reflect the process of interpretation and qualified reading of the visual text of a culture:

- the process of communication between the object and the subject of perception,

- features of the interaction of elements of the visual image with the subject of perception,

- the ability of the subject to perceive adequately and produce visual images in cultural activities.

Formation of visual literacy is a special task of modern humanitarian pedagogy, which is the need to develop critical thinking skills, focused on understanding and revising the mechanisms and content of broadcast information in current socio-cultural practices that play an important role in the process of acquiring visual experience.

According to D'Ignazio and Bhargava in a 2018 article, and one cannot but agree with them about "much work remains to be done in clarifying and standardizing the definition of data literacy, especially in relation to a shifting field of technological developments and visual communication practices. What should data literacy look like for non-technical learners, who will not go on to be data scientists, but who will need to communicate with data in their professional lives? <...> the best way forward is through engaging learners where they are with hands-on creative activities that build their capacity. Without such invitations any efforts to work with novices will fall into a techno-centric focus on software skills acquisition, which has little chance of connecting learners to the opportunity of data to help them achieve their goals. This is a critical research agenda for those in the digital humanities space, who have a history and practice of working on precisely this concern" [17].

Visualization is implemented differently at different levels of the educational system of the Russian Federation. This is determined by the goals and objectives of educational practices for different age categories: from the visualization of verbal text in a preschool educational institution to the visualization of statistical data and digital media research in higher education. As notes I.Y. Murzina "...finding meaning through reflexivity. The degree to which we move along this way consciously determines educational strategies, teaching methods in working with students, communication tools or network interactions in a multicultural world" [18].

#### V. CONCLUSIONS (INFERENCE)

Visualization as a person's ability to "catch" reality in visibly perceived and reproducible images determines the depth of understanding of historical realities and actual practices by a person, not only in the context of the Post Literacy, but also in the context of BigTime (M.M. Bakhtin). When addressing the modern culture, additional difficulties arise due to the videocracy ("power of images") of mass culture. The activity of students as interpreters of texts of various modifications implies a reflexive-critical attitude to the phenomena of the surrounding reality, the presence of



visual literacy skills to recreate a holistic image, meaningful for another person to read or interpret. Interpretation practices, which result in visual or visualized images, – are a common phenomenon in humanitarian pedagogy and meet the requirements of the digital area. The combination of two methods - visualization and cultural interpretation – in the implementation of the general tasks of education allows the pedagogical community to respond to the "challenges" of time and, without losing touch with the traditions in the field of visual, resist the entropy of meanings.

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