



# Use of Blended Learning and Project-Based Approach in Formation of Digital Research Competencies of Undergraduates in Interdisciplinary Areas

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**Abstract:** The development of modern information society is characterized by processes of digitalization of the main types of human activity. This requires education to train highly qualified specialists with digital competencies appropriate to the level of digitalization of their professional activities. As a rule, insufficient attention is paid to the formation of digital competencies when training master's students in the humanities. This requires the development of appropriate tools based on relevant approaches and methods. The practicum "Information technologies in scientific research" is aimed at solving the problems of formation of digital competencies of undergraduates both to increase efficiency in research work and in further professional activity. The practicum implements such progressive methods as blended learning and project-based approach. The practicum is implemented within the framework of teaching the corresponding discipline in the master's program "Conflict Studies" at St. Petersburg State University.


## 1 INTRODUCTION


The processes of digitalization of various spheres of human activity in the developing information society make the problem of training highly qualified specialists with relevant digital competences topical. Formation of digital competencies is especially important in training master's students, whose research activity is the basis for their professional activity. In addition, professionally, master's degree graduates are usually faced with the need to work in a team to implement various projects. In today's uncertainty of the sanitary-epidemiological situation associated with the emergence and spread of COVID-19, methods such as blended learning are developing in education. Taken together, all this raises the problem of developing methods and tools for the formation of digital competencies that are adequate to both the level of development of professional activity and the conditions of the organization of the educational process.

The connection between the educational process and scientific activities is particularly pronounced in the master's program, where undergraduates conduct scientific research in preparation for their graduate qualification work. The created interactive practicum "Information technologies in scientific research" is designed to take into account this relationship and is aimed at forming the relevant professional digital competences. The need to create such a practicum is dictated by objective reasons related to both the uncertain epidemiological situation and the support of the full research cycle when working on the graduate qualification work. Also, the workshop is focused on application in the organization of blended learning.

Directly the practicum is aimed at the professional training of undergraduates in the direction of training "Conflictology", to form in them a complete set of digital competencies, the methodological basis and practical tools for using modern digital technology in future professional activities, as well as in conducting research for the preparation of graduate qualification work.

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The direction of training "Conflictology" in the master's program not only has a practice-oriented orientation, but also reflects the content of conflictology as an interdisciplinary scientific field of research. That determines the relevance of the latest interdisciplinary research topics of master's degree students in the field of conflictology, the need to automate the processes of search, processing and analysis of textual data from various Internet sources, primarily the media (mass media). The relevance and demand for the formation of digital and instrumental competencies are determined by the presence of large volumes of information distributed on various digital network resources, as well as the rapid obsolescence of information along with constantly changing priorities, the emergence of new types of problems and conflicts caused by digital transformations in the economy and society.

## **2 FORMATION OF DIGITAL COMPETENCIES IN THE MASTER'S PROGRAM**

The situation related to the consequences of pandemic coronavirus disease (COVID-2019) has aggravated the situation of uncertainty and instability. Therefore, the most relevant is the problem associated with the development of VUCA-world as the main trend of civilizational development. Ambiguity and uncertainty are set by the dynamics of social development based on the processes of digitalization (Basalaeva and Basalaev, 2022). In accordance with this, specialists are required to master digital competencies to effectively perform their type of activity. The education system, whose tasks include formation of such global competences, itself depends on VUCA-world. Researchers note that for formation of digital competences it is necessary to apply approaches and methods corresponding both to digital transformations, and a situation of uncertainty and instability of social development (Ryazanova, Morgun and Argunova, 2021). As effective tools of formation of digital competences they offer the use of distance learning, methods of blended learning, project methods (Gusin and Leonov, 2021; Obukhova, 2021). Experts in the field of education believe that blended learning is the main driver of innovative development of university education all over the world (Krasnov, Kalmykova and Krasnova, 2020; Pletyago, Ostapenko and Antonova, 2019). The blended learning model proved to be an effective solution for educational institutions during the

COVID-2019 pandemic, but continues to be used in the presence of remote students, as well as in the implementation of in-service training programs (Saboovala and Manghirmalani Mishra, 2021; Singh, Steele and Singh, 2021). The use of project methods in education is due to the need to train highly qualified specialists with project thinking, who are ready to creatively solve professional tasks of any level of complexity (Gorbunova, 2019). Also, project-based learning methods allow to effectively solve the problems of research work of master students (Muller, 2021). The maximum efficiency in the educational process in the master's degree program is noted by researchers when using the model of blended learning with elements of project activities (Voronin, Egorova and Khotulev, 2019).

Analysis of existing master's degree programs in the field of "Conflictology" (St. Petersburg State University, A.I. Herzen Russian State Pedagogical University, St. Petersburg Humanitarian University of Trade Unions, Russian State Social University, MGIMO, Tallinn University, etc.) shows that there are no disciplines in the curricula that comprehensively solve the problems of formation digital competencies of undergraduates in research and professional activities. Individual disciplines form practical skills of using statistical software packages (for example, SPSS or Statistica) to process empirical data obtained during the research. Disciplines on the use of information and communication technologies in scientific activity consider general issues without reference to the subject area. They are not aimed at solving the problems of identifying relevant topics of the subject area; determining the terminological base of the study; formation of a corpus of texts for further analysis using information and communication technologies. The practical part of such disciplines is not focused on the analytical and research work of a graduate student on the analysis of selected materials from the flow of socio-political and scientific information, as well as making forecasts for the development of their subject area and building relevant thematic trends.

## **3 PRACTICUM AS A TOOL FOR THE FORMATION OF DIGITAL COMPETENCIES**

When creating the practicum, we use scientific and practical developments and research methodology combining citation network analysis and semantic

analysis to study qualitative patterns between endogenous disciplines (Raimbault, 2019); expert method of context evaluation in intellectual search and analysis of scientific texts (Koivisto and Hamari, 2019), methods and approaches of Digital Humanities to study the development of categorical and conceptual apparatus of scientific directions (Piciocchi and Martinelli, 2016), methods of processing and analysis of bibliometric data of scientific publications (Palmlad and van Eck, 2018), etc. We also apply the experience of creating the educational-methodical complex "Technologies of data extraction and intellectual analysis in scientific research" for technical training areas (ITMO University), developed within the framework of the project supported by the Vladimir Potanin Foundation in 2020-2021 (Kononova and Prokudin, 2021a; Kononova and Prokudin, 2021b).

The practicum is developed as a practice-oriented part of the academic discipline "Information Technologies in Scientific Research" for Master's students in the field of training "Conflict Studies". Performance of practical tasks with the use of formalized description of the experience of research search and analytical research based on modern ICT will allow to form the instrumental and digital competencies necessary for future master's students in their research and professional activities, as well as to obtain sustainable skills of processing large volumes of information obtained from heterogeneous sources.

As part of the workshop, undergraduates will participate in the formation of a digital archive of media materials and scientific publications, supplemented on the principles of crowdsourcing (thematic collections of publications and media materials on current areas of interdisciplinary research areas "Conflict Studies").

Implementation of the practicum will allow to form practical skills of using information and communication technologies to solve such problems as: identification of relevant topics included in the interdisciplinary direction "Conflictology"; definition of terminological research base; formation of texts for further analysis with the help of ICT tools.

In general, the successful study of the practicum is focused on the formation of the following digital competencies:

- is able to carry out a comprehensive, interdisciplinary analysis, using modern theoretical approaches, to identify patterns of conflict and peaceful ways of interaction, to develop theoretical and methodological foundations of alternative technologies for

conflict prevention, resolution and management, improves the conceptual and categorical apparatus of analysis. To form this competence the following skills are formed: integrated use of ICT in identifying relevant topics of interdisciplinary direction "Conflictology"; definition of terminological base of research; formation of corpus of texts; analysis of corpus of texts with the use of ICT;

- is able to formulate problems of theoretical relevance in the field of conflictology, analyze and systematize knowledge about conflicts and peace, conduct applied conflictology research, analyze, summarize the results obtained, make theoretical conclusions and recommendations for conflict resolution and peacekeeping. To form this competence the skills of using ICT to build thematic trends in the development of interdisciplinary field "Conflictology" are formed.

The main components of the practicum are:

- individual practice-oriented tasks with methodological recommendations for their implementation;
- group tasks for forming thematic collections of contexts and creating a collective bibliographic base relevant to the undergraduates' field of research;
- reference cases containing: collections of scientific publications with a description of the methodology of their formation (from the selection of digital scientific resources to the search and explication of publications relevant to the topics of research in the field of conflict studies); terminological landscapes, corresponding to the topics of research in the field of conflict studies (with a description of their formation); thematic trends characterizing the dynamics of development of the main directions of interdisciplinary field of research in conflict studies (with a description of the methodology of their construction).

The workshop exercises contain links to open-access resources:

- introductory videos that explain, using concrete examples, the essence of the practicum assignments;
- guidelines and recommendations for using Internet content parsers;
- methodological recommendations for completing the practical exercises;
- test materials;
- archives of media and scientific materials on relevant topics corresponding to the field of

training "Conflictology" with placement in open online resources, replenished on the principles of crowdsourcing and distributed access.

The peculiarity of the practicum is the use of:

- a comprehensive approach ensuring consistent application of ICT (network parsers and programs of intellectual analysis of text data) in the analytical and research work of a master's student (from search and selection of information materials in the flow of socio-political and scientific information to making forecasts and constructing thematic trends);
- specially formed material collections - electronic media archives and practical case studies, which are used by Master's students not only as a benchmark during the practical work, but also to supplement these collections during the practical exercises.

The innovativeness of the pedagogical approach proposed by the practicum consists in:

- integrated use of ICT at all stages of the study;
- taking into account all forms of implementing the curriculum;
- orientation towards professionally significant results;
- connection of the content of the tasks performed by master's students with the content of their scientific research.

The demand for the developed product by the university and educational community is determined by the lack of a unified approach to the organization of scientific and practical work of masters with the possibility of adapting the proposed methods and tools to the tasks of other educational programs in the preparation of master's theses.

The electronic format of the practicum and the availability of the crowdsourced materials archive provide a combination of traditional classroom learning with the elements of electronic learning which is characterized by a technologically rich online environment. During the classroom phase, the main focus will be on case studies, creative seminars and discussions, exchanging experiences and testing results, as well as meetings with representatives from the expert and professional communities. During the classroom sessions, remote learners will be connected to the corporate videoconferencing system and interactively participate in the learning process. At the same time, the workshop materials presented in electronic form are available to both full-time and remote master's students (performing individual assignments on creating new corpora of text arrays

and placing them as shared sources; practical tasks aimed at applying analytical tools).

## 4 CONCLUSIONS

The modernization of the academic discipline with the introduction of the practicum is practice-oriented, which will effectively solve the problem of training highly qualified personnel to solve professional problems based on the use of digital competencies. Advanced methods and approaches based on blended learning and project approach are implemented in the practicum. The content part of the tasks is developed in close cooperation with the heads of master's programs, professors, heads of master's theses. This increases the motivation of master's students to actively learn the practicum as a tool of their research activity.

If the content part of the developed practicum is changed, it can be adapted for application in professional training of master students in different directions. Besides, the practicum can be used by master teachers in their methodical work, heads of master's final qualifying works for increasing their efficiency. The practicum can also be demanded by scientific-pedagogical workers and researchers for implementation of new methods and approaches using modern ICT in their scientific activities.

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