Professional Training of Masters in the Conditions of Digital Transformation of Education

Timur Vezirov [a], Tatiana Gish [b], Vladimir Elmawla [b], Ludmila Kuzmenko [c] and Olga Krivolapova[b]

[a] *Dagestan State Pedagogical University, Makhachkala, 367000, Russia*
[b] *North-Caucasian Federal University, Stavropol, 355000, Russia*
[c] *Stavropol Stitelny College, Stavropol, 355000, Russia*

Abstract

The article discusses the author's practical experience in organizing the professional training of masters studying in the master's program "Information and Communication Technologies in Education" at the FSBEI HE "Dagestan State Pedagogical University" in the context of the digital transformation of pedagogical education, where an important place is occupied by the author's electronic teaching materials in disciplines block "Subject part" of the educational program.

Keywords[1]

Digital transformation, teacher education, master's training, master's program, e-learning materials.

1. Introduction

Higher education in Russia today is being built in the context of digital transformation. For the development of the digital economy in Russia, the following programs are being implemented: "Strategy for the Development of the Information Society in the Russian Federation for 2017-2030"; “The digital economy of the Russian Federation”, for which competent specialists are needed. The digital economy requires a specialist to develop the skills of self-organization, planning, self-motivation, where digital technologies can play an important role as components of the digital educational environment of a university, which in turn should provide an individual educational trajectory for students-future teachers, on the basis of which they develop. ICT competence and get acquainted with new technologies and educational online media services. These technologies include infographics, mind mapping and scribing. Digital technologies make it possible to individualize the learning process at all stages of the classroom, as well as provide tools for the development of blended learning. The priority project "Modern digital educational environment in the Russian Federation" is aimed at solving these problems, for the practical implementation of which it is necessary to introduce online learning, including open educational resources (OER).Currently, in the context of digitalization of education, a new system of training should be implemented for specialists who are inclined to creative non-standard solutions and possess communication skills. An important role in such training is played by the process of forming digital literacy in future specialists, the main goal of which is the ability to design and use content using digital technologies based on computer graphics, multimedia development of online courses, and communication with other students.

2. Literature review

In the second article [6] by N.P. Petrov and G.A. Bondareva analyzes the stages of digitalization and the emergence of new digital technologies that represent pedagogical potential, in particular, they note that the digitalization of education changes the content of the taught courses, as well as the delivery of information through connections to information networks, databases, forums.

SLET-2020: International Scientific Conference on Innovative Approaches to the Application of Digital Technologies in Education, November 12-13, 2020, Stavropol, Russia
EMAIL: timur.60@mail.ru hr (Timur Vezirov); gtanya09@mail.ru (Tatiana Gish); vladimirmawla.vm@gmail.com (Vladimir Elmawla); adriena@mail.ru (Ludmila Kuzmenko); obabchenko@ncfu.ru (Olga Krivolapova)
ORCID: 0000-0003-4592-8462 (Timur Vezirov); 0000-0003-2761-7847 (Tatiana Gish); 0000-0002-5433-8934 (Vladimir Elmawla); 0000-0003-3126-3850 (Ludmila Kuzmenko); 0000-0001-8632-1179 (Olga Krivolapova)

In article [7] T.O. Puchkovskaya examines the features of the digital transformation of processes in the education system, and also analyzes the readiness of teachers to work in the conditions of using digital technologies for organizing individual training in remote access mode, which shows the formation of their information competence, including: cognitive, activity, organizational, communication, analytical , projective and motivational components.

I.V. Robert examines the strategic guidelines for the development of education in the context of digital transformation (methodological, theoretical, technological and humanitarian-applied) and describes their characteristics [8].

The authors of the monograph [1] T.G. Vezirov and A.V. Babayan examines the professional training of masters in the context of the informatization of education, the role and place of e-learning at the present stage of education development, as well as the organizational and pedagogical aspects of the professional training of masters by means of e-learning.

T.G. Vezirov and G.R. Kozaeva offer the results of a study of some aspects of professional training of specialists in the context of digitalization of education, in particular, masters of pedagogical education at the FSBEI HE "Dagestan State Pedagogical University" and in the training of specialists of the State Autonomous Educational Institution of Higher Professional Education "South Ossetian State University named after A.A. Tibilov [2].

The works of T.G. Vezirova [1], E.N. Dronov [3], A.N. Kulibekova [4], M.K. Manafova [5] and others.

The authors of the article [10] V.K. Saryan and E.V. Salomatina.

AND I. Danilyuk and A.M. Kondakov developed a list of basic competencies of the digital economy based on the analysis of Russian and foreign models of competencies [2].

M.G. Sorokova et al. In the article [11] carry out a comparative analysis of the opinions of students at different levels of education, the learning process in the digital environment of the university.

According to A.Yu. Uvarov, the use of digital technologies will lead to an update of the content of educational work, the development of innovative methods and forms of educational work, the transition to authentic methods and assessment tools that demonstrate the effectiveness of educational work [14].

S.V. Panyukova in the educational and methodological manual "Digital tools and services in the work of a teacher" considers the possibilities of basic digital tools and services that are used to create educational content, electronic educational resources, distance learning courses, and also presents web technologies for communication and interaction, shells for testing and diagnostics, tools for creating video and animation, collaboration environments, services for portfolio management and many online services that are still difficult to organize [9].

3. Methodology

To solve the problem of professional training of masters in the context of the digital transformation of education, the selection and analysis of relevant literature was used in the work. To test the effectiveness of the research results, we used theoretical (analysis of scientific and methodological literature, resources of educational Internet portals, FSES HE) and applied (observation, questionnaire, survey, tests) methods.

4. Results and discussion

In the context of the digital transformation of higher education, the scope of application of digital tools and services in such formats as blended learning, massive open online courses (MOOCs), and various hybrid models is expanding.

Currently, educational online services and massive open online courses are widely used.

The following educational platforms are used to host online courses:

1. Edmodo system, which is a popular learning management system.
2. Universarium (http://universarium.org), which allows you to organize cooperation with leading universities in Russia.
3. Coursera (http://www.coursera.org), where content is available for a fee.
4. Udemy (http://about.udemy.com), which allows you to create authoring courses and take training.

5. Teachbase (https://teachbase.ru) is a cloud resource, has a simple interface, completely in Russian.
6. Moodle (https://moodle.org/) - tooling environment

Taking online courses, you can get not only knowledge, but also additional diplomas and certificates. It is important to pay attention to the level of educational organization and the availability of certificates for conducting educational activities [15].

Master's students in the field of study 44.04.01 Pedagogical education, master's program "Information and Communication Technologies in Education" were trained in the online course "Digital Tools and Services for Teachers" (author - Professor S.V. Panyukova) on the "Stepik" platform [four].

This online course is designed for teachers who want to learn more about the latest trends in the informatization of education, master special applications and services for creating electronic educational resources, tests, surveys, crosswords, infographics, time axes, videos and web portfolios.

The structure of the online course is as follows:

1. Introduction.
2. Digital technologies in education.
3. Distance educational technologies.
4. Digital educational content.
5. Tools and services to support the educational process.
6. Conclusion.
7. List of used literature.

All sections of the course contain numerous examples and links to the resources being studied.

In addition to online courses, there are a large number of platforms on which it is possible to form and develop the skills of future masters. These platforms allow you to supplement your digital portfolio, improve your skills in various areas

The most common tool for assessing digital literacy is a digital portfolio, which contains information about competencies and skills acquired in parallel with higher education or after graduation [2].

Future masters of teacher education in the master's program "Information and Communication Technologies in Education" create their digital portfolio using the 4portfolio.ru portal and demonstrate it during the defense of master's theses. Such a process develops digital literacy, communication skills, and also presents the results of diagnostics of universal skills (SoftSkills), which are very necessary for a modern teacher.

Based on the digital portal 4portfolio.ru, you can organize blended learning, which is one of the factors of personalization.

As T.V. Dolgov, the technology of blended learning is synergistic, allowing more efficient use of the advantages of both full-time and e-learning, and leveling or mutually compensating for the disadvantages of each of them [1].

Blended learning allows you to transfer the functions of transmitting knowledge to digital carriers, thereby changing the teacher's functions in the classroom for organizing the project and research work of students, as well as organizing their individual educational trajectory.

In the educational process of the magistracy, we use the “Flip Class” model of blended learning, where the implementation of online learning in the form of massive open online courses is carried out outside the university.

MOOCs in Russia have great potential for development, in particular, the organization of such academic educational projects as: Lectorium; Universarium; Open education; Stepik, etc.

An important place for the practical implementation of e-learning and blended learning is occupied by e-learning materials, which can be created independently without special computer skills and financial costs.

Together with graduate students in the field of preparation 44.04.01 Pedagogical education, the master's program "Information and Communication Technologies" at the FSBEI HE "Dagestan State Pedagogical University" developed and used in the implementation of blended learning the following electronic teaching materials in the disciplines:

1. E-learning tools in teacher education.
2. Digital educational environment.

3. ICT competence of the teacher.

Over the past years, a promising direction in teacher education has been e-learning, aimed at increasing the efficiency of the educational process, developing the competencies necessary for a future specialist.

In this regard, the development of mechanisms, ways, models and technologies of professional training of masters of pedagogical education by means of e-learning seems to be very relevant for modern pedagogy of higher education [16, 17].

The e-learning material "Means of e-learning in teacher education" contains the following sections:

1. Introduction.
2. Theory.
3. Practice.
4. The control.
5. Glossary.
6. About the authors.
7. Literature.

The section "Theory" includes the following questions:

1. Didactic principles of electronic pedagogy in the open education system.
2. Video conferencing system in e-learning.
3. E-learning at a university: current development trends, experience and prospects for the use of e-learning in the educational sphere of a pedagogical university.
4. E-learning using distance learning technologies.
5. Organization of the educational process using specialized e-learning tools.

The discipline "Means of e-learning in teacher education" is included in the block B1.O3.03 "Subject part" of the curriculum for the master's program.

The electronic educational material "Means of e-learning in teacher education" was developed in the FhontPage software environment and when loaded, the following main window appears (Fig. 1.):

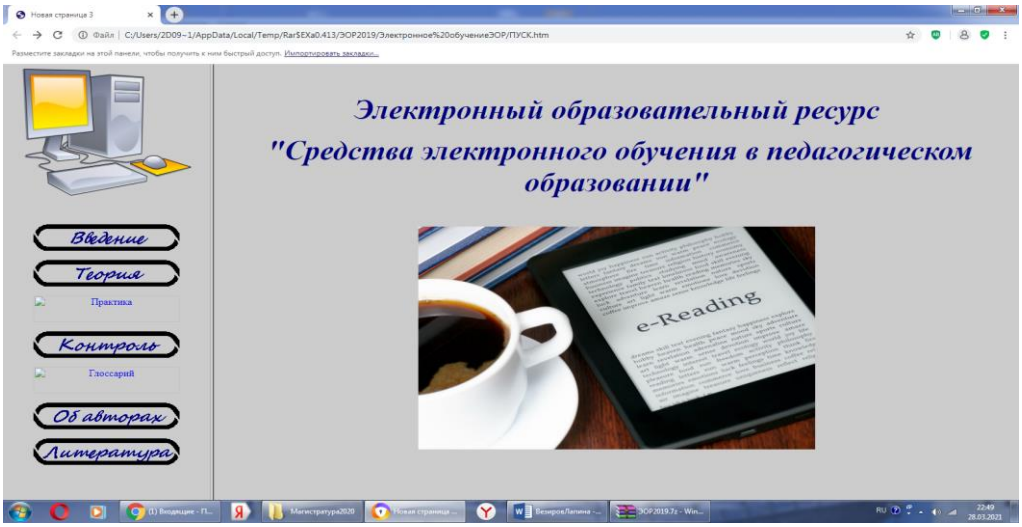

Figure 1: Electronic Learning Modules **(**ELM) main window

Using the hypertext technology in the content of the electronic educational material "Means of e-learning in teacher education", we turn to its other components. For example, the "Theory" component looks like this (Fig. 2.):

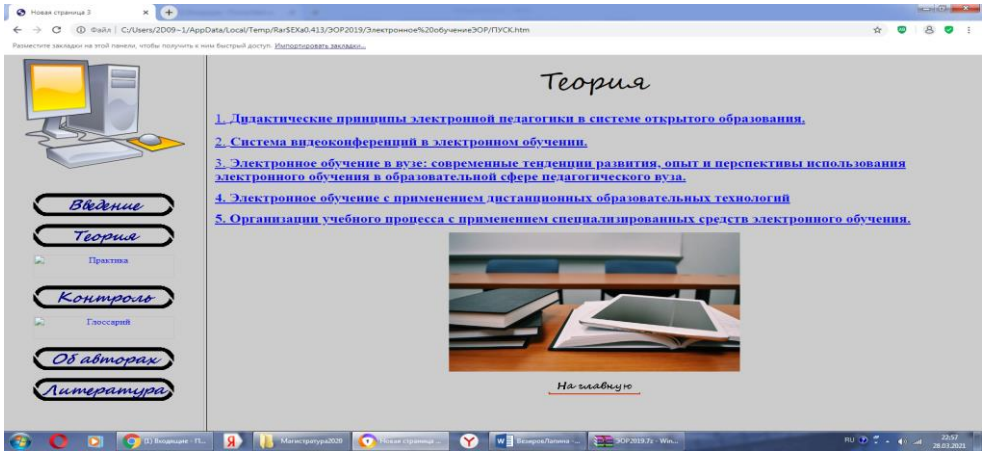

Figure 2: Window of the component "Theory" of ELM

The digital environment (space) has received a fundamentally new quality with the advent of the Internet, based on information technology and electronic computers.

The defining element for the digital environment is digital technology, which, unlike analog, works with discrete rather than continuous signals. Digital technologies are mainly used in digital computing electronics, primarily computers, in various fields of electrical engineering such as gaming machines, robotics, automation, instrumentation, radio and telecommunications devices, and many other digital devices.

The digital environment has its own infrastructure, including: telecommunications and Internet lines; computing systems of various dimensions; computational control built-in units, as well as a structure consisting of: network software protocols; programs and software platforms and an ultrastructure, which is an infosphere that contains direct and hidden meanings perceived by a person, expressed in texts, tables, video and audio content.

In the educational process of the magistracy, the digital resource "Digital Educational Environment" is used, which has the following structure:

1. Introduction.
2. Theoretical block.
3. Practical block.
4. Control block.
5. Glossary.
6. Literature.
7. About the authors.

The discipline "Digital educational environment" is included in block B1.O3.03 "Subject part" of the curriculum for the master's program.

We use the following digital platforms in the educational process of the Master's program:

1. Moodle learning management system, which is used in the organization of distance learning in connection with the introduction of restrictive measures during a pandemic.

2. Website https://metanit.com/. This site is dedicated to various programming languages and technologies, computers, mobile platforms and IT technologies. This site hosts a variety of guides and tutorials, articles and examples.

3. https://openedu.ru/ - Open Education platform. Online courses in this platform are used as a means of supporting the organization of independent activities of students and consolidating theoretical knowledge, developing practical skills and competencies in the process of taking courses related to future professional activities

4. https://professorweb.ru/. Professor Web is a free service with a guide for quick and intuitive training in all the intricacies of programming in C # and the .NET Framework platform.

Modern digital technologies have made it possible for universities to interact in a network form and implement the curricula of other universities, thereby increasing the availability and quality of education.

The digital educational resource "ICT competence of a teacher" is also studied by graduate students of the partner university of Novosibirsk State University, who study under the master's

program "Information and communication technologies in teaching foreign languages" under the contract dated 05.07.2016 programs of higher education "Information and communication technologies in teaching foreign languages" and "Information and communication technologies in education" in the direction 44.04.01 Pedagogical education "(Fig. 3).

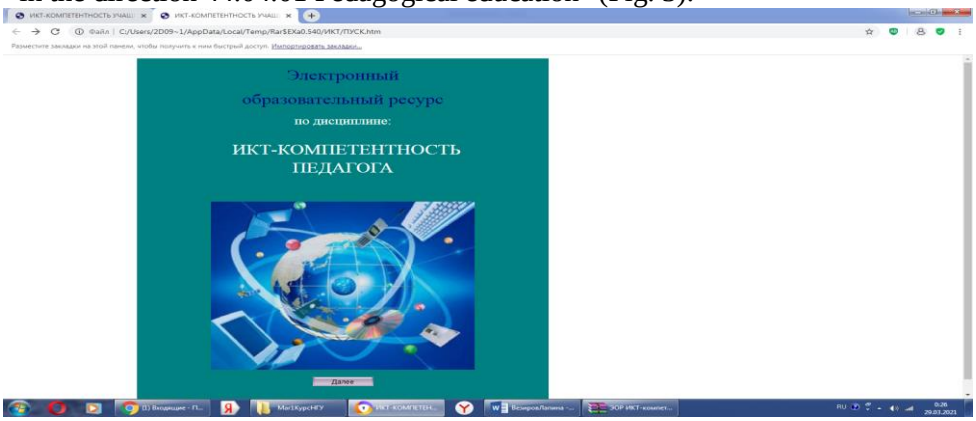

Figure 3: The main window of the digital resource "ICT Competence of a Teacher"

The structure of this resource is as follows:

1. B Conducting
2. Analysis of the level of formation of the system of continuous education in informatics and ICT.
3. Subject area "Informatics and ICT".
4. Educational area "Informatics and ICT" at different levels of education.
5. Requirements for the competence of graduates at various levels of the educational field "Informatics and ICT".
6. Stages of monitoring the level of ICT competence at various levels in the system of continuing education.
7. ICT competence of a teacher: structure, requirements and measurement system.
8. Improving the qualifications of educators in ICT as a component of the process of informatization of education.
9. Systematic formation of teacher training programs on the use of ICT in subject teaching.
10. Evolution of the paradigm of applied mathematics education for teachers of computer science.
11. Conclusion.
12. List of references.
13. Glossary.
14. Video lectures

As a result of the study, through surveys and tests on the organization of professional training of masters using the author's electronic teaching materials, they showed their effectiveness.

In general, future masters positively assessed the use of distance learning technologies in the educational process and spoke about the advisability of using a blended form of education, combining distance and full-time education, where digital tools and services occupy a special place.

The main difficulties in using distance learning technologies by graduate students were associated with workload, insufficient time, lack of technical capabilities, especially in mountainous rural areas.

It is necessary to assess the difficulties associated with the use of distance learning technologies in the context of the digital transformation of teacher education as a way to organize the professionalism of future masters and direct additional efforts to their more detailed analysis and study.

5. References

[1] Vezirov, T.G. Professional training of masters of pedagogical education by means of e-learning: monograph / T.G. Vezirov, A.V. Babayan. - Ulyanovsk: Zebra, 2015 .-- 140 p.

[2] Vezirov, T.G. Professional training of specialists in the conditions of digitalization of education: monograph / T.G. Vezirov, G.R. Kozaev. - Makhachkala, 2021 .-- 132 p.
[3] Dayilyuk, A. Ya. Concept of the Basic Model of Competence of the Digital Economy / A.Ya. Danilyuk, A.M. Kondakov. - Moscow: Russian University of Friendship of Peoples, 2018 .-- 32 p.
[4] Dolgova, T.V. Blended learning - innovation of the XXI century / T.V. Dolgova // Interactive education. - 2017. - No. 5. - P.2-9.
[5] Dronova, E.N. Organizational and pedagogical conditions for the effective use of the Moodle distance learning system in the educational process of the magistracy in a pedagogical university / E.N. Dronova // Informatics and Education. - 2017. No. 7 (286). - S.51-56.
[6] Kulibekov, A.N. Formation of professional and creative competence of future masters using network training courses: abstract of thesis… .candidate of pedagogical sciences: 13.00.08 / A.N. Kulibekov. - Makhachkala, 2019 .-- 23 p.
[7] Manafova, M.K. Formation of professional competencies of future masters of pedagogical education using a web portfolio: abstract of thesis ... candidate of pedagogical sciences: 13.00.08 / M.K. Manafova. - Makhachkala, 2020 .-- 23 p.
[8] Online course "Digital Tools and Services for Teachers". - Access mode: https://stepik.org/course/56395/syllabus
[9] Panyukova, S.V. Digital tools and services in the work of a teacher. Study guide / S.V. Panyukov. - M .: Publishing house "Pro-Press", 2020. - 33 p.
[10] Petrova, N.P. Digitization and digital technologies in education / N.P. Petrova, G.A. Bondareva // World of Science, Culture, Education. - No. 5 (78). - 2019. - C.353-355.
[11] Puchkovskaya T.O. New requirements for teacher competencies in the context of digital transformation of processes in education // Informatization of Education - 2020. Materials of the International Scientific and Practical Conference dedicated to the 115th anniversary of the birth of the Patriarch of Russian education, great teacher and mathematician, Academician of the Russian Academy of Sciences S.M. Nikolsky. - Oryol, 2020. - pp. 122-127.
[12] Robert, I.V. Strategic guidelines for the development of informatization of education in the context of digital transformation / I.V. Robert // Informatization of Education - 2020. Materials of the International Scientific and Practical Conference dedicated to the 115th anniversary of the birth of the Patriarch of Russian education, great teacher and mathematician, Academician of the Russian Academy of Sciences S.M. Nikolsky. - Oryol, 2020. - P.42-59.
[13] Saryan, V.K. Digital skills for the digital economy / V.K. Saryan, E.V. Salomatina // Informatization of Education - 2020. Materials of the International Scientific and Practical Conference dedicated to the 115th anniversary of the birth of the Patriarch of Russian education, great teacher and mathematician, Academician of the Russian Academy of Sciences S.M. Nikolsky. - Oryol, 2020. - pp. 128-131.
[14] Uvarov, A. Yu. Education in the world of digital technologies: on the way to digital transformation / A. Yu. Uvarov. - Publishing house of the State University - Higher School of Economics, Moscow: 2018 .-- 168 p.
[15] Zaporozhko V., Parfenov D., Parfenov I. ,"Approaches to the description of model massive open online course based on the cloud platform in the educational environment of the university", Smart Innovation, Systems and Technologies, Vol. 75, pp. 177-187.
[16] Parfenov D., Zaporozhko V. ,"Developing SMART educational cloud environment on the basis of adaptive massive open online courses", Proceedings of the Conference Internationalization of Education in Applied Mathematics and Informatics for HighTech Applications, Vol. 2093, pp. 35-41.
[17] Pankratova, O.P., Konopko, E.A. Remote training of teachers for IT navigation in inclusive education (2021) CEUR Workshop Proceedings, 2834, pp. 493-498.
[18] Parfenov D., Zaporozhko V., Lapina M., Sora D. Development and Research of Algorithms for the formation the Individual Educational Trajectories of Students in the Digital Educational Platform: CEUR Workshop Proceedings SLET-2019 – Proceedings of the International Scientific Conference Innovative Approaches to the Application of Digital Technologies in Education and Research, 2019. Pp. 258-265.