Digital Humanities Approaches to Learning Methods Development

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Abstract

The article discusses the possibilities of the project method implementing to the university education in the transition period from offline to online training. The pedagogical aspects are considered in the context of the interdisciplinary approaches of digital humanities as learning content and teaching methods. Such approaches to the higher education pedagogy allow to improve the quality of education and ensure the successful mastering by students of the competencies necessary of the digital labor market specialists. The article presents the results of an experiment that was carried out as part of the pedagogical activities of the Department of Information Systems in Art and Humanities of the Faculty of Arts of St. Petersburg State University during 2018-2021. The results obtained indicate that the approaches of digital humanitarian pedagogy contribute to the more effective development of students' competencies of a specialist in a digital society.

Keywords

Digital Humanities, Project Method, Electronic Learning

1. Introduction

In pedagogical context the current period is a transition from offline to online learning. Research (long-term included surveillance, surveys, interviews) shows that the main pedagogical solution at the moment is the mechanistic transfer of offline teaching methods to online. Wherein, peculiarities and advantages of the online learning are not fully exploited. Therefore, studying of pedagogical approaches are adequate to the online environment is very relevant.

If in the first decades of 21 centuries scholars and practitioners focused on the technological and even technical aspects of the problem, recently there has been a tendency to concentrate on humanitarian aspects of complex which includes technological, pedagogical and learning content aspects (Technological Pedagogical Content Knowledge concept). In this connection with the concept of digital humanities as a theoretical basis for the development of digital pedagogy is very promising.

As a rule, the learning environment of a modern university develops on the basis of a combination of corporate and open sources. In this context, the courses «Digital Heritage» and «Information Technologies in Museums» included in the curricula of the Faculty of Arts of St. Petersburg State University are digital humanitarian educational resources (Figure 1). They are developed on the basis of the interaction of corporate materials and open web resources [1, 2]. Corporate materials include files such as course programs, study guides, presentations, assignments developed by the course author. Open resources are represented by multimedia materials, including websites of museums, galleries, open data databases and repositories, massive open online courses, etc.

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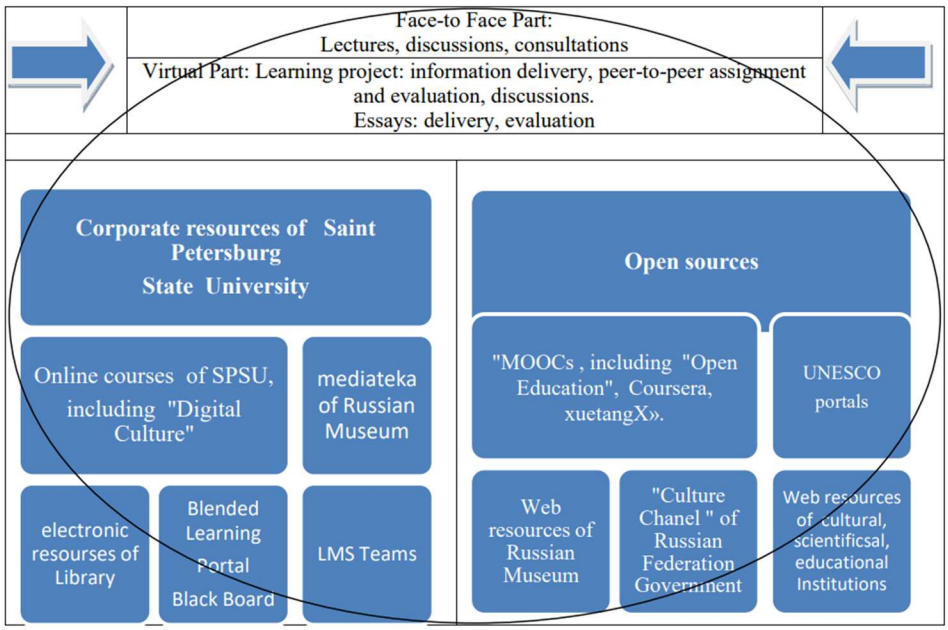

Figure 2: Blended Learning Environment: Case of Saint-Petersburg State University, 2020-2021

2. Statement of the issue

Hypothesis of the research is that the virtual learning environment requires special pedagogical approaches and methods that are adequate to the content of the course and information and communication technologies for its delivery. An issue of development teaching methods that are adequate to the digital environment of modern society is interpreted from the point of view of the personal development of future professionals interacting with the electronic learning environment.

The research context is concepts of Digital Humanities [3-6], Technological Pedagogical Content Knowledge Concept [7], Project Method [8], and the Taxonomy of Pedagogical Goals by B. Bloom [9].

Digital Humanities postulates the equality of technological and humanitarian components and TPACK consider learning as interaction between learning content, pedagogical approaches and technologies. Main role in this tirade obtains learning content, namely fundamentals of scientific knowledge.

From the didactic point of view, the research focuses on the study of those conditions which contribute to the development of digital humanitarian competencies of the classical university students. The complex of virtual environment and learning assignments is considered as a tool for development of the specified knowledge, skills, and abilities of future professionals. According with the Taxonomy of Pedagogical Goals by B. Bloom, the tasks are designed in a such way that students gradually acquire skills and knowledge from the reproductive, algorithmic, heuristic to creative level [6, 9].

In this case, digital humanitarian competences can be described in the terms of the methodology of Human-Centered design, HCD («Design Based on Human Engagement»). It is a way of designing and managing the process of creating products and services, when each stage of problems solving based on the developers creative thought and emotional involvement. Human participation is implemented with observing a project realization challenges, brainstorming, conceptualizing, decision making and fulfill the solution. The project object in this case is a virtual museum, which is being developed by a third-year student [1, 5, 6].

According to UNESCO suggestions one of contemporary pedagogical issues is development of learning methods which allow including students in research activities already at the stage of future specialists training [2]. In proposed research context, such kind of activity concern with providing students with opportunities to co-work with distributed expert communities and is associated with

the development of the competencies presented in the educational standard of Russian Federation. Flagging the importance of a systematic approach to the development of specialist competencies, we highlight the following ones among them as significant for the implementation of the pedagogical design of educational assignments, control and measuring materials and assessment tools. These competences are developed in aforementioned courses of Saint Petersburg State University:

- ability to use modern information technology and software, including domestic production, in solving problems of professional activity (OPK-2),
- ability to solve standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security (OPK-3),
- ability to take part in the management of projects for the creation of information systems at the stages of their life cycle (OPK-8),
- ability to take part in the implementation of professional communications with stakeholders in frame of whole project activities and within project groups (OPK-9)
- ability to understand, study and critically analyze the received scientific and technical information on the research topic and results, be fluent in methods of processing, analysis and synthesis information, information search and databases on the Internet using the capabilities of modern search queries (PKA-1),
- ability to analyze and structure information needs in a subject knowledge areas, formulate requirements for their information technology support, design information systems in accordance with the needs of information management in a subject knowledge areas (PKP-1),
- ability to use modern technologies for creating multimedia content in the print, 3D graphics, animation, video and audio forms for placing it in information systems (PKP-8)
- ability to search, critically analyze and synthesize information, apply a systematic approach to solving assigned tasks (UK-1)
- ability to determine the range of tasks within the framework of the goal and choose the best ways to reach them, based on the current legal norms, available resources and restrictions (UK-2)
- ability to carry out social interaction and fulfill own role in the team (UK-3)
- ability to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language (s) (UK-4)
- ability to perceive the intercultural diversity of society in the socio-historical, ethical and philosophical contexts (UK-5)
- ability to participate in the development and implementation of projects, including entrepreneurial (UKB-1)
- ability to understand the essence and significance of information in the development of society, use the main methods of obtaining and working with information, taking into account modern technologies of the digital economy and information security (UKB-3)

The virtual learning environment of the presented courses is digital content which includes files are created by different developers, namely highly qualified professionals (experts from the Russian Museum, St. Petersburg State University), members of student groups, and open sources. Thanks to this, conditions are created for the development of such competencies as (1) understanding connection and equality of digital and humanitarian components of electronic resources, (2) evaluation web resources according to following criteria (2.1) reliability in context of their heterogeneity in the scientific level of knowledge in connection of the level of the developers qualifications, as well as (2.2) relevance to project tasks.

3. Literature Review

3.1. Digital Humanities

Consideration of ways to solve these problems is carried out on the basis of the theory of digital humanitarian knowledge (DH) and pedagogy, namely TPACK. It should be noted the complexity of defining the DH subject area, as well as the dynamics of its development.

Digital humanities today encompass a wide range of research methods and social practices: rendering large sets of images, 3D modeling of historical artifacts, alternate reality games, mobile production and learning spaces, and more. At the same time, continued interest in the traditional areas of DH digital archives, quantitative analysis, projects to create electronic tools for the implementation of digital research.

The Digital Humanities Rack [3] showcases the wide range of science, technology, social practices and structures that make up the digital humanities today. At the same time, the fundamental elements of Digital Humanities, such as computational thinking and knowledge representation, lie at the lower base levels of the "rack", and it is also shown than the "shelf" is higher, the level of abstraction of the interaction of technology and humanitarian knowledge increases. In the case is presented in this paper, the subject knowledge areas are associated with knowledge representation (first floor) and project activities (sixth floor) [Figure 2].

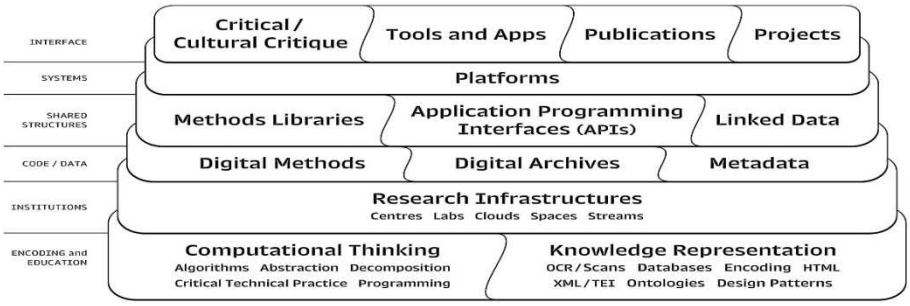

Figure 2: The Digital Humanities Stack (from Berry and Fagerjord)

The Digital Humanities Manifesto [4] positions digital humanities (DH) as an area of research, teaching and publishing based on the systematic application of digital technologies in the humanities and social sciences. At the same time, a distinctive feature of DH is the development of bilateral relations between the subject areas of this tandem: on the one hand, the possibilities of using technologies in a wide range of studies in the field of humanitarian knowledge are being studied, on the other hand, digital technologies are subjected to scientific expertise on an unlimited range of issues: from philosophical to applied. Such approach is in line with the views of John Unsworth, Susan Schreibman, and Ray Siemens who, as editors of the anthology A Companion to Digital Humanities (2004), distinguished the Digital Humanities field from being viewed as «digital computing» or «mere digitization» [7].

3.2. Technological Pedagogical Content Knowledge Theory (TPACK)

The theory reflects the pedagogical aspects of the educational paradigm of the information society. TPACK concept was introduced by Jhon Shulman in 1986 and Punya Mishra and Matthew J. Koehler [8]. Scholars, teachers and the learning resources' designers support ideas of the researchers. According to this theory, eLearning develops as the intersection of three areas (1) content knowledge, (2) pedagogical knowledge and (3) technological knowledge (Figure 3).

Hypothetically, each electronic learning resource consists the following types of knowledge (1) Content Knowledge (CK), (2) Pedagogical Knowledge (PK), (3) Technology Knowledge (TK), (4)

Pedagogical Content Knowledge (PCK), (5) Technological Content Knowledge (TCK) (6) Technological Pedagogical Knowledge (TPK), (7) Technological Pedagogical Content Knowledge (TPCK).

There are three levels of knowledge here. The first is «Pure Knowledge». (1) Content knowledge includes knowledge of concepts, theories, and conceptual frameworks as well as knowledge about methods of developing knowledge. (2) Pedagogical Knowledge (PK) Pedagogical knowledge includes generic knowledge about how students learn, teaching approaches, ways of assessment and knowledge of different theories about learning (3)Technology Knowledge (TK) refers to an understanding of the way that technologies are used in a specific content domain. This type of knowledge depends on the resource content, so the resource developer sometimes should have knowledge in a technology enhanced, but sometimes he/she needs only a computer literacy.

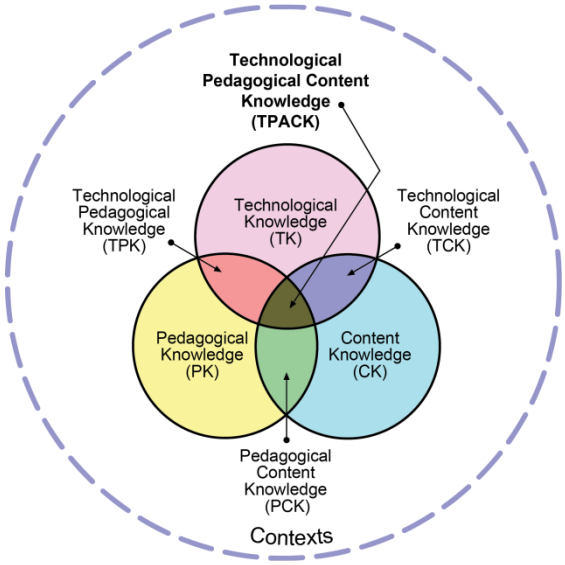

Figure 3: Main Components of Technological Pedagogical Content Knowledge theory (from Shulman, L. S., Mishra, P., & Koehler, M. J.)

The second level of knowledge occurs at the intersection of two areas of expertise, namely (4) Pedagogical Content Knowledge (PCK) (5) Technological Content Knowledge (TCK) and (6) Technological Pedagogical Knowledge (TPACK).

Pedagogical content knowledge is knowledge about how to combine pedagogy and content effectively. This is knowledge about how to make a subject understandable to learners. Technological content knowledge refers to information about how technology may be used to provide new ways of teaching content. Technological pedagogical knowledge refers to the affordances and constraints of technology as an enabler of different teaching approaches.

The highest level of knowledge is (7) Technological Pedagogical Content Knowledge (TPACK). It address to the knowledge and understanding of the interplay between CK, PK and TK when using technology for teaching and learning. It includes an understanding of the complexity of relationships between students, teachers, content, practices and technologies.

In our view, the theory gives a whole picture of the education development in information society. It allows solving aforementioned problems. The TPACK provides an idea, that the Content Knowledge is component, which determines technological design and pedagogical methods of e-learning resources. It is obvious, that a course of Mathematics or Fine Arts needs sets of different technological solution and pedagogical activities. Thus, we can see path how wide range of trendy and disparate methods gradually turn into a methodology of information society education.

The issues of the development of «social educational space» and «social educational environment» as well as the interaction between them are in the focus of modern pedagogical research in Russia (T.N. Noskova, N. . Morze, J. Malach, P. Kommers, T.). Scholars emphasize constantly increasing of the global electronic environment significance as a component of professional and personal

development. The contemporary professional is faced with the task of individualizing this space. The systematization of the above questions is presented in the concept of the educational pedagogical environment, developed at the Russian State Pedagogical University. A.I. Herzen [9].

Emphasis the following aspects of the theory: consideration of the pedagogical environment as a system based on the interaction of virtual and classroom spaces and including the following components: target, subjective, scientific and educational, psychological and didactic, subject-material, organizational and managerial, socio-psychological. Highlight the psycho-didactic component. It describes the methodology for solving the research issues through the development of a system of assignments, which implementation leads to the development of the competencies of a specialist in a digital society. There are competencies which are manifested in sufficient knowledge and skills, both in the humanitarian and technological areas of knowledge. An example of the Implementation of this approach is presented in this article.

3.3. Project Method

According to M. Knoll, [10], the project method is a way to achieve a didactic goal via solving learning problem, which should achieve with a practical result, formalized in a way is assigned by an educator. This method presupposes a combination of tasks that are problematic and creative in nature. The teacher within the framework of a project is allocated a role of developer, coordinator, expert, and consultant.

The main didactical purpose of the project method is to provide students with the opportunity to independently develop their competencies in process of a practical problems solving or issues that require the integration of knowledge from various subject areas both theoretical, and empirical. For example, humanitarians and technological ones are in context of the presented research.

The project method has a long history. Founded in 1577 by the Academia di San Luca in Rome, and developed in 1763 by the Royal Academy of Architecture in Paris. It was originally aimed at training architects, but then was increased to other subject areas and now is successfully used by European universities. In 1860th the project method was moved to the American continent by the founder of MIT William B. Rogers, supported by a number of American universities and is also actively developing to this day. The philosophical rationale of this method is the concept of pedagogical constructivism is presented in the writings of L.S. Vygotsky, J. Dewey, and others.

The classical models for the implementation of training based on the project method are linear, holistic and universal, proposed, respectively, by Calvin M. Woodward (1879, Washington University, США), Charles R. Richards , 1900, Teachers College, Columbia University, New York, USA), William H. Kilpatrick, 1918 Teachers College, Columbia University, New York, USA). In the 90s, this list was replenished with a telecommunications project, the author of the term is E. Polat (Institute of Secondary Education, Russian Academy of Educationб IOSO RAO).

The educational project presented in the paper is linear and telecommunication. It is an educational, cognitive, research, creative activity of students, having a common problem, goal, agreed methods of activity directed to achieve an individual results. It is realized via computer telecommunications and wide range of pedagogical approaches. There are lectures and essays, independent work, communications with external experts, classmates, open sources study, reflection via PMM, the project results presentation and evaluation.

4. The experiment methodology and results

The experiment tool is a complex of virtual learning environment and the set of tasks aimed at developing digital competencies through pedagogical communication in blended learning environment. The depth of development of competencies is carried out on the basis of the systematic of B. Bloom's pedagogical goals [11]. The assignments' complex which includes the following tasks: generalization of lecture materials (an essay performed by each student once a week or once every two weeks, a total of 8 to 16 essays per semester), implementation of an educational project, filling in individual semantic maps (method of personal meaning maps), surveys , tests [1, 6].

An aim of the research is to study the relationship between the development of educational content of universities and teaching methods in the context of digital humanities, TPACK. To achieve this goal, a blended learning environment was designed, based on the courses «Museum Information Systems» and «Theory of Communication». These courses are included in the main educational program of the Faculty of Arts of St. Petersburg State University in the direction 09.03.03 «Applied Informatics» with the assignment of the qualification (degree) - bachelor in the profile «Applied Informatics in Art and Humanities». Also a component of the virtual learning environment is a massive open online course «Basics of working in a digital environment», in the development of which the authors actively participated.

The digital learning environment requires the development of adequate teaching methods. Below are presented the results of an experiment aimed at studying pedagogical approaches which make conditions for students to develop competencies which are manifested in sufficient knowledge and skills, both in the humanitarian and technological areas of knowledge.

The research includes the following components: (1) formation of a blended learning environment; (2) development of a methodology that allows students to be included in activities related to the implementation of research already at the stage of training future specialists [2].

There are following research methods were used: participatory observation, analysis of works and surveys of students, as well as semantic mapping (PMM).

The implementation of the educational project is included in the course program and consist in creation electronic resource called «Virtual Museum» by each student. The project realization is carried out through the following set of tasks: (1) formulation the museum title; (2) development of the concept of the museum (including the target audience (audiences) of the museum and methods of its (their) activities; (3) making of the museum collection; (4) grounding of the technological solutions for implementation of the museum; (5) development of virtual tour around the museum; (6) creation of the project presentation; (7) evaluation of the project by fellow students, instructor and external experts, if possible. The work on the project takes 16 hours, provided by the Program of the course in the block «Practical tasks».

1st stage (1-3 lessons): defining the subject area of the museum, the goals of its activities and implementation technology, for example, page on social networks, blog, website, etc. Creation of the collection in accordance of the subject area and the goals of museums are started on this stage.

2nd stage (4-13 lessons): development of projects, which is accompanied by the publication of the resource prototypes in the web space. It allows the participants to discuss the working process with fellow students, as well as consult with the teacher and external experts.

3rd stage (14-15 lessons): defense of the project in a student group and assessment of the project by fellow students, teachers and external experts.

In the process of implementation of aforementioned stages, the experimenters examinated the level of students' mastering of cognitive operations related to the design of virtual museums in the following components: (1) subject area of the museum, (2) implementation technologies, (3) comprehension of the equality of technological and content components.

Table 1

The levels of DH competencies mastering by 3rd year students

The level of the competencies mastering by students	2018/19 students	2019/20 students	2020/21 students
Repetition	12 from 12	11 from 11	13 from 13
Algorithmic Action	12 from 12	11 from 11	13 from 13
Applying	10 from 12	11 from 11	13 from 13
Analysis	09 from 12	08 from 11	0 7 from 13
Synthesis	06 from 12	09 from 11	09 from 11
Evaluation	05 from 12	07 from 11	11 from 13

The experiment was carried out for 3 years (2018/19 - 2020/21). It was attended by 36 third year bachelors. The 2018/19 group was considered as a control group, and the 2019/20, 2020/21 groups were considered experimental.

The level of mastering cognitive operations (table 1) was checked on the basis of the taxonomy of pedagogical goals by B. Bloom [11]. In the course of checking the knowledge of the control group, it turned out that the students experience the greatest difficulties in comprehending the equality of technological and content components, the least - in the choice of technologies for implementing the project (2) identification of the museum subject area caused minor difficulties.

To solve the identified problem in 2019/20 the following adjustments were made to the pedagogical design of the course: a system of written assignments aimed at understanding the role of humanitarian knowledge in the development of the museum was developed, and an excursion to the multimedia center of the Russian Museum was organized. The result was a positive trend in the development of these competencies.

Circumstances of 2020/21 made possible to add changes in the conditions of the experiment via involvement of external expertise of projects and activation of the online component of pedagogical communication. Analysis of the results obtained allows us to draw the following conclusions. External examination of projects (Nanjing Pedagogical University, Nanjing, China) led to an increase in the quality of projects by introducing additions to the content which need for understanding the materials by carriers of Chinese culture. Reducing classroom interaction with students does not have a significant impact on the development of knowledge and the implementation of projects.

5. The Results Discussion

Hypothesis of the research is that the virtual learning environment requires special pedagogical approaches and methods that are adequate to the content of the course and information and communication technologies for its delivery. The presented study examined the implementation of the project-based teaching method in a virtual learning environment.

The virtual learning environment of the presented courses is digital content which includes files are created by different developers, namely highly qualified professionals (experts from the Russian Museum, St. Petersburg State University), members of student groups, and open sources. Thanks to this, conditions are created for the development of such competencies as (1) understanding connection and equality of digital and humanitarian components of electronic resources, (2) evaluation web resources according to following criteria (2.1) reliability in context of their heterogeneity in the scientific level of knowledge in connection of the level of the developers qualifications, as well as (2.2) relevance to project tasks.

In addition, the inclusion of a student in the interaction with the Network as a member of the community of professionals working in the space of open resources at an early stage of training [6], allows solving the problem of mastering competencies related to research activities. For example, the following activities can be carried out on the Web: implementation of student and expert projects; conducting a variety of presentations of research results: from presentation in virtual class room to maintaining pages in social networks and blogospheres. Also, it is possible to participate in various forms of assessing the work of colleagues is possible: from intermediate and final attestation at the university to participation in discussions with experts and blind review of the project results (virtual museums in this case), etc.

Finally, analysis of the projects results obtained shows that regarding technology, web sites are mainly used as implementation technologies. Only one student chose a social network (Project «Museum of Computer Games»). The blog has not been chosen by anyone.

Themes of virtual museums developed by students: «Virtual Museum of Neuroart», «Virtual Museum of Talking Walls», «Museum of the History of Computer Games», «Trail of the Silk Road in St. Petersburg», «Countries of the Great Silk Road», «Retrospective of video games», «Internet meme as an arts of youth» , «Where art meets technology», «Museum of Fonts», «Museum of Video Games».

Subject areas of sciences presented in the themes of virtual museums implemented by students in 2018 / 19-2020 / 21: art history, intercultural communication, history, social problems. They reflect

the digital humanities perspectives. Together with the data on the performance of other tasks, this indicates the achievement of the set goals.

6. Conclusion

In the context of the concept of digital humanities, the presented methodology makes it possible to implement an innovative direction of interdisciplinary research, which corresponds to contemporary educational demands for the development of the competencies of a professional working in the modern society.

Also, the presented pedagogical solution is a methodology that allows students to be included in the educational process and to implement activities related to the implementation of the functions of scientific research, discoveries, innovations already at the stage of training future specialists [2]. As the study assignments are completed, students form a virtual museum as a prototype of an individual professional environment that becomes a part of the virtual space of courses, and, consequently, a virtual component of the learning environment of St. Petersburg State University. Hypothetically, these spaces can be transformed into expert communities in the future professional life of their authors. Tracking the process of origin and development of these hypothetical communities can lead to very promising discoveries in the field of networked pedagogy in methodological and empirical aspects.

Finally, these pedagogical approaches are associated with expanding the accessibility of users to digital materials based on an expert assessment of the compliance of electronic material with educational goals [2].

7. References

[1] C. Lucchiari, R. Folgieri, R., E. Gaevskaya, N. Borisov, Digital humanities competencies development in various learning environments. CEUR Workshop Proceedings, 2021, 2920, pp. 20–32

[2] Towards knowledge society. UNESCO world report. URL:https://unesdoc.unesco.org/ark:/48223/pf0000141843_eng/.

[3] David M. Berry, Anders Fagerjord, Digital Humanities: Knowledge and Critique in a Digital Age. Wiley, UK, 2017.

[4] Digital Humanities Manifesto. URL: https://tcp.hypotheses.org/411, 2011/.

[5] E. Gaevskaya, N. Borisov, Digital Humanities Approaches to Design of Blended Learning Communication. Proceedings of the conference "New Educational Strategies in Modern Information Space" (NESinMIS 2020). Saint-Petersburg, Russia, 2020, pp. 17 - 21 http://ceur-ws.org/Vol-2630/

[6] E. Gaevskaya, N. Borisov, O. Babina, Digital Educational Development via collaboration of the Museum and the University, in: Proceedings IV International Scientific and Practical Conference «Technological Perspective: New Markets and Point Economic Growth», 2018, pp.140-146.

[7] Unsworth, J., Susan Schreibman and Ray Siemens (Eds). «A Companion to Digital Humanities» New York: Blackwells (2004).

[8] P. Mishra, M. J. Koehler, Technological pedagogical content knowledge: A framework for teacher knowledge, Teachers College Record, volume 108 number 6, 2006, pp 1017-1054.

[9] N. Morze, J. Malach, P. Kommers, T. Noskova. Report on the Implementation of Work Package 7 “Dissemination of the Project Results” in the Framework of the IRNet Project

[10] M. Knoll, Project Method, in: Encyclopedia of Educational Theory and Philosophy, D. C. Phillips (Ed.), Thousand Oaks, CA: Sage 2014. volume 2, pp. 665-669. URL: http://www.mi-knoll.de/150901.html.

[11] B. S. Bloom, M. D. Engelhart, E. J. Furst, W. H. Hill, D. R. Krathwohl, Taxonomy of educational objectives. The classification of educational goals, USA, New York: David McKay Company, 1956.