

Conference Paper

Development of Online Master's Degree Course in Education Digitalization Conditions: On BSU Experience

A.G. Klepikova, V.N. Kormakova, E.I. Eroshenkova, and E.N. Musaelian

Belgorod National Research University, Belgorod, Russian Federation

Abstract

This article presents a study of the development of the online master's degree course at Belgorod National Research University (BSU) in a context of education digitalization in Russia. It demonstrates the successful introduction of the frameworks of intensity, scalability, and a modular approach to learning, asynchrony, interactivity, automation, openness, and adaptability. We consider the online master's course as an open information and learning environment that is designed for effective management and monitoring of the educational process. The online master's degree course at BSU aims to create a flexible and adaptive educational system that meets the needs of the digital economy and ensures the fullest use of the didactic potential of digital technologies. It is proved that to ensure high-quality assimilation of the master's degree program, the managers of the educational process need to provide pedagogical support to learners. The basis for effective development of online master's degree course is in availability of online courses (MOOC) placed on online platforms; formation of students' ICT competence; application of interactive teaching methods; motivational readiness for self-education; readiness of teachers to interact online; available on-line maintenance in the educational process and the possibility of computer networks/Wi-Fi. According to the study, the conditions for the effective development of online master's degree course in higher education allow: ensuring the personalization of the educational process; involving each student in learning activities; motivating learners at all stages of the learning process; providing the continuous personalized monitoring of students' learning achievements, giving the prompt feedback to students; ensuring the availability of educational programs for learners who live in remote areas, as well as those with disabilities.

Keywords: continuing education digitalization, online learning, e-learning, online master's degree course, cyberculture, MOOC.

Corresponding Author:

A.G. Klepikova

klepikova@bsu.edu.ru

Published: 21 January 2021

Publishing services provided by
Knowledge E

© A.G. Klepikova et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the XXIII International Conference Conference Committee.

1. Introduction

Cyberculture is increasingly becoming a "habitat" and a source of development for an individual. The Internet "generates" new cultural practices and activities, attitudes, meanings, values, phenomena, knowledge and skills. The virtual space of the Internet

OPEN ACCESS

network offers vast flow of information, contributes to the formation of new competencies, network identity, the introduction of new types of communication, and increases the level of personal mobility.

The educational system in Russia seeks for productive activities to introduce the digitalization ideas into the practice of continuing education. This idea is based on understanding of global trends, the needs of the state and society, and of the labor market, the dynamics of ongoing processes in the field of education; age increase, level of needs, motivational readiness, and opportunities for young students. The society and each person's awareness of the need to get education throughout life is becoming a life strategy today, a necessary basis for "survival" in a highly competitive labor market. From this point of view, according to the authors, an effective means of obtaining higher education and developing professional mobility is the rapidly developing online education, as well as the online master's degree. The strength of the online master's program includes: 1) relevance of the stuff taught; 2) availability to train at online master's course from anywhere in the world; 3) independent choice of the pace of training by students; 4) possibility of combining work and learning; 5) regular teachers and students real time feedback (chats, video conferences) etc. [2].

The introduction of online master's programs is caused by the need to adapt higher education to the needs of the digital economy and digital society, reflecting the global trends of the modern era, recorded in the following regulatory documents: Decree of the President of the Russian Federation as of 09.05.2017 № 203 "On the strategy for the development of the information society in the Russian Federation for 2017-2030"; Decree of the Government of the Russian Federation as of 18.04.2016 № 317 "On the introduction of the national technological initiative"; Regulation of the Government of the Russian Federation as of 28.07.2017 № 1632-R "On approval of the program "Digital economy of the Russian Federation" (section 2 — "Personnel and education"); Priority project in the field of education "Modern digital educational environment in the Russian Federation" (approved by the Presidium of the Council under the President of the Russian Federation for strategic development and priority projects, Protocol № 9 as of 25.10.2016) [2].

Important basis for training in the online master's degree course is, first of all, personal motivation, independent choice of the direction of training that is most in demand on the labor market and the desire for self-learning. According to the data published on the Coursera website [8], the students, which are enrolled in the online master's degree course, are mostly people at the age of 30–35 who have had employment history for about 14 years. This period of life is characterized by the reconsideration of their

professional career, the search for more knowledge in the field of professional activity, the expansion of professional skills.

The introduction of innovative educational technologies in the online master's degree course (adaptive, personalized, mobile, mixed, synchronous and asynchronous learning, gamification, project and research activities, cloud technologies, etc. [6]) allows to "change for the better" the lives of millions of people with a sufficient level of education, intellectual abilities, determination and perseverance, who want to succeed and improve the level of education, but are unable to do this for various reasons (living conditions, social status, marital status, level of material wealth, etc.) [16].

2. Methodology and Methods

In accordance with the aim of the study to develop master's degree course in terms of digitalization of education in the world, the authors relied on the practice of Russian and foreign universities: 1) integration of an online master's degree in the educational process of the University [4, 9, 10, 12, 13, 16], etc.; 2) use of online courses in educational programs of higher education [1, 3, 6, 11, 14, 15, 17], etc. The research methodology is based on the previously obtained results of the analysis of theoretical approaches and principles of quality management of learning and professional activities of students in the E-learning environment at the University, the introduction of which ensures the organization of personal development of learners in the learning process; provides students with the flexible variable learning; allows them to study in a new paradigm of education; gives a new quality of learning and sets professional skills; strengthens the applied orientation of the educational process at the University [5]. The analysis of the quality of training the masters of teacher education at BSU on the basis of information technologies allowed the authors to draw a conclusion about the possibility of setting a high level of knowledge for students' ICT competencies through interactive teaching methods (training in cooperation (Google+), team work on the Internet (web-quests), interactive educational games-tasks that are based on gamification and storytelling, Case-study [7].

The previous research [1] allowed the authors to test the model of managing the educational process through the online courses, which is an important component of the development of online master's programs at BSU. The introduction of learning models in the educational process through distance and mixed learning technologies, online courses increase learning results and opportunities for life-long learning process, as well as in the online master's program.

3. Results and Discussion

Currently, we know the positive experience of foreign and Russian universities that have integrated online master's degree course into the University's educational process. One example of this integration is master's degree course in computer science at the University of Illinois and Coursera, in which all courses are taught in the format of mass open online courses (MOOC) [9]. The program includes MOOC that was developed at the University of Illinois and laid-open on the Coursera platform as a specialization. Here, to get a master's degree, a student needs to get 32 credits (8 online courses). Students pick out the courses on the list of MOOC grouped by four topics, within which there is a core course and elective courses. The program includes viewing online videos, completing tasks, group work, and interacting with teachers during their office hours. If students do not complete the required number of courses for a master's degree, they receive a certificate from the platform [9].

The master's degree course in computer science that was developed at Georgia Tech University on the Udacity platform [13] is made up of MOOC developed by University scholars. The program that was launched in 2015 attracted 3,000 students. Students have the right to freely choose MOOC from the list of courses offered, and have to pass 30 credits to get a master's degree. The training course lasts for 3 years, but at the request of the student the training period can be extended up to 6 years.

The courses analysis, as well as MOOC, allow to make the following conclusions: 1) they are created in conjunction with online platforms; 2) they are analogues of full-time programs; 3) as MOOC the courses are used, which have been created by the University that offers the program; 4) have low barriers associated with the combination of online courses, with the expectation of the number of credits, level of labor intensity; 5) the fee is much lower than the fee for similar full-time programs; 6) educational programs that combine online and full-time formats, and full online programs, are offered only at the master's level and only in computer science training; 7) students who study at the master's degree course within the specialization (Coursera) or MICROMASTERS (edX), pass MOOC together with those registered for the online course, while additional tasks are presented on the platform only for students.

Theoretical review of scientific works shows that online master's degree course has been successfully introduced on the basis of: intensity (the program was developed on the basis of accredited University graduate programs); scalability (the training program can simultaneously train thousands of students); a modular approach to training (the course program is divided into independent subject areas and credit of the fractional

units in accordance with the material studied); both synchronous and asynchronous (you can study at any time, in any place, at your preferred pace); interactivity (the program provides support and active interaction within the student community, in the “student-teacher” interaction in different formats); automation (development of tests and control tasks of sufficient complexity so that the assessment can be fully automated); openness (training according to the results of completed tasks “opens the way” to learning for any student with sufficient competence); adaptability (changes in the content of the program according to the needs of students) [2, 6, 10, 15–17], etc.

In the Russian educational environment, the first online master’s degree course on modern combinations theory was launched in the fall of 2016 at Moscow Institute of Physics and Technology (MIPT) [12]. The structure of the proposed program has a significant difference from the American online master’s programs we have described. The program is introduced online, but applicants are required to pass written exams in mathematics and computer science. The passing of state exams and defending the final work are also held in full-time format. The number of vacancies for the course is limited (the first set was 10 people), the fee of the program is equivalent to the fee of a full-time course in combinations theory. The course uses MOOC that is created by MIPT teachers, so there are no organizational difficulties dealing with the development of the curriculum and the formation of network agreement [15]. Currently, several universities in Russia introduce online master’s degree course: Tomsk State University (5 courses), MIPT, BMSTU (The Bauman Moscow State Technical University), South Ural State University and Far Eastern Federal University.

At Belgorod national Research University, the development of online master’s degree course started with the introduction of main professional educational programs of the master’s course through e-learning (EL), distance learning technologies (DLT). In order to arrange independent work of students, training with EL and DLT is conducted in all forms of education (full-time, correspondence) in 14 fields of training (28 master’s degree courses). When applying for training, undergraduates get access to their personal account. The choice of training mode (traditional, combined, remote) depends on the form of interaction between students and the teacher. Students can choose to attend classroom sessions in real (traditional mode) or virtual (combined mode) via a webcam. The combined training mode includes simultaneously conducting classes directly in the classroom and using telecommunications technologies in the teleconferencing mode. The use of online learning technologies involves the interaction of the teacher with students in online mode through a tool for teleconferencing in the corresponding course of the e-learning system (ELS) “Pegasus”. All processes in the ELS “Pegasus” are

duplicated through demonstration equipment on the screen for simultaneous interaction with students in the audience. The distance learning mode is based on independent work of students with electronic educational resources placed in the ELS "Pegasus", with online interaction of undergraduates and teachers through communication tools, the teleconferencing mode (webinar). Before taking classes online, students are required to activate an Intranet user account, apply for online training in the student's personal account, sign up for virtual presence during classes according to the schedule, as well as for tests/exams during online sessions. The interaction mechanism between teachers and students during online classes varies from lectures listening to public messaging between conference participants. At the same time, any of the online students can become a speaker and demonstrate a paper (for example, a presentation) for all participants of the e-learning process to view; use the built-in features of the interactive whiteboard.

4. Results and Discussion

We carried out a study of the conditions for the effective development of online master's degree course evidence from Belgorod National Research University. The survey was conducted with 143 undergraduates at the age of 21 to 46 who study at BSU in more than 30 fields of training, as well as programs introduced with EL and DLT. The results of the study showed the following: 86% joined the master's degree course after just after getting a bachelor's degree; 4.9% — in 1–3 years after graduation; 1.4% — in 3–5 years; the same number — in 5–10 years; about 5% — in 10–20 years after graduation, and only 1.4% — in 20 years. At the same time, 37.8% of respondents were engaged in their field; 39.9% — did not work in the field they had been trained in, 22.4% — were not employed. The results of the responses are shown in Figure 1 and Figure 2, where we can clearly see what distinguishes Russian masters from the global trend of admission to the master's degree courses.

The main reason for enrolling for the master's degree course according to 37% of respondents is "get the best opportunities for professional growth"; 18.2% of respondents indicated "get career opportunities and opportunities to continue their studies abroad or in graduate course"; 14% — "get education in another field of training"; 9.8% — "for self-realization and self-development"; 7% — "for further training in graduate school". Other answers: get an opportunity to be trained abroad; solve the problem of employment; spontaneous choice; be able to get a higher salary, etc. In our opinion, valuable is the information about the attitude of undergraduates to the choice of the

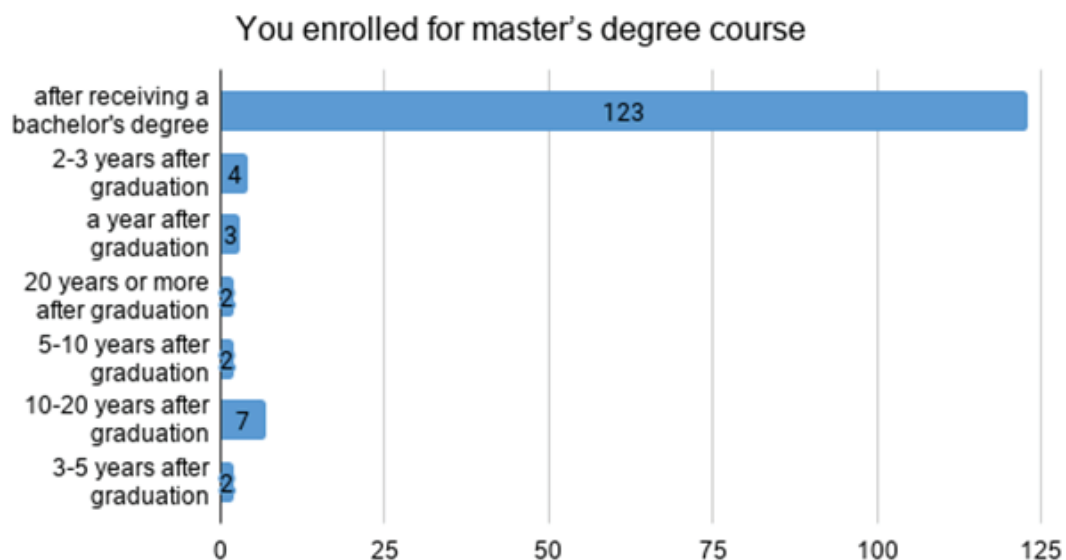


Figure 1: Respondents' responses on enrolling for the master's degree course

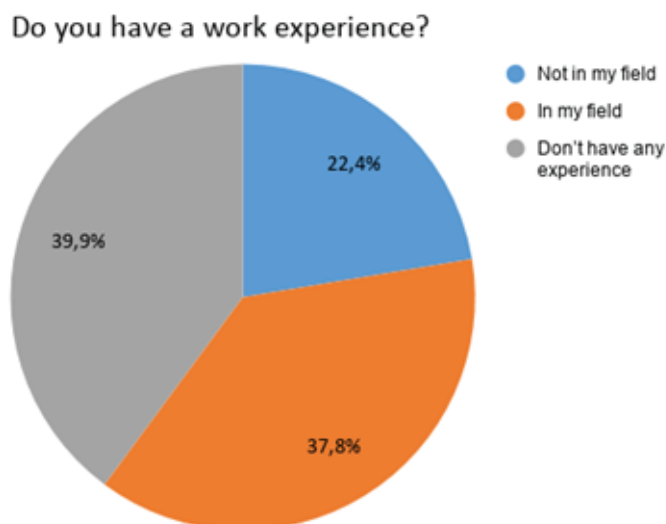


Figure 2: Respondents' responses on the employment (before enrolling for the master's degree course)

purpose of training in the master's degree course (more than 50% of respondents picked it out): get knowledge and skills that will help adapt to the workplace; master practical skills lively; get a career that is in demand on the labor market.

The formation of students' information and communication skills is of great importance in the development of online master's degree course. According to 81.1% of respondents, their ability to search and process information from various sources, as well as specialized databases, developed to the greatest extent; 82.5% are ready to study through information technologies and new types of communication, as well as

58.7% — in a foreign language; 52.4% of respondents noted the highest degree of development of project activities and teamwork skills. The answers of undergraduates concerning the strongest ways of educational work in the master's degree course of the University are shown in Figure 3. Responses to the question “what forms of educational work in the master's degree course do you think are most acceptable?” were somewhat different (Figure 4).

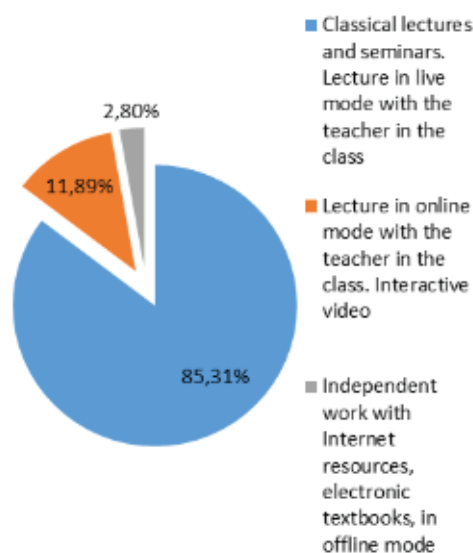


Figure 3: Respondents' responses on the strongest ways of academic work at the University

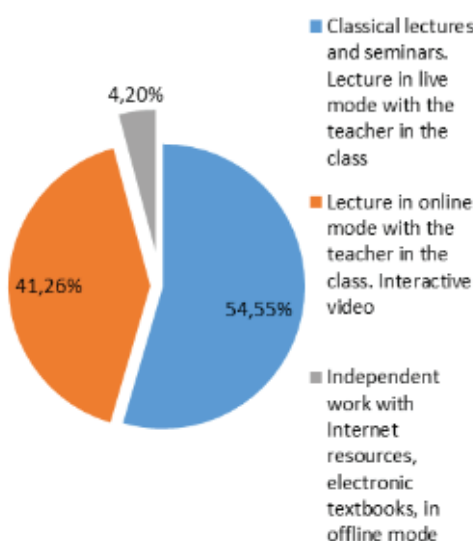


Figure 4: Respondents' responses on the most acceptable ways of academic work at the University

The results did not surprise us, since 52.4% of undergraduates combine work in their field with training, and 28% take part-time jobs. Online training gives them freedom of choice and mobility in the process of combining work with training, mastering training courses in a more convenient mode. At the same time, undergraduates have the

opportunity to participate in online webinars and special chats with teachers from anywhere in the world.

Responses of undergraduates, who study through EL and DET, to the question: “are you satisfied with the online training introduced at the University?”, are presented in Figure 5 and Figure 6. The analysis of the obtained data allows us to come to the following conclusion: 30.8% of students are completely satisfied; 53.8% are rather satisfied with this format of interaction; 69.2% — the real process fully meets their expectations.

Are you satisfied with the online training arrangements introduced at the University?

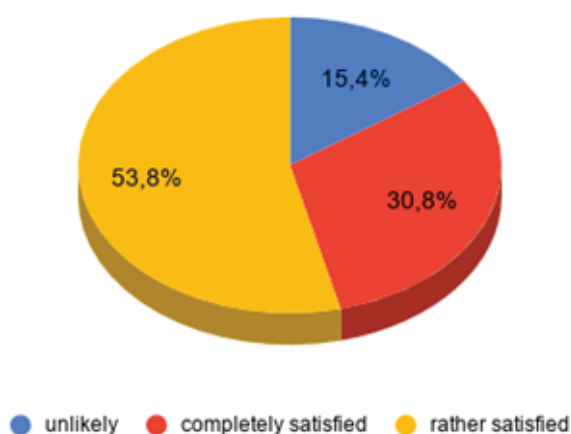


Figure 5: Respondents' responses on quality of online learning arrangements at the University

How does this training mode meet your expectations?

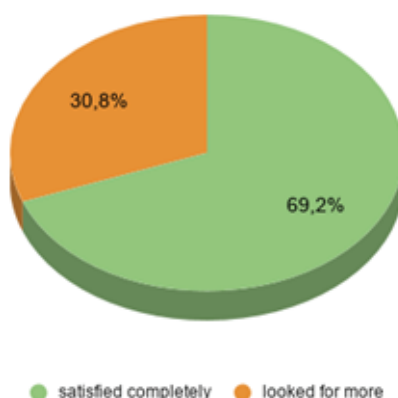


Figure 6: Respondents' responses on the compliance of the training arrangements with their expectations

Students' opinions about the possibility of getting better online education were mixed. Problems related to the technical capabilities of computer networks/Wi-Fi and insufficient quality equipment in classrooms were identified (23.1% and 30.8%, respectively); problems related to the lack of motivational readiness for online learning (7.7%), as well as external problems related to the unavailability of teachers to interact and communicate online (21.7%). Despite some existing objective difficulties in classes in the combined and online learning mode, undergraduates recommend these types of training in the following ratio: 61.5% — rather Yes than No; 30.8% — advise; 7.7% — do not advise.

The study showed that the successful development of the online master's degree course at the University is based on: the availability of online courses (MOOC), hosted on online platforms; the formation of ICT competence of masters; the use of interactive methods of training; motivational readiness for self-education; the teachers' interaction and communication online; technical equipment during educational process and possibilities of computer networks/Wi-Fi.

5. Conclusions

Thus, the online master's degree course is considered by us as open information and learning environment designed for effective organization, management and monitoring of the educational process. The goal of developing an online master's degree course, as well as at BSU, is to create a flexible and adaptive educational environment that meets the needs of the digital economy and ensures the fullest use of the didactic potential of digital technologies. In our study, we have formulated the conditions for effective development of online master's degree course in higher education, which allows for the personalization of the educational process; involves each student in active learning activities; ensures sustainable motivation of students at all stages of the learning process and the project nature of learning activities; carries out continuous personalized monitoring of learning achievements of students, gains prompt feedback from students; ensures that educational course is accessible to people who live in remote areas, as well as those with disabilities. These conditions contribute to increasing the information openness and transparency of education in the online master's degree course, the development of youth mobility, and their personal and professional growth. Developing an online master's degree course is a task that requires scientific justification and experimental verification.

Acknowledgments

The study was carried out within the framework of the State Task of the Belgorod State National Research University for 2020-2022. № FZWG-2020-0012 "Substantiation of the integrative methodology of vocational education at the university: dominants of the formation of universal competencies, pro-social attitudes and poly-subjectivity of the future teacher".

The authors express gratitude to Belgorod National Research University, North Caucasus Federal University and Belgorod University of Culture and Arts management for the opportunity to undertake the research.

References

- [1] Belenko, V., Klepikova, A., Nemtsev, S., Belenko, T. and Mezentseva, O. (2019). MOOC introduction into educational process: Experience of on-line courses integration in University educational programs. CEUR Workshop Proceedings. *In: Proceedings of the International Scientific Conference Innovative Approaches to the Application of Digital Technologies in Education and Research (SLET-2019)*. Stavropol-Dombay, Russia, vol. 2494.
- [2] Bilenko, P., Blinov, V., Dulinov, M., Esenina, E., Kondakov, A. and Sergeev, I. (2019). *Didactic concept of digital professional education and training*. Moscow: Pero Publishing House, p. 97.
- [3] Conducting a comprehensive analysis of the results of testing models for the use of online courses and developing scientifically-based recommendations for the use of online courses in the introduction of educational programs of higher education. (2017). [Electronic resource]. Retrieved March 2, 2019 from <http://itoo.urfu.ru/uploadfiles/ckfinder/files/%D0%A0%D0%B5%D0%BA%D0%BE%D0%BC%D0%B5%D0%BD%D0%B4%D0%B0%D1%86%D0%B8%D0%B8.pdf>
- [4] Gershon, E. (2018). Digital Frontier: CU Boulder pioneers a MOOC-based graduate degree in Electrical Engineering. The Coloradan. June, 1. Retrieved February 14, 2020 from <https://www.colorado.edu/coloradan/2018/06/01/digital-frontier>.
- [5] Klepikova, A., Musaelian, E., Kormakova, V. and Prokopenko, Y. (2018). Quality management principles of scientific and methodological support for students' activity within e-learning environment. *In: Proceedings of the International Multidisciplinary Symposium ICT Research in Russian Federation and Europe "Integrating Research Agendas and Devising Joint Challenges"*, Roma, Italy, Stavropol, Russia, pp. 63-75.

- [6] Kondakov, A. (2020). Digital education: opportunities matrix. Retrieved February 3, 2020 from [http://F:/_/{%}D0{%}A3{%}D1{%}80{%}D0{%}A4{%}D0{%}A3/2{%}20\(1\).pdf](http://F:/_/{%}D0{%}A3{%}D1{%}80{%}D0{%}A4{%}D0{%}A3/2{%}20(1).pdf)
- [7] Kormakova, V., Klepikova, A., Musaelian, E., Baybikowa, G. and Lapina, M. (2019). Formation of ICT — Competencies of postgraduate students of teacher education based on interactive techniques. CEUR Workshop Proceedings. *In: Proceedings of the International Scientific Conference Innovative Approaches to the Application of Digital Technologies in Education and Research*. Stavropol-Dombay, Russia, vol. 2494.
- [8] Learn more about online degrees on Coursera. (2020). [Electronic resource]. Retrieved February 14, 2020 from <https://www.coursera.org/degrees>.
- [9] Illinois online. (2020). Master of Computer Science in Data Science. [Electronic resource]. Retrieved February 14, 2020 from <https://online.illinois.edu/mcs-ds>
- [10] McAndrew, K. (2018). Taming innovation: how the online master's degree course returned the initiative in transformation to the University. *Educational Studies*, vol. 4, p. 60-80.
- [11] Methodological recommendations on the introduction of online courses in the curriculum. Retrieved March 2, 2019 from <https://s31333.cdn.ngenix.net/fd95ff/2443ca32/docs/methodical-recommendations-2.pdf>.
- [12] MIPT. (2020). Modern combinatory theory. Russia's first online master's degree course [Electronic resource]. Retrieved February 15, 2020 from <http://omsmcript.ru/>
- [13] OMS CS. (2020). Online Master of Science Computer Science. Retrieved February 14, 2020 from <https://www.omscs.gatech.edu/>
- [14] Research-based recommendations on the use of online courses in the introduction of higher education educational programs developed by the Ural Federal University based on the results of the project "Research of new forms of organization of the educational process through open online courses". Retrieved March 2, 2019 from http://fgosvo.ru/uploadfiles/metod/67_6014_URFU.pdf.
- [15] Semenova, T. and Vilkova, K. (2017). Types of integration of mass open online courses in the educational process of universities. *University management: practice and analysis*, vol. 21, issue 6, p. 114-126. DOI 10.15826/umpa.2017.06.080.
- [16] Stephen, L. (2018). Higher education: the experience of an online learning advocate. *Educational Studies*, vol. 4, p. 167-187. DOI: 10.17323/1814-9545-2018-4-167-187.
- [17] Zubkov, A. (2018). Integration of mass open online courses into the educational process of higher education institution: foreign experience. *Science about person: humanitarian researches*, vol. 2, issue 32, pp. 94-98.

- [18] Zakirova, T. (2017). Project activity of students as a method of developing competences of University students. *Modern problems of science and education*, vol. 5, p. 326.