



Copyright © 2023 by Cherkas Global University
All rights reserved.
Published in the USA

European Journal of Contemporary Education
E-ISSN 2305-6746
2023. 12(2): 610-628
DOI: 10.13187/ejced.2023.2.610
<https://ejce.cherkasgu.press>

IMPORTANT NOTICE! Any copying, reproduction, distribution, republication (in whole or in part), or otherwise commercial use of this work in violation of the author's rights will be prosecuted in accordance with international law. The use of hyperlinks to the work will not be considered copyright infringement.



**European Journal of
Contemporary Education**



ELECTRONIC JOURNAL

Involving Future Teachers in Practical Activities on Developing the Multifunctional Interactive Portfolio for their Professional Development

Elena V. Soboleva ^{a,*}, Tatiana N. Suvorova ^b, Dmitry Yu. Lyapunoff ^a, Aleksandr V. Grinshkun ^b

^a Vyatka State University, Kirov, Russian Federation

^b Moscow City University, Moscow, Russian Federation

Abstract

In accordance with the requirements of the professional standard, the teacher of the modern school must have skills related to digital technologies, communicative competence, and the skill to manage educational projects. Professional development of future specialists requires organization of purposeful practical activities, within which students of pedagogical specialties will be able to acquire skills to work with information, use various software environments to create the e-portfolio and present necessary educational resources in it.

The purpose of the research is to study the impact of participation of future teachers in practical activities of developing the multifunctional interactive portfolio of their professional development.

The methodology is based on the analysis of the didactic potential of the e-portfolio technology, support for UNESCO initiatives, state programs for the development of education. The analysis and generalization of literature on the problem of using interactive tools in the digital school, processing of test results are applied. The software tools are: interactive simulators; timelines; mental maps; presentations. The experiment involved 80 students of Vyatka State University who major in Pedagogical Education (bachelor degree level).

Research results. The implementation of the system of practical exercises on the development of the multifunctional interactive portfolio made it possible to change the nature of interaction between participants in educational relations in the experimental group; to improve quality of services in the electronic form; to determine priority areas for development for each student, etc.

In conclusion, the features of applying the proposed portfolio model are described: principles of the unity of education and upbringing, individualization, variability, reflection and cooperation; the system of components that take into account professional competences, etc.

* Corresponding author

E-mail addresses: sobolevaelv@yandex.ru (E.V. Soboleva), tn_suvorova@vyatsu.ru (T.N. Suvorova), usertydf@gmail.com (D.Yu. Lyapunoff), aleksandr@grinshkun.ru (A.V. Grinshkun)

Keywords: digitalization of society, teacher education, professional competences, cloud technology, interaction, assessment of results.

1. Introduction

Changes in the world and education, new challenges and new opportunities for participants in the didactic process increase the need for developing and subsequent implementing innovative didactic approaches, models and technologies as the basis for the development of modern society.

According to the provisions of the UNESCO Strategy for Technological Innovation in Education (2022–2025), the COVID-19 pandemic has contributed to disorganization of education. But at the same time, in addition to the needs associated with ensuring the continuity of learning, the pandemic has raised the importance of technology and digital innovation to the higher level for increasing the resilience of educational systems and rethinking the future of education (UNESCO Strategy..., 2022).

A. Hanelt et al. are conducting research on the conditions and factors of the new digital didactics (Hanelt et al., 2021). S. Bećirović, M. Dervić discuss the problems of higher education transformation (Bećirović, Dervić, 2022). In other words, scientific work in the field of higher pedagogical education is being activated in the context of improving the quality of education systems (Soboleva et al., 2022).

Today pedagogical education, according to O.A. Imanova, has a special responsibility (Imanova, 2021). The main task of the teacher education is to train teachers who are able to work in the face of modern challenges, quickly respond to external influences and changing priorities. This requires a complete transformation of technologies and communications, educational environments when transferring knowledge in the didactic process. There is also a radical renewal of the methodology of education, the modernization of teacher training (Prokhorova, Semchenko, 2018).

At the same time, the mentor of the new digital school, as a responsible and active subject of society, often has to realize personal meanings through certain professional practices, including the use of innovative technologies. And then the teacher can confidently and skillfully reproduce those teaching technologies that he/she “knew to own cost”.

The current mentors of the modern school and future teachers need:

- teaching methods that will inspire students to be creative.
- electronic educational resources that will allow them to develop scientific goals, content and tools for assessing learning in the digital age;
- services of information interaction, in the space of which it will be possible to teach students to cooperate and solve problems creatively;
- means with the help of which it will be possible to involve students in the processes of goal-setting, designing their own educational trajectory;
- "opportunity maps" for planning own activities to achieve individual educational results;
- tools for assessment and self-assessment of results and achievements.

According to L. E. Babushkina et al. using the e-portfolio technology is a possible way to solve this problem (Babushkina et al., 2021). The electronic portfolio is a promising pedagogical technology for assessing educational achievements, professional development and employment.

O.G. Smolyaninova, E.A. Bezyzvestnykh also convincingly prove that the electronic portfolio contributes to solving the problems of professional development of future teachers (Smolyaninova, Bezyzvestnykh, 2019).

As a result, the future teacher in the context of modern requirements for the quality of higher education for the level of formation of digital skills for successful professional activity needs to master the relevant information and activity competences.

The formation of these competences requires the organization of purposeful practical activities, within which students, future teachers will be able to acquire the skills to work with information, use various software environments to create the e-portfolio and present the necessary educational resources in it.

Practical activities at seminars and laboratory work is a natural situation when future teachers assess their professional knowledge and skills, it can really contribute to professional development in the field of information technology.

In addition, within the framework of practical activities on designing the electronic portfolio, students of pedagogical specialties receive a unique opportunity:

- for the purposeful development of reflection as a process of knowing oneself as a professional;
- for analysis own thoughts and experiences in connection with professional teaching activities.

So, the electronic portfolio in the context of digitalization of education allows to:

- effectively carry out interaction between the teacher and students to organize joint activities when working with documents, when assessing educational results;
- track the individual progress of each student;
- diversify the forms of control;
- self-compare;
- develop professional and personal competences.

It should be noted that most often the electronic portfolio is considered as a means of demonstrating the competences received by students; as a reflective tool that allows to track the dynamics of students' individual progress and assess academic achievements. In other words, in the vast majority of cases, existing e-portfolio developments are focused on performing one or two functions. However, the range of didactic possibilities of the e-portfolio makes it possible to enrich its content and reasonably expand the range of applications.

So, on the one hand, the work on designing electronic portfolios is effectively used to form professional competences in students of pedagogical specialties. At the same time, digital school teachers need experience in developing multifunctional interactive portfolios.

2. Relevance

2.1. Literature review

2.1.1. Analysis of Russian scientific and pedagogical literature

A.D. Korol, Yu.I. Vorotnitsky note that the digital transformation of all areas of human activities makes new demands on the education of people who will participate in modernization of production, in public and private life, create, implement and use digital technologies in everyday practice (Korol, Vorotnitsky, 2021).

This is confirmed by the provisions of the law "On Education in the Russian Federation" (Federal'nyj zakon "Ob obrazovanii...", 2012), the state program "Development of Education" (2018–2025) and other regulations that determine priorities for the development of a modern school (Gosudarstvennaya programma..., 2017).

According to V.G. Larionov, E.N. Sheremetyeva, L.A. Gorshkova, the global penetration of digital technologies into all spheres of human life and society has not left education aside (Larionov i dr., 2021). In the context of the digitalization of the economy, the guidelines for the development of higher education are changing. Higher education is seen as a kind of "bridge", which is aimed at ensuring the transition of the entire society into the digital age. This bridge involves the education and training of completely new specialists with digital thinking and digital competences. As prerequisites for the digital transformation of higher education the authors indicate both penetration into the educational field of various information technologies that have changed the learning process itself and emergence of a number of legal acts. The scientists reasonably prove that the digital transformation of higher education involves restructuring of all areas of activities based on information and communication technologies.

O.A. Imanova examined a number of state documents aimed at modernizing domestic education; she notes that the main content of the training of a modern teacher is also changing (Imanova, 2021).

The introduction of new state educational standards of higher education for the training program 44.03.01 "Pedagogical education" and the professional standard of the teacher is a logical reflection of the new requirements for training of teaching staff (Prikaz «Ob utverzhdenii...», 2018). An important direction of modern Russian education, according to the author, should be the study of international experience, widening domestic developments aimed at creating and implementing assessment tools that meet the needs of modern society.

N.V. Tikhonova considers that digital technologies are actively used at all levels of education (Tikhonova, 2021). This allows them to be effectively used when solving many methodological problems (training, demonstration, modeling, educational and gaming, etc.). In her study the information technology is considered as an important element in assessing professional competences of students of pedagogical faculties.

Information and communication technologies (photo and video cameras, phones, tablets, computers, etc.) perform the following functions:

- a tool that allows to document the process of acquiring the first professional experience;
- a tool that allows to conduct an objective analysis of professional experience;
- a resource with the help of which the obtained results can be used in the future to improve professional competences.

N.V. Tikhonova notes that the main task of students is an adequate interpretation and structuring of the material, as well as high-quality reflection, which is a key factor in personal and professional development (Tikhonova, 2021).

S.D. Yakusheva uses the concept of "professional skills", which determine the teacher's readiness for an activity, study and generalization of pedagogical experience (Yakusheva, 2019). It is professional skills, according to the author, that are the main methodological principles of pedagogy, which allow selecting and enriching the innovative palette of the new century.

Vashetina, Asafova, Kaur et al. analyze features of the professional development of future and current teachers in Russia, India, and Brazil (Vashetina et al., 2022). They singled out the aspect of the influence of the activity of future teachers in the digital environment on their professional development and self-development, as well as the relationship of professional development with self-determination, namely with goal setting.

N.G. Zharkikh, S.S. Kostyria consider the professional development as a process of qualitative and quantitative changes occurring in various professionally significant personality structures, the result of which are positive changes in professional activity and human consciousness (Zharkikh, Kostyria, 2018).

According to the conclusions of O.G. Smolyaninova, E.A. Bezyzvestnykh the interactive portfolio technology is aimed primarily at increasing students' own activity and their motivation for educational activities (Smolyaninova, Bezyzvestnykh, 2019).

M.I. Tomilova, E.Yu. Vasilyeva, O.A. Kharkova argue that alternative forms play a significant role in the process of assessing academic achievements of students at the present stage: creating a portfolio, conducting open lessons, and practical research (Tomilova i dr, 2013).

A.A. Samsonova defines the portfolio as a set (collection) of works of a student or teacher, which is a presentation of the activities for a certain period of time (Samsonova, 2020). The portfolio may also include sections related to students' self-assessment of achievements and planning for further stages and forms of education. For example, the choice of specialized classes, the design of an individual educational trajectory, etc.

E.V. Neborsky et al. conducted similar empirical studies (Neborsky et al., 2021). But their work is distinguished precisely by the sample, which includes students of pedagogical training programs, that is, future teachers. For such students, it is not just an experience, but development of an attitude and own pedagogical strategy for using digital technologies in education.

M.A. Choshanov lists the following qualities of teachers in the digital age: the ability to inspire students to be creative; develop on a scientific basis the goals, content and tools for assessing learning in the digital age; to teach students to cooperate and solve problems creatively (Choshanov, 2021). N.V. Garashkina, A.A. Druzhinina also believe that the teacher of the electronic educational environment should be able to combine traditional and innovative approaches, create and implement original technologies for teaching and educating using digital resources (Garashkina, Druzhinina, 2022). And further N.V. Garashkina, A.A. Druzhinina for the professional development of students-future teachers offer a learning model based on a combination of learning forms that integrate resources of digital and traditional didactics (Garashkina, Druzhinina, 2022).

O.G. Smolyaninova, E.A. Bezyzvestnykh in their works show that the electronic portfolio allows to optimize the work with information (search, processing, updating, reorganization, transfer), create a non-linear structure of materials in different formats, and organize quick access to them for students, parents, and teachers (Smolyaninova, Bezyzvestnykh, 2019). The electronic portfolio allows to design and implement an individual educational route, see progress in educational activities.

According to the findings of E. V. Borzova and M. A. Shemanaeva, the multifunctionality of technology is ensured not only by the number of functions, but also by several modalities of functions: functions are presented for each subject of the educational process (Borzova, Shemanaeva, 2022). This allows educational technology to be designed according to the stages of growth and development that characterize progressive development of the individual.

So, in the modern electronic portfolio of a student information about the results of both educational and extracurricular activities of the future teacher is most often included. But they do not pay enough attention to tracking changes in professional activities and human consciousness. In addition, in the overwhelming majority of cases, the existing e-portfolio developments are focused on performing a single function – recording the educational achievements of students. They do not fully implement the property of interactivity and, as a rule, do not use cloud technologies to individualize learning and form the required professional competences.

2.1.2. Analysis of foreign studies

In the research A.-S. Ulfert, I. Schmidt show that the digital environment today penetrates both everyday practices and the field of professional activities, not only radically changing their forms, but also rebuilding people's consciousness. The use of educational technologies in pedagogical practice, as scientists note, has become an integral part of the didactic process. Information technology allows to create entire collections of images, texts and data, accompanied by sound, video, animation and other visual effects, it includes an interactive interface and other control mechanisms. As a result, according to the authors, the problem of developing digital literacy of people is gaining unprecedented relevance (Ulfert, Schmidt, 2022). A.-S. Ulfert, I. Schmidt consider that development of digital competences has particular importance. Developed basic digital competences are the foundation for activities in the digital space (Ulfert, Schmidt, 2022). An individual possessing digital competences increases the level of efficiency of his/her professional activity, reduces the time to perform not only professional, but also personal tasks. These conditions open up new opportunities for professional and personal growth. Self-efficacy is described by the authors as one of the most important determinants of the productive use of information systems. A.-S. Ulfert, I. Schmidt propose to actively connect the possibilities of information and communication technologies for the formation and assessment of digital self-efficacy (Ulfert, Schmidt, 2022).

P. Sikström et al. indicate that the digital educational environment provides fundamentally new opportunities (Sikström et al., 2022):

- to move from learning in the classroom to learning anywhere, anytime;
- to design an individual educational route, thereby satisfying the educational needs of the student;
- to turn students not only into active consumers of electronic resources, but also creators of new resources, etc.

Considering transformations of the information society, Ch. Edwards et al. highlight the following characteristics (Edwards et al., 2018):

- a high level of development of computer technology, information and telecommunication technologies;
- increasing opportunities for access to information for a wide range of people;
- transformation of information and knowledge into a strategic resource, the main driving force of economic and social development.

The authors note that technology forces many countries to introduce technology consumption into the education sector. But at the same time, scientists call for the methods of education and upbringing to be also changed with the use of smart technologies. The use of information technologies, according to Ch. Edwards et al. will influence upbringing and learning strategies (Edwards et al., 2018). Since there is an integration of intellectual technologies with education and upbringing, new pedagogical techniques will be required for teachers and students to learn how to integrate technologies and goals.

B. Depro, K. Rouse describe possibilities of the case method as a professionally oriented technology for students. In their opinion, conducting a case study reveals and explores a contemporary phenomenon in real life through a detailed contextual analysis of a limited number of events or conditions and their relationships (Depro, Rouse, 2022).

H. Kim rightly notes that participation of teachers and computers in the didactic process at the same time significantly improves the quality of education (Kim, 2022).

Author researched didactic opportunities confirming the feasibility of using information technologies in training based on the cooperation of the teacher and the student: the joint use and publication of documents of various types and purposes; organization of group, paired and individual works; organization of interactive classes and collective training.

The personal qualities that are in demand in the conditions of the developing digital economy can be formed in the conditions of the digital educational environment built on the basis of new approaches to the use of forms, methods and teaching aids (including those implemented with the help of educational electronic resources). Therefore, one of the main goals of education, according to A. Hanelt et al., is the development of the student as a subject of own activity in the process of education and upbringing using digital information technologies (Hanelt et al., 2021).

An interesting approach is presented in the studies of P. Middleditch, W. Moindrot, S. Rudkin. The authors consider the possibilities of Twitter for training and formation of professional competences (Middleditch et al., 2022). Interaction on Twitter is considered by the author as a way of digital identification in the electronic space, a means of building an image and promoting an individual or organization.

Among promising educational technologies that are adequate to modern educational tasks, contributing to the development of student independence and formation of skills to manage own educational and cognitive activities, C. Chang et al. single out the technology of the electronic portfolio as a way of fixing, accumulating and evaluating the individual educational results of a student in a certain period of education (Chang et al., 2017).

According to H. Barret, the electronic portfolio is a promising pedagogical technology for assessing educational achievements, professional development and employment, and has been successfully used in America, Europe, Australia and other countries for more than 20 years (Barrett, 2007).

Interactive exchange between the teacher and students using information technologies is rational to use not only for organizing joint activities when working with documents, but also when assessing educational results. One of the effective forms of evaluation of training results is the portfolio.

The e-portfolio, according to Johansen, is used in international educational practice as a means of demonstrating competences and reflection, as a tool for development in the educational and professional sphere, and as a way to advance in the labor market (Johansen, 2023).

D.J. Cole, C.W. Ryan, F. Kick emphasize the possibilities of the electronic portfolio in the prolonged authentic assessment of the individual achievements of students which are in demand in the rapidly changing technologies of the modern economy (Cole et al., 1995).

A. Oosterbaan et al. believe that the portfolio artifacts reflect the achievement of certain goals and acquired competences. Also, the electronic portfolio is a reflective tool that demonstrates the development of competences (Oosterbaan et al., 2011).

From the point of view of I. Nicolaidou, portfolios allow students to participate in assessment of their own work, track individual progress and provide a basis for a full assessment of the quality of individual work (Nicolaidou, 2012).

J. Arter, V. Spandel believe that the portfolio is used as a conscious collection of students' works, subject to a specific goal, which shows the author of the portfolio or other participants in the educational process efforts and achievements in one or more areas (Arter, Spandel, 2005).

Thus, from the perspective of foreign authors, the electronic portfolio is:

- a means of demonstrating competences received by the trainee;
- a reflective tool that allows to track the dynamics of the individual progress of students and assess individual achievements.

However, the property of interactivity is far from being fully realized in them. As a rule, the sections aimed at informatization and individualization of the educational, social, scientific activities of students and the implementation of the professional development of students are poorly developed.

2.2. Purposes and objectives of the study

The purpose of the work is determined from the need to study the impact of involving future teachers in practical activities to develop the multifunctional interactive portfolio on the level of their professional development.

Research objectives:

- clarify the potential of the electronic portfolio for the formation of professional competences of future teachers;
- develop a system of practical exercises for designing the interactive multifunctional cloud portfolio as a means of professional development of students of pedagogical specialties;

- systematize and select tools for filling the interactive multifunctional cloud portfolio;
- experimentally confirm the effectiveness of the proposed system of work.

3. Materials and methods

3.1. Theoretical and empirical methods

The methods for studying the aspects of using the interactive multifunctional cloud portfolio for constructing and implementing individual educational routes for students in the course of project activities are the analysis of legal acts, teaching aids, literature in the field of using interactive tools in the field of education. The methods of theoretical analysis are used (comparative method, generalization of experience); study and analysis of the experience of using the electronic portfolio.

In the study, when creating a business card site for the future teacher, Google Sites resources are used.

To assess achievements, interactive exercises developed in ProProfs are used. ProProfs is an online application to support the learning process through interactive exercises. In ProProfs educators create electronic manuals, surveys, quizzes and flash cards.

The Timeline JS service allows to display a time line on the site.

Mind maps designed in MindMap are used in educational and teaching activities. They allow to select only the most important points from a huge amount of text, provide a structural representation of a large amount of information and allow building causal-logical relationships.

During the pedagogical experiment, the analysis and generalization of the experience of students with the interactive multifunctional cloud portfolio aimed at constructing and implementing individual educational routes of students in the course of practical activities was carried out.

To process the results questionnaire and diagnostic methods were used (observation, conversation, generalization, questioning, testing, evaluation).

When selecting the control and experimental and control groups, the authors took into account the results of the author's testing which consisted of 80 questions grouped in blocks in accordance with the types of tasks of the professional activity:

PC-1. Willingness to implement educational programs in the subject in accordance with the requirements of educational standards.

PC-2. Ability to use modern methods and technologies of training and diagnostics.

PC-3. The ability to solve the problems of education and spiritual and moral development of students in educational and extracurricular activities.

PC-4. The ability to use the possibilities of the educational environment to achieve personal, meta-subject and subject learning outcomes and ensure the quality of the educational process by means of the taught subject.

PC-5. The ability to provide pedagogical support for socialization and professional self-determination of students.

PC-6. Willingness to interact with participants in the educational process.

PC-7. The ability to design individual educational routes for students.

PC-8. The ability to design trajectories of professional growth and personal development.

There are 10 questions in each block. The principles and content of the questions are disclosed in the research program. The portfolio was designed as part of the course Digital Technologies in Education.

Processing of statistical data was performed using Pearson's χ^2 (chi-square) test.

Methodological feature of determining the levels: professional competences correspond to the training program 44.03.01 Pedagogical education.

3.2. The base of research

The main purpose of the experiment was to test the impact of involving students of a pedagogical specialty in the practice of designing the interactive multifunctional cloud portfolio of their level of professional development.

80 students of the training program Pedagogical education were involved (bachelor degree level, 51 % female, 49 % male).

The development and filling of the multifunctional cloud portfolio took place as part of the course "Digital Technologies in Education".

There was a general assessment of the level of professional development of students of pedagogical specialties: pedagogical skill, pedagogical technique, pedagogical mastery, pedagogical creativity, pedagogical innovation.

As part of the control event future teachers were asked to complete 80 tasks (tasks in accordance with the indicators of achieving professional competences of the main training program).

3.3. Stages of research

At the first stage of the study the analysis of domestic and foreign works in the field of modeling and technologization of higher pedagogical education was carried out, including the use of interactive and cloud technologies for professional development.

In addition, 80 questions for the control work were compiled. Their examples are presented in 4.3.1.

Based on the control materials, general assessment of the levels of professional development of students of pedagogical specialties was carried out. As part of the control event the future teachers were asked to do 80 tasks (10 questions for each task of professional activity). Correct performance was scored in 1 point.

Conditional names for the levels of professional development were introduced to interpret the results: skill, technique, mastery, creativity, innovation.

The student could get from 0 to 80 points for the control work. According to the measurement results the levels were determined as follows: from 0 (inclusive) to 24 points – "skill"; from 25 (inclusive) to 40 points – "technique"; from 41 (inclusive) to 54 points – "mastery"; from 55 (inclusive) to 59 points – "creativity"; and "innovation" in all other cases.

The second stage of the experiment was devoted to determining the structure of the course "Digital Technologies in Education" in accordance with the purpose of the study.

The third stage of the study is practical activities for designing and filling the portfolio: determining the structure of a business card site, creating timelines, quizzes, mind maps, electronic teaching aids and planned interactive activities (discussion, didactic games, situations of pedagogical communication).

4. Results

4.1. Key concepts of designing didactic games

When analyzing the literature, it was revealed that the processes associated with formation and development of the digital economy inevitably have an impact on development of educational systems around the world. Diffusion of end-to-end digital technologies is observed everywhere in all spheres of human activity, including education.

1. So, the main task of the digital transformation of education is to improve its quality through introduction of digital technologies at various levels (from management of educational organizations to private methods). In response to the challenges of the digital economy, changes are expected in the context of achieving qualitative changes in the digital transformation of education.

The digital transformation of education, as a new stage in its development, is associated with the diffusion of end-to-end digital technologies into its structure and content. We consider that the main guidelines for education at this stage are:

- development of personal independence of students;
- formation of the subjectivity of students;
- development of new forms of interaction between participants in the educational process;
- development of new ways of organizing joint (group, collective) work;
- development and implementation of a personalized learning system based on hierarchies to automate the content of educational resources.

The personal qualities that are in demand in the conditions of the developing digital economy can be formed in the digital educational environment built on the basis of new approaches to the use of forms, methods and teaching aids (including those implemented with the help of educational electronic resources).

Therefore, one of the main goals of education is the development of the student as a subject of own activity in the process of education and upbringing using digital information technologies.

2. According to the authors, the electronic portfolio technology can be attributed to promising educational technologies that are adequate to modern educational tasks and contribute

to the development of student independence and formation of skills to manage their own educational and cognitive activities.

In this study the electronic portfolio is considered as a way of recording, accumulating and evaluating the individual educational results of a student in a certain period of education.

3. When analyzing the term "interactivity", its concept was clarified both in pedagogical and technical senses.

They imply purposeful inter-subject interaction between the teacher and students to create optimal conditions for development of the student.

Among leading signs and tools of interaction are polylogue, dialogue, mental activity, meaning creation, intersubjective relations, freedom of choice, a situation of success, positivity, optimism in assessment, and reflection.

In the technical sense, interactive is understood as electronic content in which operations with its elements are possible: manipulations with objects, interference in processes. The conceptual difference between interactive multimedia content lies in the replacement of textual (verbal) descriptions with a direct audiovisual representation of objects, processes, phenomena with the modeling of typical reactions to external influences or changing conditions. When analyzing educational resources posted on the Internet, we take into account both aspects of the concept of "interactivity".

Currently, Internet resources that can be used to create a digital educational environment and implement e-learning have been developed. Among them are the Russian Electronic School, Uchi.ru, YaKlass, etc. The tasks are designed in such a way that they enable students to realize themselves as a subject of the activity, that is, these projects implement interactivity in the technical sense, and at the same time, the teacher can use these resources by organizing activities using interactive teaching methods.

The systems highlight the roles of the teacher, student, parent. Students are given the opportunity to construct an individual educational trajectory, within which the system will automatically create and save the student's digital portfolio. It should be noted that the listed platforms are mainly focused on the implementation of the learning function, while the social or scientific component of the educational process is practically not discussed. No attention is paid to supporting the purposeful interaction of participants in educational relations, aimed at planning and analyzing joint affairs and events.

4. In the presented study the joint activity of students in the process of cognition implies the exchange of knowledge, ideas, methods of activity. Each student makes own individual contribution to the result of group work. Moreover, this happens in an atmosphere of goodwill and mutual support, which allows students not only to acquire new knowledge, but also to plan, analyze their activities, develop skills of interaction and cooperation.

5. The authors identify the following didactic possibilities, confirming the feasibility of using cloud technologies in teaching based on the cooperation of the teacher and the student: sharing and publishing documents of various types and purposes; organization of group, pair and individual work not only in the classroom, but also outside school hours; organization of interactive classes and collective teaching.

The author's position is that it is rational to use interaction of the teacher and students with the use of cloud technologies not only for organizing joint activities when working with documents, but also for assessing educational results. One of the effective forms of assessing learning outcomes is a portfolio.

6. The work presents a system of activities for designing and filling the electronic portfolio, during which future teachers form the following competences:

– communicative, including knowledge, application of technical means of communication in the transfer of new information (PC-5, PC-6);

– cognitive as a skill to learn new information and its interaction with existing knowledge (PC-1, PC-3);

– reflexive - the level of self-development and self-control of a person, associated with self-awareness and responsibility (PC-7, PC-8);

– motivational - the level of motives that influence formation of values and needs in the digital environment (PC-8, PC-3);

– technological as a skill to study information technologies, as well as understanding their principles of operation and capabilities (PC-2, PC-3).

The formation of each competence corresponds to the function of a multifunctional learning model

At the same time, these functions correlate with the professional competences identified earlier in 3.1.

4.2. The system of practical exercises for designing the interactive multifunctional cloud portfolio by students of pedagogical specialties as a means of their professional development

Let us describe the logic of work on developing and filling the multifunctional portfolio, which was organized by the university teacher as part of the course "Digital Technologies in Education".

The first lesson. On a local disk (for example, on the Desktop), create the folder "Your Full Name_Your Group_Report 01" and save all subsequent files to this folder. Tip: Use the help available at (<https://support.google.com/accounts#topic=3382296>) to get the work done.

Next, on the Google.com resource, create a new or use a previously created account for Google services (which will later be used to perform practical work).

After that, in the browser's "Bookmarks" folder, create a folder and name it Your Surname (Bookmarks / Bookmark Manager / New Folder).

Answer the following questions (give answers):

- a. What is mode "Incognito" in the browser? In what cases is it used?
- b. How do lock a tab in the browser? In what cases can this function be useful?
- c. Check the keyboard shortcut of "Ctrl + Shift + t" in the browser. In what cases can this combination be useful?

Remember that effectiveness of searching for information on the Internet largely depends on the skill to formulate a competent search query. Therefore, advice: read the article "How to search for information on the Internet."

After reading the article, answer the following questions (give answers):

- a. How to search for information using the exact phrase? Give a specific example.
- b. How to highlight the most important words in a search query (specify the icon operator)? Give a specific example.
- c. How to exclude pages containing unwanted words from the query results (specify the icon operator)? Give a specific example.

Reflection was organized at the end of the first lesson. For example, in one document on a network drive, each of the students wrote down words that characterize his/her state or attitude to the work done. Words could be highlighted in color or graphics could be used.

The second lesson. On your Google Drive, in the My Drive section, create a folder called My Portfolio. Open the window for setting access rights for the My Portfolio folder (open the context menu with the right mouse button). Carefully study the options for granting access and answer the questions (answers should be short):

- a. Open access via the link to the "My portfolio" folder (insert a screenshot confirming the completion of the task);
- b. In what case can you find usernames or animal icons unfamiliar to you in a document, spreadsheet or presentation;
- c. What access roles can be granted to a specific user?
- d. How to recover a file accidentally deleted from Google Drive?
- e. How long do files deleted from Google Drive stay in the Recycle Bin?

Set up your mailbox (<https://mail.google.com/mail/>) in such a way that when writing a new letter, your signature is automatically added: your full name and group code (insert a screenshot of the dialog box with the settings).

Consider: what rules are needed to follow when writing an email (netiquette) (give at least 5 IMPORTANT rules). Design them in your portfolio.

Next, using your personal Google mail (***@gmail.com), create and send to your corporate address (stud*****@vyatsu.ru) a letter which will have the subject "Checking the connection", when writing the letter, be sure to follow the network etiquette. Check the fact of receiving the letter on your corporate mail <https://mail.vyatsu.ru/owa/> (insert a screenshot showing the contents of the received letter)

In the lesson report, enter the answers to the following questions (you can use the Help in the upper right corner) (answers should be short):

- Why do I need to fill in the "Subject" field in the email?
- Identify the difference between a copy of a letter and a blind copy of a letter.
- How to schedule sending of the created letter at the right time?

The next step is email filtering. Explore the message filtering settings (Settings/All setting/Filters and blocked addresses/Create a new filter). Make sure that the letters coming from the teacher never fall into the "Spam". Insert a screenshot with the settings confirming the completion of the task.

In your "My Portfolio" folder on Google Drive, create a Google document containing your short biography, teaching experience, experience of using information technologies. Open editing access to this document to one or more of your classmates by agreement (insert a screenshot confirming the completion of the task).

Reflection was also organized at the end of the second lesson. For example, "Picture in a circle". Each of the students in the graphic editor added a detail/fragment to the overall image.

The third lesson. On your disk in the "My Portfolio" folder, create your own form for surveying your classmates (on any topic), consisting of 10 questions (use at least five different types of questions). Choose the design you like (add a link to the report to fill out the form).

Next, send a link to fill in the form to two classmates. Look at the results of their answers. Required - with the generation of a pivot table and chart. Add a screenshot of the table and chart with the form results to the report (there must be at least 3 records).

The proposed service contains a free designer for developing web pages. The designer is as lightweight and functionally simplified as possible. It is used to quickly publish web pages of a simple structure. To organize teamwork with them. Important advantages: ease of use, availability, convenience, high speed of loading ready-made pages.

Using the reference material, create a personal business card site consisting of three pages: "Biography", "Achievements", "Pedagogical activity", "Useful services".

In the third lesson, students filled in the "Biography" page with information about themselves, added photos.

Reflection was also organized at the end of the third session. For example, "Compliment", which was expressed orally by the participants. But, if desired, it could be sent by e-mail. At the same time, it was necessary to follow the rules of network etiquette.

The fourth lesson. On the pages "Achievements" and "Pedagogical activity" it was necessary to enter information about diplomas, certificates, medals, letters of commendation, achievements in the field of sports, music, etc. (if possible with photos). For example, participants prepared a report on a youth forum, an event at the Engineering Institute, or organizing a school Olympiad.

For example, in 2019, students as part of the Vyatsky Talker team organized an event for students of school No. 48 in Kirov. Schoolchildren completed tasks "Regional Features of Russian Speech". According to the results, each participant could receive an illustrated electronic dictionary of Vyatka words.

At the same lesson, a template for the "Useful Services" page was prepared. Subsequently, this template was filled in by the following references: developed interactive simulators (ProProfs); timelines (Timeline JS); mental maps (MindMap); presentations (Prezi).

The study and development of services for each application took place during separate classes.

That is **the fifth lesson** is the compilation of interactive simulators; **the sixth lesson** – timeline planning; **the seventh lesson** – the design of a mental map; **the eighth lesson** is mastering the Prezi tools.

At the end of each lesson, time for reflection or self-reflection was necessarily freed up.

The ninth lesson. Publish the resulting site and place a link to it in the report.

Save the report and name it: Report_YourName_YourGroup.docx. Upload the completed report as an answer to the Moodle task.

Self-representation and defense of the report.

So, the resulting electronic portfolio is:

1) interactive, because it contains electronic content, in which various operations with its elements are possible: from manipulations with the objects of a business card site and filling in a form to setting security parameters;

2) multifunctional, since

- there is a change in the nature of interaction between participants in educational relations, which is expressed in their active involvement in the process of professional development of students;

- individualization within the framework of cognitive activities and taking into account the educational needs of future teachers (individual educational routes);

- personal development of students (hard work, curiosity, imagination, memory, emotional intelligence, etc.).

4.3. Experimental assessment

4.3.1. The ascertaining stage of the experiment

The experimental and search work was carried out on the basis of Vyatka State University. The experiment involved 80 students: 41 girls (51 %) and 39 young people (49 %). The average age of respondents is 18 years. Program of the training - 44.03.01 Pedagogical education.

When selecting the control and experimental and control groups, the authors took into account the results of the author's testing which consisted of 80 questions (10 questions for each task of professional activities). Correct performance was scored in 1 point.

Thus, it was possible to collect data on 80 students, from which the experimental and control groups were formed. Each of them has 40 people. The sample was not random. The experimental group included 58 % of girls and 42 % of young people.

Classes were conducted as follows: one lecture (two hours a week) and two practical classes (4 hours a week). A total of 9 classes. 4 hours of lecture and 14 hours of the practical exercises were allocated for the experiment. The content of each of them is disclosed earlier in paragraph 4.2.

To interpret the results conditional names for the levels of professional development were introduced: skill, technique, mastery, creativity, innovation.

Let us describe the essence of the levels of professional development in order to assess the results of the experimental work later.

Level "Skill" – when implementing educational programs both support of a mentor and detailed instructions are needed; the student is able to use the same teaching/diagnostic methods and technologies; without errors solves repetitive tasks of education and development of students. The future teacher uses (mostly) the same possibilities of the educational environment to achieve learning outcomes and ensure the quality of the educational process; carries out the required support of the socialization and self-determination of students by means proven and known to him. The future teacher interacts with the participants of the educational process according to the same plan/scheme; designs individual educational routes for students and trajectories of their professional development by means of the same technologies.

Level "Technique" – the student needs a clear plan or instruction for implementing the program; periodic consultation on how to use the methods and technologies of training and diagnostics is needed; help in solving the problems of education and development of students is required. The student consciously uses the main features of the educational environment to achieve learning outcomes and ensure the quality of the educational process; provides the required pedagogical support for socialization and professional self-determination of students; technically interacts with participants of the educational process and only within the scope of activities. The future teacher designs individual routes for students and the trajectories of their professional development by means of technologies known to them.

Level "Mastery" – ready to implement, with the assistance of a mentor, programs in a subject; is able to use the methods and technologies of training and diagnostics proposed by the mentor. The future teacher solves the necessary tasks of education and development of students; applies the main features of the educational environment to achieve learning outcomes and ensure the quality of the educational process. The future teacher provides the required pedagogical support for socialization and professional self-determination of students; interacts with participants of the educational process; designs individual educational routes for students and trajectories of their professional development by means of the technologies proposed by the mentor.

Level "Creativity" – ready to implement educational programs in the subject and introduce new blocks/modules into them; is able to use creative methods and technologies of training and diagnostics; solves the most important tasks of education and development of students. The student uses possibilities of the educational environment to achieve learning outcomes and ensure the quality of the educational process; provides effective pedagogical support for socialization and professional self-determination of students. The future teacher interacts

creatively with participants of the educational process; shows creativity when designing individual educational routes for students and trajectories of their professional development by means of traditional technologies.

Level "Innovation" – ready to implement experimental programs in the subject; provides effective pedagogical support for socialization and professional self-determination of students. The future teacher interacts intensively with participants of the educational process; designs individual educational routes for students and trajectories of their professional development by means of new technologies.

Here are some examples of tasks for each competence.

PC-1. A project can be defined as:

- a) a set of activities aimed at achieving a unique goal which are limited in resources and time;
- b) a system of goals, results, technical and organizational documentation, material, financial, labor and other resources, as well as management decisions and measures for their implementation;
- c) a system complex of planning (financial, technological, organizational, etc.) documents containing a complex system model of actions aimed at achieving the original goal.

PC-2. From the standpoint of the ability to use digital resources when solving the problems of professional activities, determine what should be understood as a method of teaching in the digital educational environment? (choose one the most complete answer):

- it is an ordered activity of the teacher and students, aimed at achieving the goal of learning;
- it is a way of movement of thoughts from the teacher to students in order to transfer knowledge to the latter;
- it is such a logical category that indicates the way of organizing cognitive activities;
- a way to organize independent activities of students with information resources of the environment (information, communication, management), which ensure the acceptance by students of the goal, its organization, stimulation, evaluation and control, with the possibility of remote pedagogical correction.

PC-3. What are the forms of education in inclusive education? Answer options: only full-time; only evening; full-time and evening; not legally defined.

PC-4. The prezi.com service allows to create: tests to test students' knowledge; interactive multimedia presentations; text documents and store them in the "cloud"; thematic sites.

PC-5. Methods for studying the real pedagogical process do not include ... Answer options: observation; survey; questioning; pedagogical experiment.

PC-6. Which of the applications contributes to communication of all participants in educational relations remotely? Answer options: Prezi, Notepad, Paint, Twiddla, LearningApps, Learnis, Sferum, OpenMeetings, Yandex.Telebridge.

PC-7. Which application does not support cloud collaboration? Answer options: GoogleClassroom, Notepad, Dnevnik.ru, Sferum, CloudTop, Joli Cloud.

PC-8. Open project management has developed on the basis of:

- a) rolling planning;
- b) risk management;
- c) dialectical materialism;
- d) goal management;
- e) corporate open door policy.

Thus, taking into account the results of processing materials, it was possible to collect data on 80 students of pedagogical specialties, of them, the experimental and control groups were formed.

4.3.2. Forming stage of the experiment

Thus, the teacher, when supervising practical work on designing the multifunctional cloud portfolio as a means of professional development of students of pedagogical specialties, organized activities in the experimental group according to the logic of the previously described classes.

The tasks of the described system of work:

- master the basic principles of working with web browsers and search engines;
- master the basic methods of working with Google services: mail, disk, documents, forms, sites;
- revise the basic rules of working on the Internet, including network etiquette;
- get acquainted with the official network services and resources of the university;

- explore interactive services that are potentially useful for a novice teacher;
- track the individual progress of the student, achieved in the process of obtaining education, and beyond direct comparison with the achievements of other students;
- to form in-demand professional skills: information interaction; management of educational projects, etc.;
- to form ideas about technologies, methods and techniques of reflection.

Figure 1 shows a variant of organizing tracking and analyzing the progress of students in the development and filling in the multifunctional cloud portfolio by the teacher.

Mark the completion of a work step in the required column with a "+" sign. After validation, the cell will be colored							
Last name, first name	Worked out reference material	Completed the interactive task "Stages of creating a resource"	Invented content, drew sketches	Wrote the script	Created the document structure	Made a reflection	Link to the game
Murov Ivan	+	+					
Popov Oleg	+	+					
Nizina Maria	+	+					
Goreva Ann	+	+	+	+	+	+	

Fig. 1. Filling in the "progress table" when developing the portfolio

The participants of the control group also learned the basics of working with web browsers and search engines; methods of working with Google services: they revised the rules of working on the Internet, including network etiquette; official network services and resources of the university; interactive services potentially useful for a novice teacher. However, they were not involved in specially organized activities for the development and filling in the multifunctional cloud portfolio.

4.3.3. Control stage of the experiment

At the fixing stage of the experiment, testing was also carried out on the basis of the course materials in accordance with the competences indicated in paragraph 3.1. Information about the levels of professional development of future teachers before and after the experiment is presented in Table 1. (Table 1).

Table 1. Assessment of the level of professional development

Level	Groups			
	The experimental group (40 students)		the control group (40 students)	
	before the experiment	after the experiment	before the experiment	after the experiment
Skill	35 % (14)	10 % (4)	33 % (13)	30 % (12)
Technique	18 % (7)	10 % (4)	18 % (7)	20 % (8)
Mastery	23 % (9)	23 % (9)	25 % (10)	25 % (10)
Creativity	18 % (7)	38 % (15)	18 % (7)	18 % (7)
Innovation	8 % (3)	20 % (8)	8 % (3)	8 % (3)

For $\alpha = 0.05$, according to the distribution tables, χ^2_{crit} is equal to 9.488. Thus, we get: $\chi^2_{obs.1} < \chi^2_{crit}$ ($0.090 < 9.488$), and $\chi^2_{obs.2} > \chi^2_{crit}$ ($10.244 > 9.488$).

Consequently, the shift towards increasing the level of professional development of students of pedagogical specialties can be considered non-random.

After the quantitative analysis of the obtained data it can be concluded that the number of future teachers in the experimental group who have the level "Innovation" increased from 8 % to 20 %.

A significant positive shift was also recorded for the level "Skill" level: from 10 % to 35 % of the respondents. There were no changes in the level of "Mastery" in the experimental group. The reason, in the opinion of the course teacher, is that the transition from a skillful or technically sound way of professional actions takes more time. Formation of own approach to the implementation of the program, to solving problems of pedagogical communication, choosing own tool for designing the development trajectory involves more systematic and lengthy work.

Qualitative changes were recorded for the level "Creativity". 15 out of 40 respondents developed qualities and competences corresponding to this level. At the beginning of the course the number of such respondents was 7.

For the control group there is also a positive trend in certain levels of professional development. But it is less significant. For example, the level "Technique", the indicator increased from 18 % to 20 %. The value of the level "Skill" changed from 33 % to 30 %.

The reasons for this are seen in the fact that even the best result for each lesson in the traditional system of practices and seminars has a predominantly educational focus, without a global focus on social, scientific or professional activities. Therefore, future teachers did not have the opportunity to improve the technique of communication, development of educational programs and support for self-determination of their potential students.

5. Discussion

The research materials correspond to the priority areas of the activity of UNESCO and the Russian education system in terms of ensuring the continuity of learning, development of technologies and digital innovations to increase the sustainability of educational systems and rethink the future of education.

In this context, also identified the following benefits of using interactive technologies to support innovative pedagogical activities:

- widening of opportunities for presentation of educational material;
- emergence of additional opportunities for variable transformation of the content of the material;
- development of communication skills;
- widening of the list of educational tasks to be solved and the tools to be used;
- the emergence of additional opportunities for the use of different forms of work (individual, group);
- increasing motivation, self-control, ability to reflect.

The obtained conclusions about the didactic potential of the interactive multifunctional cloud portfolio in relation to the individualization of learning confirm and complement the results of the work of I. Nicolaidou (Nicolaidou, 2012).

In this context, it was found that the cloud portfolio that supports a full cycle of activities can become a means of professional development for teachers.

A significant result of the study is the description of the basic ideas of the approach that extend the ideas of O.G. Smolyaninova, E.A. Bezyzvestnykh about the possibilities of digital interactive tools for the formation of professional competences of students of pedagogical specialties (Smolyaninova, Bezyzvestnykh, 2019). In particular, through activities that implied:

- planning and analysis of activities: designing the content of the resource, summarizing and systematizing the material in the form of mind maps, setting educational goals for the study period, planning the timeline, summing up the results of educational activities, etc.;
- organizing joint work using cloud technologies in a single educational space.

6. Limitations

It is needed to pay attention to the possible limitations for the study:

1. The formation of questions for the authors' testing in such a way as to ensure that the control and experimental groups have the same knowledge and skills that form the basis of the professional competences of the teacher (in accordance with the training program of Vyatka State University 44.03.01 Pedagogical education (bachelor degree level).

The formation of each competence corresponds to the function of a multifunctional learning model

At the same time, these functions correlate with the professional competences identified earlier in 3.1.

2. An important condition is that the guidance of the practice of students in designing and filling the interactive multifunctional cloud portfolio, organizing the joint work of all participants in educational relations in the educational space throughout the experiment was carried out by the same teacher. The development of the interactive multifunctional cloud portfolio took place in the same classrooms. The software also remained unchanged.

7. Conclusion

In the course of the study the following possibilities of the interactive multifunctional cloud portfolio for the professional development of future teachers were identified:

- changing the nature of interaction between participants in educational relations;
- individualization in the course of educational and cognitive activities;
- taking into account educational needs of future teachers (individual educational routes) and practice orientation of the projected portfolio;
- development of personality traits (hard work, patience, creativity, aesthetic expressiveness, emotional intelligence, etc.);
- development of professional competences in accordance with the training program.

The proposed model of the interactive multifunctional cloud portfolio has the following distinctive features:

1. It is based on the principles of the unity of education and upbringing, individualization, variability, reflection and cooperation.
2. It is a system of interrelated components, determined by professional competences in accordance with the training program and labor functions of future teachers.

In addition, each competence corresponds to a specific function of the learning model.

The analysis of all the merits and demerits of the proposed system of classes for designing the interactive multifunctional portfolio made it possible to formulate the following conditions for the effective realization of the allocated didactic potential:

1. Definition the filling of the portfolio, the purpose of its creation and evaluation criteria. Students must understand why they are doing this, what components they need to include in the portfolio, what should be its structure, how and by what criteria their work will be assessed.
2. Clear planning of time and duration of work. Both the teacher and the student should be as focused as possible on filling in the portfolio.
3. Qualitative portfolio analysis and selection of fragments for presentation. From the position of reflection, the collection of a large amount of factual material is of interest for development of methodological skills of future teachers.
4. Presentation of the interactive multifunctional portfolio. During the defense of the results of practical training, the course teacher assesses all components of the portfolio, including photo and video recordings, mind maps, interactive exercises, presentation, quality of introspection and self-assessment.

This study convincingly proves that the cloud portfolio can become an effective multifunctional tool for implementing educational, research activities of students under the following conditions:

- a clear definition of the didactic functions of the projected portfolio;
- selection of digital tools that have the necessary didactic capabilities and properties; precise formulation of methodological tasks for the solution of which the portfolio will be sent;
- taking into account the structure and specifics of the future professional activity of students.

The use of the proposed model and tools of cloud services makes it possible to determine the best options and solutions that contribute to professional development of students of pedagogical specialties, their high-quality training and conscious choice of the place of work.

References

Arter, Spandel, 2005 – Arter, J. Spandel, V. (2005). Using Portfolios of Student Work in Instruction and Assessment. *Educational Measurement: Issues and Practice*. 11: 36-44. DOI: 10.1111/j.1745-3992.1992.tb00230.x

Babushkina et al., 2021 – Babushkina, L.E., Sergeeva, N.A., Rubleva, O.S., Tyutyunnik, I.A. (2021). Ispol'zovanie elektronnoho portfolio kak sredstva formirovaniya inoyazychnoj kommunikativnoj kompetentnosti pri podgotovke budushchih pedagogov-t'yutorov [Using the electronic portfolio as a means of formation the foreign language communicative competence when

training future tutors-teachers]. *Perspektivy nauki i obrazovania*. 52 (4): 492-505. DOI: 10.32744/pse.2021.4.33

Barrett, 2007 – Barret, H. (2007). Researching electronic and learning engagement: The REFLECT initiative. *Journal of Adolescent & Adult Literacy*. 50(6): 436. DOI: 44910.1598/JAAL.50.6.2

Bećirović, Dervić, 2022 – Bećirović S., Dervić M. (2022). Students' perspectives of digital transformation of higher education in Bosnia and Herzegovina. *The Electronic Journal of Information Systems in Developing Countries*. Early View. DOI: <http://dx.doi.org/10.1002/isd2.12243>

Borzova, Shemanaeva, 2022 – Borzova, E.V., Shemanaeva, M.A. (2022). Vzaimosvyazannoe razvitie mezhkul'turnoj kompetencii i gibkih navykov s pomoshch'yu zadaniy v inoyazychnom obrazovanii v universitete [Interconnected development of intercultural competence and soft skills through tasks in foreign language education at a university]. *Perspektivy nauki i obrazovania*. 58(4): 307-319. DOI: 10.32744/pse.2022.4.18 [in Russian]

Chang et al., 2017 – Chang, C., Liang, C., Tseng, K., Tseng, J.S. (2014). Using e-portfolios to elevate knowledge amassment among university students. *Computers & education*. 72: 187-195. DOI:10.1016/j.compedu.2013.10.015

Choshanov, 2021 – Choshanov, M.A. (2021). Inzheneriya distancionnogo obucheniya [Distance learning engineering]. *Laboratoriya znanij*. 304. [Electronic resource]. URL: <https://glavkniga.su/filecont/565982.pdf> (date of access: 11.01.2023). [in Russian]

Cole et al., 1995 – Cole, D.J., Ryan, C.W., Kick, F. (1995). Portfolios across the curriculum and beyond. [Electronic resource]. URL: https://openlibrary.org/books/OL22232876M/Portfolios_across_the_curriculum_and_beyond (date of access: 19.01.2023).

Depro, Rouse, 2022 – Depro, B., Rouse, K. (2022). Adapting the Case Method in an Economics Capstone Research Course. *International Review of Economics Education*. 41. 100249. DOI: 10.1016/j.iree.2022.100249

Edwards et al., 2018 – Edwards, Ch., Edwards, Au., Spence, P., Lin, X. (2018). I, teacher: using artificial intelligence (AI) and social robots in communication and instruction. *Communication Education*. 67: 473-480. DOI:10.1080/03634523.2018.1502459

Federal'nyj zakon "Ob obrazovanii...", 2012 – Federal'nyj zakon "Ob obrazovanii v Rossijskoj Federatsii" ot 29.12.2012 N 273-FZ. [Electronic resource]. URL: https://www.consultant.ru/cons/cgi/online.cgi?from=140174-0&req=doc&rnd=e8JNiQ&base=LAW&n=422428#1VfnfMTScRodol_qp1 (date of access: 01.11.2022). [in Russian]

Garashkina, Druzhinina, 2022 – Garashkina, N.V., Druzhinina, A.A. (2022). Lichnostno-professional'noe razvitie studentov – budushchih pedagogov s ispol'zovaniem form perevernutogo obucheniya [Personal and professional development of students – future teachers with the use of blended learning]. *Perspektivy nauki i obrazovania*. 58 (4): 128-140. DOI: 10.32744/pse.2022.4.8 [in Russian]

Gosudarstvennaya programma..., 2017 – Gosudarstvennaya programma Rossijskoj Federacii "Razvitie obrazovaniya". [Electronic resource]. URL: <http://gov.garant.ru/SESSION/PILOT/main.htm> (date of access: 03.11.2022). [in Russian]

Hanelt et al., 2021 – Hanelt, A., Bohnsack, R., Marz, D., Marante, C. A. (2021). A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies*. 58(5): 1159-1197. DOI: <http://dx.doi.org/10.1111/joms.12639>

Imanova, 2021 – Ivanova, O.A. (2021). Obosnovanie vozmozhnosti ispol'zovaniya elektronnoho portfolio dlya ocenivaniya urovnya razvitiya professional'noj kompetentnosti budushchih pedagogov [Mastering the technology of electronic portfolio by future teachers-tutors in the conditions of distance learning]. *Pedagogicheskie nauki*. 7(326): 46-53. DOI: 10.32517/0234-0453-2021-36-7-46-53

Johansen, 2023 – Johansen, K. (2023). Challenges regarding digital distance learning of operationally-oriented professions, due to Covid-19 pandemic. *International Journal of Educational Research Open*. 4: 100225. DOI: 10.1016/j.ijedro.2023.100225

Kim, 2022 – Kim, H. (2022). CALL teacher training and knowledge development. *International Journal of Educational Research*. 116: 102077. DOI: 10.1016/j.ijer.2022.102077.

Korol, Vorotnitsky, 2021 – Korol, A.D., Vorotnitsky, Yu.I. (2021). Tsifrovaya transformaciya obrazovaniya i vyzovy XXI veka [Digital Transformation of Education and Challenges of the 21st

Century]. *Vysshee obrazovanie v Rossii*. 31(6): 48-61. DOI: 10.31992/0869-3617-2022-31-6-48-61 [in Russian]

Larionov i dr., 2021 – Larionov, V., Sheremetyeva, E., Gorshkova, L. (2021). Tsifrovaya transformatsiya vysshego obrazovaniya: tekhnologii i cifrovye kompetencii [Digital transformation of higher education: technologies and digital competencies]. *Vestnik Astrahanskogo gosudarstvennogo tekhnicheskogo universiteta. Seriya: Ekonomika*. 2: 61-69. DOI: 10.24143/2073-5537-2021-2-61-69 [in Russian]

Middleditch et al., 2022 – Middleditch, P., Moindrot, W., Rudkin, S. (2022). Teaching with Twitter: An Extension to the Traditional Learning Environment. *International Review of Economics Education*. 41: 100252. DOI: 10.1016/j.iree.2022.100252

Neborsky et al., 2021 – Neborsky, E.V., Boguslavsky, M.V., Ladyzhets, N.S., Naumova, T.A. (2021). Izuchenie otnosheniya studentov pedagogicheskikh napravlenij podgotovki k cifrovoj transformatsii v vuze [Studying the attitude of students of pedagogical areas of preparation for digital transformation in a university]. *Perspektivy nauki i obrazovaniya*. 52 (4): 94-107. DOI: 10.32744/pse.2021.4.6 [in Russian]

Nicolaidou, 2012 – Nicolaidou, I. (2012). Can Process Portfolios Affect Students' Writing Self-efficacy? *International Journal of Educational Research*. 6: 10-22. DOI: 10.1016/j.ijer.2012.08.002

Oosterbaan et al., 2011 – Oosterbaan, A., Schaaf, M. F., Baartman, L.K.J., Stokking, K. (2011). Reflection During Portfolio-based Conversations. *International Journal of Educational Research*. 49. DOI: 10.1016/j.ijer.2011.02.001

Prikaz «Ob utverzhdenii...», 2018 – Prikaz «Ob utverzhdenii federal'nogo gosudarstvennogo obrazovatel'nogo standarta vysshego obrazovaniya – bakalavriat po napravleniyu podgotovki 44.03.01 Pedagogicheskoe Obrazovanie» ot 22.02.2018 № 121. [Electronic resource]. URL: <https://fgos.ru/fgos/fgos-44-03-01-pedagogicheskoe-obrazovanie-121/> (date of access: 09.12.2022). [in Russian]

Prokhorova, Semchenko, 2018 – Prokhorova, M.P., Semchenko, A.A. (2018). Vovlechenie obuchayushchihsya – budushchih pedagogov professional'nogo obucheniya v proektnuyu deyatel'nost' v ramkah discipliny [Involving of trainees-future teachers of professional training in project activities in the discipline]. *Vestnik Mininskogo universiteta*. 6(2): 6. DOI: 10.26795/2307-1281-2018-6-2-6

Samsonova, 2020 – Samsonova, A.A. (2020). Portfolio kak sredstvo proektirovaniya individual'noj obrazovatel'noj deyatel'nosti studenta [Portfolio as a means of designing individual educational activities of a student]. *Molodoj uchenyj*. 21(311): 709-711. [Electronic resource]. URL: <https://moluch.ru/archive/311/70292/> (date of access: 17.02.2023). [in Russian]

Sikström et al., 2022 – Sikström, P., Valentini, Ch., Kärkkäinen, T., Sivunen, A. (2022). How pedagogical agents communicate with students: A two-phase systematic review. *Computers & Education*. 188: 104564. DOI: 10.1016/j.compedu.2022.104564

Smolyaninova, Bezyzvestnykh, 2019 – Smolyaninova, O.G., Bezyzvestnykh, E.A. (2019). Professional'naya podgotovka Uchitelya 4.0: razvitie tsifrovyyh kompetenciy s pomoshch'yu ePortfolio [Professional Training of Teacher 4.0: Developing Digital Competency By Means of ePortfolio]. *Zhurnal Sibirskogo federal'nogo universiteta. Gumanitarnye nauki*. 12(9): 17141732. DOI: 10.17516/1997-1370-0478

Soboleva et al., 2022 – Soboleva, E.V., Zhumakulov, K.K., Umurkulov, K.P. (2022). Developing a Personalised Learning Model Based on Interactive Novels to Improve the Quality of Mathematics Education. *Eurasia Journal of Mathematics, Science and Technology Education*. 18(2): 2078. DOI: 10.29333/EJMSTE/11590

Tikhonova, 2021 – Tikhonova, N.V. (2021). Ispol'zovanie cifrovogo portfolio pri ocenivanii professional'nyh kompetenciy budushchih uchitelej [The Use of Digital Portfolio to Assess the Student Teachers' Professional Skills]. *Vysshee obrazovanie v Rossii*. 30(10): 87-98. DOI: 10.31992/0869-3617-2021-30-10-87-98 [in Russian]

Tomilova i dr., 2013 – Tomilova, M.I., Vasilyeva, E.Y., Kharcova, O.A. (2013). Otsenka znanij v vuze v vospriyatii studentov [Assessment of high school knowledge in student perception]. *Ekologiya cheloveka*. 20(9): 29-33. DOI: 10.17816/humeco17310 [in Russian]

Ulfert, Schmidt, 2022 – Ulfert, A.-S., Schmidt, I. (2022). Assessing digital self-efficacy: Review and scale development. *Computers & Education*. 191: 104626. DOI: 10.1016/j.compedu.2022.104626.

UNESCO Strategy..., 2022 – UNESCO Strategy for Technological Innovation in Education (2022-2025). [Electronic resource]. URL: https://unesdoc.unesco.org/ark:/48223/pf0000378847_rus (date of access: 08.01.2023). [in Russian]

Vashetina et al., 2022 – Vashetina, O.V., Asafova, E.V., Kaur, B. et al. (2022). Professional Development of Teachers and Future Teachers: Factors and Challenges. *Education and Self-Development*. 17 (3): 100-117. DOI: 10.26907/esd.17.3.09

Yakusheva, 2019 – Yakusheva, S.D. (2019). Razvitie professional'nyh umenij pedagoga-menedzhera v sisteme professional'no-pedagogicheskogo inzhiniringa [Development of professional skills of a teacher-manager in the system of professional pedagogical engineering]. *Vestnik Orenburgskogo gosudarstvennogo universiteta*. 3(221): 87-94. DOI: 10.25198/1814-6457-221-87 [in Russian]

Zharkih, Kostyrya, 2018 – Zharkih, N.G., Kostyrya, S.S. (2018). Professional'noe razvitie pedagoga v otechestvennyh i zarubezhnyh issledovaniyah [Professional development of the teacher in domestic and foreign research]. *Uchenye zapiski Orlovskogo gosudarstvennogo universiteta*. 3(80): 250-257. [Electronic resource]. URL: <https://www.elibrary.ru/item.asp?id=37878154> (date of access: 22.12.2022). [in Russian]