INFORMATION TECHNOLOGIES IN EDUCATION AND SCIENCE
HUMANITIES AT DIGITAL AGE: FROM BRANCH INFORMATICS TO DIGITAL HUMANITIES

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The article considers the modern tendencies of the humanities development using the potential of information technologies actively for research problems whose decision will have basic value for definition of the potential, scales and consequences of digital technologies development.

'Digital humanities' are considered as the interdisciplinary area of researches uniting methods and practice of humanitarian, social and computing sciences for studying the possibilities of application and interpretation of new digital and information and communications technologies in the humanities and education in whole.

Keywords: digital humanities, branch informatics, humanitarian informatics, digital technologies.

The fast development of digital technologies and their integration practically in all spheres of the human life have defined the crucial point in the development of modern society because of almost unlimited possibilities for the creation, analysis and distribution of knowledge. In this connection the role of the humanities is increasing because they actively use the potential of information technologies for solution of such questions of principle as cultural memory and identity, confidentiality and data security, communications and creativity during the digital age, which have basic value for definition of the potential, scales, restrictions and consequences of digital technologies development.

'Digital humanities' are one of the key innovative directions of the humanities development in the modern world. They represent the interdisciplinary area of researches that unite the methods and practice of humanitarian, social and computing sciences for the purpose of study of possibilities of application and interpretation of new digital and information-communication technologies in the humanities and education in whole.

'Digital humanities' are characterized by application of computer methods and regular use of digital resources in humanitarian and social-and-cultural researches. This is an interdisciplinary tendency to the development of the humanities whose participants represent new generation of researchers in social-humanitarian sphere that unites experts in the field of humanitarian and social sciences applying simultaneously methods, concepts and technologies of informatics.

Due to intersection of information and communications technologies, research practices and the humanities, 'the humanitarian calculations', 'the digital humanities', 'the electronic humanities' have been emerged, which, in turn, have their own classifications by analogy with the traditional humanities. In whole they "meet the case of modern models of the humanities in the digital environment, are in search of institutional role and epistemological commitments and develop as the areas of research mutually supplementing each other" [1].

Along with the term 'Digital humanities' the wide range of other terms has been taken place which also reflects the present stage of the humanities development: e-Humanities, e-Science, e‑History, humanitarian informatics, and the like. Thus in new terms the humanitarian maintenance of knowledge has the increasing value in comparison with the former names 'Computing in the humanities', 'Humanities Computing' that reflected only computer technologies and made the basis of development of so-called 'branch informatics', in the frameworks of which the experience of application of computer technologies in various branches of the humanities knowledge had been gained.

Digital humanities is the research of the new epoch features, social and cultural consequences of digital technologies, critical analysis of their possibilities and restrictions, operation with the cultural heritage and the format of artwork, and enlightenment: new media, establishment of

digital libraries, archives, databases of cultural heritage and museum collections, digital reconstructions demanding joint efforts of humanists and experts in digital technologies. The most widespread researches in the field of digital humanities are the works in such areas as text quantitative analysis, data visualization, geospatial design, and etc.

In essence, today we speak about an expansion of the humanities due to the attraction of new tools, research methods and technologies, focusing our attention on humanitarian methodology as the basis of digital humanitarian researches. Digital tools and methods become more and more important in the humanities, but they cease to be self-sufficient, they expand toolkit of the researcher, leaving in the foreground the research problems. At the same time the border between the humanists, who do not notice the world of digital culture, and those who get accustomed to it, becomes more distinct. According to the correct statement made by E.J. Zhuravleva, scientists' activity, who "expand the use and research of information and communications technologies both as the scientific tool and social-and-cultural object requiring the analysis," is a prominent aspect of modern transformations of the humanities [2]. Informatization process affects deeply both the scholarship area: its techniques, technology and supervising bodies, and the sphere of fundamental and applied researches where information technologies are applied not only at the stage of processing, storage and codified analysis of traditional material, but also become independent object of humanitarian research.

We find this position in contemporary comprehension of Digital humanities where the technological toolkit is subordinated to the solution of substantial problems, forming the modern research area developing the concept of the humanities. Thus, Digital humanities eliminates the disbalance of applied researches based on practical application of information technologies in social-and-humanities, towards the preference of means logic to the logic of maintenance of humanitarian researches, that was necessary at the initial stage of informatization of the humanities, promoted their development and was obvious in the development of any "branch" informatics. The humanitarian informatics develops in the same direction, which is aimed at studying regularity and consequences of information processes, comprehension of the reasons and character of social behavior and social communications in the information society, bearing in itself a world-view role which is exhibited in the formation of the holistic system-information picture of the world, understanding community of information managerial processes in nature, society and technology.

Including various themes from the creation of databases to the reconstruction of historical interiors, 3D-modeling of large cultural objects, visualization of the spatio-temporal data, and etc., Digital humanities include:

1) use of digital technologies in humanitarian researches uppermost for processing of huge data files: from the analysis of ancient manuscripts ('digital paleography') to the study of literary works and documents of various historical epochs ('distant reading' or 'digital reading');

2) "the research of new epoch peculiarities, social-and-cultural consequences of digital technologies, the critical analysis of their possibilities and restrictions." Here Digital humanities are closely crossed with the humanitarian informatics not only applying the methods and means of informatics in humanitarian researches, but studying regularities of appearance and development of information in the society, philosophy and methodology of the information society, informatization as the social phenomenon;

3) work with the "cultural heritage: 'digital art', new media, creation of digital libraries, archives, databases of the cultural heritage and museum collections, the digital reconstructions demanding joint efforts of humanists and experts in digital technologies" [3].

Now Digital humanities can be met at all major universities of the USA, Canada, Australia, Holland, Great Britain, and others. We would like to provide some examples.

At University of California in Los Angeles (UCLA) there are six key centers and institutes of support of Digital humanities: the Center for Digital Humanities, the Academic Technology Services, the Experiential Technologies Center, the Institute for Digital Research and Education, the UCLA Library, the Ahamanson Laboratory for Digital Cultural Heritage [4].

One of the international leaders of technology application in art, humanitarian and social sciences is the Department of Digital Humanities at School of Arts and Humanities at King's College London [5]. The department is included into the Center for e-Research, oriented to studying possibilities of computing methods for art and the humanities for the purpose of designing and development of customized applications (for instance, for search and gathering of information from the Internet editions) and it carries out training on various Master's programs in the field of digital culture and society as well as the PhD program which is considered to be the progenitor in the field of Digital humanities.

The Cambridge Digital Humanities Network was created in May, 2011 as an association of the researchers interested both in use of digital tools and in studying the results of their application, influence on transformation of processes of knowledge in the field of humanitarian and social sciences. The network participants believe that distribution of digital technologies opens new areas of research and generates the questions that break traditional disciplinary borders [6]. The network is confirmed as strategic one by the Committee on research policy of the university.

The largest world centre of the digital humanities is the Australasian Association for Digital Humanities Inc (aaDH), which unites the organizations of Great Britain, Japan, Europe, the USA and Canada and is organized on the basis of Australian National University. The main goal of the association is to create the platform for collaboration of confederates in the field of Digital humanities, for its strengthening and development. The association organized various arrangements (conferences, symposiums, schools in the field of Digital humanities), gives financial support to students and young scientists, and supervises the release of special-purpose editions at regional, national and international levels [7].

Today in the Internet there are hundreds of specialized web-pages, accounts in social networks and social media devoted to Digital humanities, a number of special articles, books, periodicals (for example, e-magazine 'Journal of Digital Humanities' [8]). The largest world research centers arrange the days of the digital humanities, international conferences and symposiums dedicated to discussion of Digital humanities problems (for example, Digital Resources in the Humanities and Arts (DRHA) is a series of annual conferences whose participants are developers, distributors, users of electronic resources of social-humanitarian character).

Russia takes part in this movement as well. Thus, within the limits of the association 'History and the computer' (AHC) the Russian researchers' interest to this new direction was designated. It is no coincidence, because many perspective research trajectories in the field of the digital humanities have already been developed both within the limits of AHC, and in a number of Russian universities. At National research Tomsk state university, for example, the researches in the field of humanitarian and historical informatics, computer linguistics, electronic publishing, social-and-cultural features of the digital age, creation of databases of cultural collections are being conducted. Their results can bring the essential contribution to the development of the given direction and encourage many humanitarian majors at the university.

Among perspective directions in the development of the digital humanities there are 3D-modeling of cultural objects, use of digital technologies in humanitarian research for processing of huge files of initial data, digital ways of visualization of spatio-temporal data, permitting to present various processes (architectural city history, ethnic movements, historical interiors); reading and text analysis in the digital world which is being varied essentially due to hypertext emerging, interleaving of text linear structure, appearance of new lexical, stylistic, conceptual forms; new forms of accumulation and translation of knowledge, the establishment of academic community, and educational environment.

Undoubtedly, the development of Digital humanities does not mean the researchers' refusal from traditional methods of studying the humanities and mass transition to digital technologies. However, it is impossible today to develop the humanities ignoring information technologies. Mastering digital tools and methods permits to expand the research base in the field of the

humanities. Since the computer engineering and computer science have now a great value for humanists, who master new tool base and information environment, the inverse process starts in the short run and the humanists will bring the essential contribution to the development of computer engineering and computer science.

Interdisciplinary condition of the digital humanities encourages unification of researchers and teachers, experts of all traditional humanities, in the field of the computer analysis, visualization, modeling, archiving data, search of information, and etc. The modern researchers connect the Digital humanities development with the achievement of synergistic effect as a result of the complex approach to researching, application of various sciences methods. Digital humanities provides the versatile approach to the research, providing the constructive interaction between various research approaches that helps in the solution of challenges.

As any other new direction Digital humanities attracts the attention of many modern researchers who even more often speak about peculiarities and prospects of development of the digital humanities.

The digital humanities are the natural continuation and expansion of traditional sphere of the humanities; they are not the replacement or refusal from traditional humanitarian inquiries. According to the experts of University of California UCLA, the digital humanities interpret cultural and social influence of the basic components of the new information epoch, new media and information technologies, as well as develop and apply these technologies in order to answer the traditional and born by new epoch cultural, social, historical and philological issues. "The role of humanists is extremely important at this historical moment as our cultural heritage has migrated to digital formats and our relation to knowledge, cultural material, technology and the society has considerably changed" [9].

A specialist of 21st century should obtain considerable technological, social, cultural and intellectual skills which "include literacy in traditional and new media, technical skills connected with this literacy, development of tools for critical analysis, ... ability to construct a model and visualization for interpretation of large-scale data, ability to project information systems and technological platforms for maintenance of long-term preservation and stability of figures, ability to estimate critically the potential and restrictions of new technologies." It is "the digital humanities to solve these problems, training students to create and criticize the maintenance of media, developing essential skills and abilities to estimate this content, operating and transforming digital technologies, developing necessary literacy in relation to the information environment" [ibid].

The analysis of the current state of interdisciplinary area in the field of Digital humanities in the work "Discussions around Digital Humanities" has been made by the professor of the 'Information technology in historical and cultural researches' department of Cologne university (Germany) Manfred Taller, who has seen "dangers" in development of the digital humanities: an accent on the researches infrastructure in prejudice of analytical methods and tools; possibilities contraction of Digital humanities before information technology application in separate areas of the humanities; the threat proceeding from "mobile revolution" which can lead to "recurrence of destructive process during PC and Internet revolutions"; potential possibility for Digital humanities "to play more active role not only in acceptance of technologies, but also in their development» [10].

M. Taller has divided the Digital humanities sphere into basic areas which are connected with 1) the text analysis by means of various computer means application from indexing to formalized definition of the author's style, 2) using texts or images for obtaining new information ("facts") and further analysis of collection of these "facts" (databases, methods of statistic analysis, geographical information systems, geospatial modeling, and etc.) in history, anthropology, archeology, art history where the social phenomena or material objects are considered, 3) non-textual resources, including digitization of big images collections, using three-dimensional models of artifacts, visualization of retrieval request in databases. Answering the question, whether Digital humanities are simply consumers of elaborations in

technology sphere or they are able to affect the further development of technologies, M. Taller notes the importance of the following thought "conceptual decisions in using new technologies in the humanities must be defined by the concepts of the humanities" [ibid].

The working out of modern toolkit for humanitarian researches is developing very fast simultaneously with the definition of knowledge domain of Digital humanities. Thus, for example, the experts of Stanford university have developed a special site "Welcome to Humanities 3.0: Tooling Up for Digital Humanities" as a launching pad for scientists who start to investigate the possibilities of digital tools, programs and methods for expansion of facilities of the humanities. Here there are the researches results in the field of the digital humanities, databases, tools for visualization, and etc. Each material allocated on the website offers an opportunity to leave comments and proposals for their improvement, to discuss special methods, tools and ideas, to estimate the potential of new tools for humanitarian researches [11].

In the Internet there are several websites where one can find modern tools and resources for execution of digital humanitarian projects, the register of digital tools for solution of Digital humanities problems, and etc., representing successful attempts to systematize the modern toolkit for the digital humanities [12, 13]. Thus, for example, the Bamboo DiRT project allows easily to find and compare various resources for humanitarian researches from musical content control systems to packages of statistical analysis. It permits to give the scientist the tool for carrying out various digital researches, including the data analysis, textual analysis, decoding hand-written and oral texts, creation of dynamic charts, and etc. [14].

Today humanists put a question on use of grid-technologies that is connected with great volumes of digital material and, therefore, acute questions of storage, access and analysis of the material for humanitarian researches. It is obvious that the humanities can use the advantages of grid-technologies connected with possibility of easy processing huge and constantly increasing volumes of data, which grow in result of digitization, with network structure of scientific cooperation, allowing the researchers working over similar projects and divided in distance, to be integrated into virtual scientific networks and safely exchange the data from reliable sources [15,16].

Marin Dakos, the Professor of History, the director of the Center of open electronic editions (France) published "Manifesto Digital Humanities" in May, 2010. That was an original attempt to express minutely the conception of maintenance, problems and prospects of the digital humanities development. In the Manifesto it is underlined that digital methods of researches are very important for all humanities and rely on the scientific paradigms having been accumulated by each of corresponding scientific disciplines, using tools and perspectives opened due to digital technologies. "The digital humanities are interdisciplinary and comprise all methods, means and the knowledge prospects connected with digital technologies in the field of the humanities." According to the authors of the Manifesto, the courses on Digital humanities should be included in curricula of humanitarian and social majors, as well as of literature and art [17].

The digital age touches all researchers, but it does not mean that a scientist-humanist should be good at programming languages. The humanist is in need of application of computation not so much for acceleration of researches as for support with new methods and new paradigms for examination of cultural artifacts. Digital humanities allows to see how new technologies affect the concept of knowledge, how the digital world development expands the resource base of researches, creates new types of data, considerably changes the character of the research. The modern researcher should learn to work not only with traditional texts and documents, but also with multimedia material, metadata, GIS-sources, 3D-models and other kinds of new sources born by the digital age.

The modern information environment makes new demands to the system of humanitarian knowledge. Development of various information and communication technologies, especially during last decade, has made considerable impact on the humanities, having expanded the

access to research materials, provided much bigger opportunities for scientists' cooperation, and opened the variety of new research methods, including interdisciplinary.

Development of Digital humanities shows convincingly that informatization promotes new synthesis of humanitarian and natural sciences, overcoming their alienation from each other. Research and design activity in the field of Digital humanities is positioned as interdisciplinary and joint working. The educational format of Digital humanities assumes the formation of new models of thinking on the basis of synthesis of information technology and achievements of the humanities.

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