Применение интерактивного полифункционального облачного портфолио для построения и реализации индивидуальных образовательных маршрутов обучающихся в ходе проектной деятельности

Проблема и цель. Одной из приоритетных задач современной школы является информатизация и индивидуализация образования. Её реализации может способствовать электронное портфолио как средство оценивания индивидуальных образовательных результатов обучающихся, оптимизации работы с информацией, поддержки проектирования нелинейной структуры предъявления материалов. Цель исследования – изучить возможности применения интерактивного полифункционального облачного портфолио для реализации индивидуальных образовательных маршрутов обучающихся в ходе проектной деятельности.

Методы исследования. Методология основывается на анализе дидактического потенциала технологии электронного портфолио, поддержки инициатив ЮНЕСКО, государственных программ развития образования. Применяется анализ и обобщение литературы по проблеме использования интерактивных средств в условиях цифровой школы, обработка результатов тестирования и электронного контента портфолио. В эксперименте задействованы 52 обучающихся 5-10 классов гимназии г. Кирово-Чепецка (Российская Федерация). Спроектированное портфолио реализовано в среде Единой региональной информационной системы образования Кировской области. При статистической обработке данных использован критерий χ²-Пирсона.

Результаты. Разработана модель интерактивного полифункционального облачного портфолио, определяющая его структуру, включающую разделы «Мой индивидуальный образовательный маршрут», «Мои уроки», «Мои студии», «Мои дела». Реализация модели в единой региональной информационной системе позволила изменить характер взаимодействия между участниками образовательных отношений в экспериментальной группе; повысить качество предоставления услуг в электронном виде; определить приоритетные направления развития для каждого обучающегося и т.д. Выявлены статистически достоверные различия в качественных изменениях, произошедших в педагогической системе (χ² = 9,302; p < 0,05).

Заключение. Особенности применения предложенной модели портфолио: принципы единства обучения и воспитания, индивидуализации, вариативности, рефлексии и сотрудничества и т.д. Трудности предлагаемых нововведений: необходимость четкого определения дидактических функций проектируемого портфолио; проблема выбора цифровых инструментов; точность формулирования задач и др.

Ключевые слова: цифровизация образования, индивидуализация обучения, электронный портфолио, облачная технология, проект, единая региональная информационная система

The problem and the aim of the study. One of the priorities of the modern school is informatization and individualization of education. Its implementation can be facilitated by the e-portfolio as a tool for evaluating students’ individual educational results, optimizing work with information, and supporting the design of a non-linear structure for presenting materials. The purpose of the research is to study the possibilities of using the interactive multifunctional cloud portfolio for implementing individual educational routes for students in the course of project activities.

Research methods. The methodology is based on the analysis of the didactic potential of the e-portfolio technology, support for UNESCO initiatives, state education development programs. The analysis and synthesis of literature on the problem of using interactive tools in the digital school, processing of test results and electronic content of the portfolio are applied. The experiment involved 52 students of classes 5-10, who study at gymnasium in Kirovo-Chepetsk (Russian Federation). The designed portfolio was implemented in the environment of the Unified Regional Information System for Education of the Kirov Region. Pearson's chi-squared test ($\chi^2$) was used for statistical data processing.

Results. The model of the interactive multifunctional cloud portfolio was developed, which determines its structure, including the sections "My individual educational route", "My lessons", "My studios", "My affairs". The implementation of the model in the unified regional information system made it possible to change the nature of the interaction between participants of educational relations in the experimental group; improve the quality of the provision of services in electronic form; determine priority areas for development for each student, etc. Statistically significant differences in qualitative changes in the pedagogical system were revealed ($\chi^2 = 9.302; p < 0.05$).

In conclusion, the features of using the proposed portfolio model are described: the principles of the unity of education and upbringing, individualization, variability, reflection and cooperation, etc. The difficulties of the proposed innovations are formulated: the need to clearly define the didactic functions of the projected portfolio; the problem of choosing digital tools; accuracy of task formulation, etc.

Keywords: digitalization of education, individualization of education, e-portfolio, cloud technology, project, unified regional information system
Introduction

According to UNESCO studies, the results of which are reflected in the World Education Monitoring Report, education is assigned a key role in this century [1]. Not only the fate of an individual, but also the life of the planet as a whole depends on its level, quality and availability.

One of the priority tasks of the modern school, according to A. Hase, L. Kahnbach, P. Kuhl, D. Lehr, is informatization and individualization of education [2]. The fundamental documents of Russia – the Federal Law "On Education in the Russian Federation" [3], the Federal State Educational Standard for General Education, the state program "Development of Education" (2018-2025) [4] and other programs determine the directions for the development of a modern school.

In addition, the current federal state educational standards of general education in order to ensure the motivation of self-development, development of self-esteem, and responsibility declare the assessment of students' personal achievements.

To achieve this goal, the electronic portfolio can serve as a way of evaluating individual educational results, adequate to modern educational tasks.

I. Nicolaidou in this works show that the electronic portfolio allows to design and implement an individual educational route for a student, to see progress in educational activities [5]. O. G. Smolyaninova, E. A. Bezvyzvestnykh convincingly prove that information on the results of both classroom and extracurricular activities can be included in modern electronic portfolios [6]. But in many cases, developers of such resources:

• do not pay due attention to the educational component, which is a priority in school education today,
• insufficiently implement interaction with parents as active participants in the educational process.

Moreover, in the overwhelming majority of cases, the existing e-portfolio developments are focused on performing a single function – fixing educational achievements of students, they do not property implement the interactivity [7]. As a rule, cloud technologies are not used to individualize the education and upbringing of schoolchildren, to support project activities.

The analysis of the conducted scientific and pedagogical research and the current situation in the practice of teaching and upbringing at school using the electronic portfolio allows us to highlight the following contradictions:

• at the socio-pedagogical level: between the new requirements for implementing the educational function of education and the insufficient possibilities of the means of the existing electronic portfolios to fulfill these requirements in the conditions of the middle school;
• at the scientific and pedagogical level: between the didactic potential of the means of the interactive multifunctional cloud portfolio and the insufficient development of methodological approaches to their use for the implementation of individual educational routes of students in the course of project activities;
• at the scientific and methodological level: between the existing opportunities for using the means of the interactive multifunctional cloud portfolio and the insufficient level of relevant research focused on their implementation in the context of the digitalization of education.
The identified contradictions made it possible to formulate the research problem related to identifying and substantiating the possibilities of the interactive multifunctional cloud portfolio for constructing and implementing individual educational routes for students in the course of project activities.

The object of the research: informatization of education and upbringing at school.

The subject of the research: the interactive multifunctional cloud portfolio that provides the construction and implementation of individual educational routes for students in the course of project activities.

The purpose of the research is to study the possibilities of using the interactive multifunctional cloud portfolio to construct and implement individual educational routes for students in the course of project activities.

The hypothesis of the research is the assumption that the use of the interactive multifunctional cloud portfolio for constructing and implementing individual educational routes for students in the course of project activities will become effective if:

- the essence of the project activity is concretized, the features of its implementation in the conditions of the main school are defined and described;
- the didactic properties and methodological functions of the interactive multifunctional cloud portfolio are determined as a means of individualizing training and education;
- the model of the interactive multifunctional cloud portfolio was developed to construct and implement individual educational routes for students in the course of project activities.
- individualization of training and education will be provided by the didactic potential of the interactive multifunctional cloud portfolio as a means of informatization of schoolchildren's training in lesson, project, educational activities and in the implementation of students' personal development.

The problem, object, subject, purpose and hypothesis of the research made it possible to identify the following tasks.

1. To identify the features of project activities in the context of informatization of education and upbringing.
2. To analyze existing approaches to the use of interactive and cloud technologies at school.
3. To justify the possibility of using the electronic portfolio to individualize the training of schoolchildren.
4. To systematize and select tools for the implementation of the interactive multifunctional cloud portfolio.
5. To design and implement a program of experimental work to test the effectiveness of using the cloud portfolio to individualize the training of schoolchildren in the course of project activities.

**Materials and methods**

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. Methods of theoretical analysis are used
(comparative and comparative method, generalization of experience); study and analysis of the experience of using the electronic portfolio.

The analysis of the works of researchers indicates the presence of the following established approach to determining the main aims of using the electronic portfolio in the educational process:

- to track the individual progress of the student, achieved in the process of obtaining knowledge, and beyond direct comparison with the achievements of other students;
- to evaluate the student's educational achievements and supplement (replace) the results of testing and other traditional forms of control.

In this study the interactive multifunctional cloud portfolio for constructing and implementing individual educational routes for students in the course of project activities is understood as a tool for:

- implementing an individual choice of subjects for in-depth study in the middle school, sections for additional education;
- choosing a role in educational affairs and the level of involvement in them, a means of conducting career guidance;
- preparing for the conscious choice of an individual curriculum in high school.

At the same time, the goals of using the portfolio and the criteria for evaluating the student's activities should be precisely defined in order to reflect the dynamics of the development and comprehensive assessment of educational achievements.

An important aspect of the presented approach is that the interactive multifunctional cloud portfolio is a working strategic tool that allows the student to effectively monitor, plan and evaluate their achievements, and the teacher to receive an equally important diagnostic tool.

To develop the interactive multifunctional cloud portfolio at different stages of the study, tools such as Dnevnik.ru, Google Docs, Yandex.Disk, 4portfolio.ru, etc. were used. At the moment, in the region, it was decided to introduce a single information system for individualization of education and upbringing.

The Unified Regional Information System for Education of the Kirov Region (URISE KR) is a model of the interactive multifunctional cloud portfolio based on the principles of the unity of education and upbringing, individualization, variability, reflection and cooperation. The model is a system of interrelated components: "Participants of educational relations", "Sections of the interactive multifunctional cloud portfolio", "Properties of the interactive multifunctional cloud portfolio", "Types of activities" and "Result". The information system will replace the existing disparate information resources, the financial support and maintenance of which fell on each educational organization, as well as on municipalities (order of the Ministry of Education of the Kirov Region).

Project activities in the study is a set of actions that allow students to orient themselves towards setting goals on their own, determining the methods of activity and mastering these methods, analyzing and evaluating learning outcomes.

In the course of 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 for students in the course of project activities was carried out.

To process the results, questionnaire and diagnostic methods were used (observation, conversation, generalization, questioning, testing, evaluation).
Experimental and search work was carried out on the basis of the Kirov Regional State General Educational Autonomous Institution "Gymnasium No. 1 in Kirovo-Chepetsk". The experiment involved 52 students of classes 5-10 (52% girls, 48% boys).

The use of the interactive multifunctional cloud portfolio for the individualization of education is implemented in the environment of the Unified Regional Education Information System of the Kirov Region (https://one.43edu.ru/auth/login).

Statistical data processing was performed using Pearson's chi-squared test ($\chi^2$).

**Literature review**

The processes associated with the formation and development of the digital economy, according to S. Bećirović, M. Dervić, inevitably affect the development of educational systems around the world – the diffusion of end-to-end digital technologies is observed in all spheres of human activities, including education [8].

According to A. Hanelt et al., the main task of the international digital transformation of education is to improve its quality through the introduction of digital technologies at various levels (from the management of educational organizations to private methods) [9]. In response to the challenges of the digital economy, according to the conclusions of A. Bough, G. Martinez Sainz, changes are expected in the context of achieving qualitative changes in the course of the digital transformation of education [10].

In our country, at the federal level, the following tasks are solved: ensuring equal access to quality education for every student, regardless of their place of residence, ensuring the global competitiveness of Russian education by 2030, joining the Russian Federation in the number of the ten leading countries in the world in terms of the quality of general education; education of a harmoniously developed and socially responsible person based on the spiritual and moral values of the peoples of Russia, historical and national cultural traditions.

A. D. Korol, Yu. I. Vorotnitsky note that 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 [11]. The main guidelines for education at this stage are the development of personal independence of students, the formation of their subjectivity, the development of new forms of interaction between participants in the educational process and new ways of organizing joint (group, collective) work, the development and implementation of a personalized learning system based on hierarchies to automate the content of educational resources [12].

V. Larionov, E. Sheremetyeva, L. Gorshkova emphasize that the innovative processes taking place in the modern education system are characterized by the transformation of the content of education, the introduction of new approaches, technologies, including the introduction of updated Federal State Educational Standards for Primary and Basic General Education [13].

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, according to A.-S. Ulfert, I. Schmidt, is the development of the student as a subject of his/her own activity in the process of education and upbringing using digital information technologies [14].
Among the promising educational technologies that are adequate to modern educational tasks, contributing to the development of student independence and the formation of skills to manage their own educational and cognitive activities, E. F. Zeer, L. N. Stepanova 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 his/her education [15].

The works of a number of scientists are devoted to the study of mechanisms for compiling, pedagogical features of maintaining and describing technical possibilities for the implementation of electronic portfolios at various levels of education [5]. Thus, the consideration of the portfolio as one of the modern means of evaluating the results of education is reflected in the scientific works of O. G. Smolyaninova, E. A. Bezyzvestnykh [6] and others, and the study of the possibilities of the student's portfolio in the field of formation and diagnostics of competences was carried out by M. Barbosa, C. Rodrigues [16] and others.

A. Gani, S. Zulaikhah use sociodrama to individualize learning. Based on the experimental data the authors are convinced of its effectiveness [17]. According to their conclusions, this method is more than just a technology: it encourages students to explore deeper and become aware of significant personal situations and problems, motivates them to greater role, behavioral flexibility. In the process of improvised dramatization, the creative components of the psyche are actualized; the spontaneity and creativity necessary for the assimilation of new knowledge grow.

Y. Huang develops algorithms for the formation of recommender services [18]. The author concludes that the personalized recommender system is a complex of algorithms, programs and services. Its task is to predict, based on information about the user's profile and activity, what may be of interest to the user. In the process of work of recommender systems, explicit and implicit methods of collecting information are used. The end result of this approach is a latent factor model that helps educators to uncover learners’ “implicit” motivations and cognitive interests using parameter estimation techniques.

V. M. Savvinov, P. P. Ivanov, V. N. Strekalovsky note that modernization of the education system is aimed at achieving “digital maturity” and solving the key tasks of education [19]:

- introduction at all levels of general education of new teaching methods, technologies that ensure development of basic skills and abilities by students, increasing their motivation for learning and involvement in the educational process;
- formation of an effective system for identifying, supporting and developing abilities and talents in children and youth;
- creation of a modern and safe digital educational environment;
- ensuring the unity of the educational space of the Russian Federation.

In the works of E. V. Frolova, O. V. Rogach it is substantiated that in modern conditions digitalization is becoming an integral attribute not only of industrial production, but also of the social sphere [20]. According to S. Y. Stepanov, P. A. Orzhakovskiy, digital products make it possible to ensure the continuity of the educational process in the context of the introduction of epidemiological restrictions [21]. An important advantage of online learning is the formation of conditions for building individual learning paths. According to P. V. Derkachev et al., individualization excludes the simplification of the educational product, assuming the introduction of a modular training system and expanding the range of educational offers [22].
When analyzing the works of T. S. Putilovskaya, E. V. Zubareva, I. G. Tuchkova, didactic opportunities were identified, they confirm 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; organization of interactive classes and collective teaching [23].

To individualize learning, the electronic portfolio can also be used as a way of evaluating individual educational results, adequate to modern educational tasks.

In the works of O. G. Smolyaninova, E. A. Bezyzvestnykh it is shown 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, organize quick access to them for students, parents, teachers [6].

A. I. Fedorov et al. conclude that the electronic portfolio serves to design and implement an individual educational route for a student, to see progress in learning activities [24].

From the point of view of tracking and evaluating the learning process and its results, the cloud portfolio helps to solve the following important tasks: track the individual progress of the student over a long period of study, evaluate his/her educational achievements and supplement the results of traditional forms of assessment [25].

Support for a full cycle of activities can contribute to a significant expansion of the range of functions of the interactive multifunctional cloud portfolio: from simply tracking the individual progress of students and assessing educational achievements to the formation of skills to manage own educational and cognitive activities, the development of students' independence, etc. The cloud portfolio that supports the full cycle of students' activities can become a means of developing students' demanded competences, including in the field of project activities.

The analysis of the scientific works listed above allows us to identify the problem associated with the need for additional study of the use of the interactive multifunctional cloud portfolio for the individualization of education in school.

The article presents the study aimed at studying the possibilities of the interactive multifunctional cloud portfolio for constructing and implementing individual educational routes for students in the course of project activities.

Research program

The main goal of the experiment was to test the potential of the interactive multifunctional cloud portfolio for constructing and implementing individual educational routes for students in the course of project activities.

At the first stage of the study, the analysis of scientific, pedagogical, educational and methodological literature was carried out in order to determine the state of development of the problem of individualization of education and upbringing in the middle school, the use of interactive and cloud technologies in the educational process, including the use of the electronic portfolio.

A general assessment of the progress of 52 students of the Kirov Regional State General Educational Autonomous Institution "Gymnasium No. 1 in Kirovo-Chepetsk" was carried out. The experiment involved 52 students in classes 5-10 (52% girls, 48% boys).
As part of the control event, school students were asked to complete 100 tasks (tasks for assessing educational achievements (first group); for diagnosing the development of personal qualities (second group)). For correct performance 1 point was given.

Let's give examples of the first group tasks:

1. 1. All squares are rhombuses. Some figures are squares. What conclusion can be drawn from this? Answer options: some squares are not rhombuses; all figures are squares; all figures are rhombuses; some figures are rhombuses.

1. 2. Continue the sequence: 3 7 4 6 10 7 9 13... Answer options: 1) 15; 2) 8; 3) 10; 4) 17.

1. 3. On the first day, 10 Kbytes of information were transmitted over the communication channel. On the second day – 6 MB. On the third day – twice as much as on the first two days. How many bytes of information were transmitted in three days? Answer options: 1) 18 030 000 bytes; 3) 18 000 000 bytes; 2) 18 905 088 bytes; 4) 19 050 098 bytes.

1. 4. From 40 tons of rock, 20 tons of coal containing 6% impurities are mined. What is the percentage of impurities in coal? Answer options: 1) 50%; 2) 46%; 3) 60%; 4) 53%.

1. 5. In the fantasy land, all computers have the Alpha operating system installed, while none of the mobile phones has the Alpha operating system installed. What conclusion can be drawn from this? Answer options: in the fantasy land, all mobile phones are computers; some mobile phones in the fantasy land are not computers; in the fantasy land, no mobile phone is a computer; some mobile phones in the fantasy land are computers.

Let's give examples of the second group tasks:

2. 1. Define the following occupations: Robotics Engineer, Cryptographer, Ergonomist, 3D Printer Designer, Programmer, Process Safety Engineer.

2. 2. Correlate the image with the events (processes) to which these images relate. For example: modeling, education, play, animal training, etc.

2. 3. According to the facts of the biography or the letters highlighted in the biography, name the surname of a famous fellow countryman. For example, “He fulfilled the dream of sea voyages, at the age of 16 he was hired as a sailor on a steamer in Odessa. Once he even went abroad, to Egypt” (Grin).

2. 4. List, using the "Atlas of new professions", professions for which it is necessary to have such cross-professional skills as: inter-industry communication, systems thinking, project management. Answer options: manager of a private equity fund in talented people, architect of living systems, bioethicist, etc.

2. 5. A high-class diagnostician who mastered information and communication technologies and is able to make diagnoses online. Answer options: genetic IT doctor; healthy aging consultant; network doctor; clinical bioinformatician.

Thus, as a result of the initial diagnosis, each school student scored from 0 to 100 points. When interpreting points into a quantitative scale, the following system was used: if the student scored less than 33 points, the mark was “unsatisfactory”; from 34 to 59 points – "satisfactory"; from 60 to 89 points – "good"; in other cases – the rating was "excellent".

Based on the results, control and experimental groups were formed. There are 26 school students in each group.

At the second stage of the study, the theoretical and accumulated empirical experience was systematized in terms of the stated problem, the structure, content, and model of the interactive multifunctional cloud portfolio were developed to construct and implement individual educational routes for students in the course of project activities in the URISE KR environment.
When analyzing legal documents, the key tasks of applying the individual approach to teaching school students were identified: formation of readiness for self-development and continuous education; design and construction of the social development environment; the inclusion of students in active educational and cognitive activities; educational activities taking into account the individual characteristics of schoolchildren.

The analysis of the literature allows to reasonably assert that one of the modern tools aimed at developing the digital competences of students in the context of the development of the digital economy and the digital transformation of education is the electronic portfolio as a set of results of educational and cognitive activities of students.

At the first stage of the experiment, the didactic potential of interactive cloud technologies was identified for the construction and implementation of individual educational routes for students in the course of project activities. In particular, the analysis of the works of O. G. Smolyaninova, E. A. Bezyzvestnykh and others made it possible to identify the features of the tools for implementing the process of individualization of education: an individual educational route, an individual educational trajectory, an individual educational program [6]. At the same time, one of the most effective modern tools for implementing the individualization of learning processes is an individual educational route. Its design is a kind of the student's educational activity in order to study some (chosen by the student) subjects at a deeper level.

The following features of the implementation of individual educational routes were identified: internal differentiation, expressed in the choice of tasks from the proposed set based on the personal experience of students; training according to individual programs, associated with individualization in the choice of courses, the level of their development; ensuring the possibility of working in temporary groups [26].

When analyzing the term "interactivity", its concept was clarified both in the pedagogical sense and in the technical one [5]. Interactive methods in pedagogy are focused on interaction of students not only with the teacher, but also with each other and technical devices, as well as the dominance of the activity of students in the learning process, they imply targeted intersubjective interaction between the teacher and students to create optimal conditions for the development of the student. 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 key aspect of the work is that the authors suggest using the cloud portfolio to support the full cycle of students' activities. The individual multifunctional cloud portfolio, according to the authors, is a means of forming the demanded competences, including in the field of project activities.

Support for a full cycle of activities can contribute to a significant expansion of the range of functions of the interactive multifunctional cloud portfolio: from simply tracking the individual progress of students and assessing educational achievements to the formation of skills to manage their own educational and cognitive activities, the development of students' independence, etc.

The teacher in the course of project activities is focused on helping students in mastering the ways of obtaining knowledge and forming a system of universal educational activities,
developing personality traits that meet the requirements of the information society through the education of a responsible and selective attitude to information; development of cognitive, intellectual and creative abilities of students.

Further, such tools as Dnevnik.ru, Google Docs, Yandex.Disk, 4portfolio.ru, etc. were analyzed. Their advantages include platform independence, insignificant labor costs for filling due to the use of various templates, interactivity, resource openness (if necessary).

However, in practice, this turned out to be disparate information resources, the financial support and maintenance of which fell on each educational organization.

On the territory of the region, it was decided to introduce a unified information system for the individualization of education and upbringing (URISE KR).

The implemented URISE KR system allows:
- to automate workflow, including reporting, which will significantly free up teachers' time and allow to directly engage in the educational process
- to improve the quality of the provision of state and municipal services in electronic form in the field of education, including enrollment in kindergarten, school, technical school, college, institutions of additional education;
- the possibility of forming the child's portfolio, on the basis of which the priority directions of his/her development will be determined.

An individual educational route is determined by the educational needs, individual abilities and capabilities of the student (the level of readiness for mastering the program). Thus, an individual educational trajectory provides for the existence of an individual educational route (content component), as well as a developed method for its implementation (technologies for organizing the educational process).

The software requirements for installing URISE KR are worth noting. The following software must be installed on the user's computer: operating system Microsoft Windows 7, Microsoft Windows 8, Microsoft or OS of the Linux family (for example, ALT Linux 5.0 School and above); Browser with Internet access: Mozilla Firefox, Google Chrome, Yandex Browser or Opera latest versions; Microsoft Office Excel or OpenOffice Calc (http://www.openoffice.org/ru/).

The working window of the System consists of the following elements: Main menu, Navigation panel, System menu, Data area.

Let's describe an example of working in the Main Menu: in the menu item "Teachers", the system will display students related to the organization selected in the menu item "Register of organizations of the education system".

An example of working in the Data Area: in the menu item "Teachers", those teachers who belong to the organization currently selected in the corresponding menu will be displayed.

Let us describe the main functionality of the system in terms of constructing and implementing individual educational routes for students.

1. Entering data into the System includes filling in the register of educational organizations, filling in data on teachers of an educational organization, filling in data on other employees of an educational organization, filling in data on classes in an educational organization.

2. In the form "Classes" there is a list of all classes of this educational organization. To edit the list, the appropriate buttons can be used: "Add" – to add a new class; "Delete" – to remove the selected class from the list.

For all classes of an educational organization, it is possible to put down the "Class mark", "Change of training" and "Duration of the training program".
For example: last academic year there were two 9th classes in the gymnasium (9A and 9B). In the new academic year, from these classes one class 10 was formed, and in the database (as a result of automatic data transfer) – 2 lists of students: 10A and 10B.

To create a new list (one class 10), it is necessary to “cut out” the data of those students who moved to class 10 from the list of classes 10B and “insert” them into the list of class 10A students. Delete the data of other students from the list of class 10B.

The algorithm of the system.
1. In the list of students in class 10A delete the data of those students who are not in class 10;
2. Rename class 10A to 10.
3. Before deleting an incorrect class, you must first mark for deletion the Students and Groups of students from this class (if they are present in it).

Note: The field "Class teacher" is filled in from the "Teachers" section.

3. Let's describe the function "Filling in data on students of an educational organization". The form "Students" contains a list of all students of the given educational organization from the selected class. Surname, name, patronymic of the student must be complete and correspond to the identity document. The system does not have the possibility to compare students by abbreviated and full name.

If the student has a disability: deaf; hard of hearing; blind; visually impaired; severe speech disorders; violation of the musculoskeletal system; mental retardation; other disabilities, then it must be indicated in the appropriate field.

To fill in the student's learning outcomes in the appropriate form, the user must enter the grades that students managed to get.

Annual grades for previous academic years will be automatically copied when transferring data from one academic period to another, if entered. If not entered, they must be entered. There is no need to enter and worry about grades that aren't due yet.

The physical condition of the student can be also assessed. In the form "Physical Development" main indicators must be entered: Student’s height (measured in centimeters), Student’s weight (measured in kilograms), the student’s Health Group (select from the drop-down list).

Further, the students of the experimental group were involved in project activities, all stages of which were supported by the objects of the URISE KR system. Gymnasium students from the control group were involved in project activities without support from the multifunctional cloud portfolio.

Let us give a specific example of the use of the individual multifunctional cloud portfolio when implementing project activities. Project activities allow students to focus on setting goals on their own, defining methods of activity and mastering these methods, analyzing and evaluating learning outcomes; they allow the teacher to help students in mastering the ways of gaining knowledge and forming a system of universal learning activities, to develop personality traits that meet the requirements information society through the education of a responsible and selective attitude to information; to develop of cognitive, intellectual and creative abilities of students.

At the preparatory stage of work on the project (information, subject, social, etc.), students of the experimental group get acquainted with the methodology of project activities: they identify problems, set the goal and objectives of the project, determine the necessary resources, the intended product.

The multifunctional cloud portfolio in the unified educational space of URISE KR at this stage is used to conduct diagnostics and self-diagnosis before starting work: identifying
the interests of students, the level of knowledge and methods of action. It also allows the student to capture ideas in the form of notes, diagrams, mental maps, form a selection of the necessary text, graphics, video materials, organize a discussion with the teacher and other students in a chat or via video conferencing, draw up an individual work plan and determine the timing of each stage of work in online calendar.

Additionally, the capabilities of the unified educational space the URISE KR allow conducting a survey of the target audience to clarify options for solving the problem, the results of which can also be entered into the cloud portfolio.

At the practical stage of project activities, the students of the experimental group independently, with the help of a teacher or in a group discussion, find ways to solve the identified problems, possible ways to achieve the goal when creating a project product, evaluate them, choose the most rational ones, master them in practice, while achieving the planned results of their own activities and planned educational outcomes. At this stage, the multifunctional cloud portfolio in the educational space URISE KR provides opportunities for consultations with a teacher or classmates, filling out a work schedule, compiling a report, forming a project materials folder (in the case of an electronic product, the product itself can be included in the project materials folder) or links to it, in the case of a material product: photographs, videos, textual descriptions of the product, etc.).

The analytical stage of project work involves comparing the goal (intended result) with the obtained product. At this stage, self-assessment and evaluation of the project product takes place: its advantages and disadvantages are determined, ways of improvement are proposed. The multifunctional cloud portfolio in the unified educational space of URISE KR allows for self- and mutual evaluation of the obtained product and the activities of schoolchildren, presenting the project product and receiving comments, feedback from the target audience and experts.

In the course of the project, in the multifunctional cloud portfolio in the educational space URISE KR the students:
1) fill in the online promotion table;
2) note the implementation of the planned steps of activities within each stage (indicative, executive and control-corrective);
3) make references to intermediate and final results of project activities.

The teacher checks the work of the students of the experimental group, comments and evaluates their skills to work with various types of information, independently plan and carry out activities, present and evaluate its results.

The students in the control group during the development and implementation of the project also carry out a huge search and research work, using a large number of information sources (electronic encyclopedias, electronic catalogs of libraries). The teacher, within the framework of the defending project procedure, evaluates the work according to the criteria: planning and disclosure of the plan, development of the topic, collection of information, selection and use of methods and techniques, information analysis, organization of written work, analysis of the process and result.

At the fixing stage of the experiment, the control test of 100 tasks was again carried out. The types of tasks, the principles of assessment corresponded to the tasks and the procedure of the input control event. Information about educational achievements before and after the experiment is presented in Table 1.
The results of supporting the students' activities by means of cloud technologies for individualization of education and upbringing

<table>
<thead>
<tr>
<th>Level of grades</th>
<th>Groups</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental group (26 students)</td>
<td>Control group (26 students)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Before the experiment</td>
<td>After the experiment</td>
<td>Before the experiment</td>
<td>After the experiment</td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>3</td>
<td>10</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Satisfactory</td>
<td>9</td>
<td>6</td>
<td>10</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>13</td>
<td>3</td>
<td>12</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

In the online resource http://medstatistic.ru/calculators/calchit.html, the values of the criterion were calculated before ($\chi^2_{obs.1}$) and after ($\chi^2_{obs.2}$) the experiment. For $\alpha = 0.05$, according to the distribution tables, $\chi^2_{crit}$ is equal to 7.815. Thus, we get: $\chi^2_{obs.1} < \chi^2_{crit}$ (0.093 < 7.815), and $\chi^2_{obs.2} > \chi^2_{crit}$ (9.302 > 7.815). Therefore, the shift in the direction of increasing the level of progress of students in the basic school can be considered non-random.

### Discussion of the results

The cloud portfolio that supports the full cycle of students' activities can become a means of forming students' demanded competences, including in the field of project activities.

In this context, the participants of the experiment during the discussion identified the following advantages of using interactive technologies to support project activities:

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

Performing the qualitative assessment of the results of the control test, we note that 65% of the students in the experimental group received grades "good" and "excellent". According to the results of the input control work, this value was equal to 15%. The number of students who did not cope with the task decreased from 50% to 12%.

The dynamics of results in the control group is not so significant. Grades "excellent" and "good" were received by 27% of schoolchildren. Initially, this figure was also equal to 15%. The number of students who failed to complete the final control test was 42% (compared to 46% during the input control).

The result of the activities of the students of the experimental group was expressed in personal choice, design and implementation of an individual educational route and was achieved through activities that implied:

- planning and analysis of activities: designing individual educational routes, setting educational goals for the study period, joint planning of events, summing up the results of educational activities;
- organization of joint work using cloud technologies in the single educational space of the Regional Information System of the Kirov Region.
The research materials correspond to the priority areas of the activity of UNESCO and the Russian education system in terms of informatization and individualization of education [1]. The obtained conclusions about the didactic potential of the interactive multifunctional cloud portfolio in relation to the individualization of learning confirm and supplement the results of the works of O. G. Smolyaninova, E. A. Bezyzvestnykh [6]. A significant result of the study is the description of the basic ideas of the approach, expanding the ideas of I. Nicolaidou about the possibilities of digital interactive tools for designing individual educational routes and trajectories of knowledge [5].

Conclusion

The implementation of the proposed model of the interactive multifunctional cloud portfolio in the Unified Regional Information System for Education of the Kirov Region (URISE KR) makes it possible, on the basis of the integrated use of cloud technologies, to organize individual and joint work of teachers, students and their parents, aimed at individualizing education and upbringing.

In the course of the study, the following possibilities of the interactive multifunctional cloud portfolio in the URISE KR environment were identified for constructing and implementing individual educational routes for students in the course of project activities:

• change in the nature of interaction between participants in educational relations, which is expressed in their active involvement in the process of development, training, education of students;
• formation of universal educational activities, communication skills, including through creation of own educational environment;
• personal development of students, which is manifested in activities not only direct, associated with the development of academic subjects, extracurricular activities, participation in educational activities, but also associated with the maintenance of the portfolio itself.

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: “Participants of educational relations”, “Sections of the interactive multifunctional cloud portfolio”, “Properties of the interactive multifunctional cloud portfolio”, “Activities” and “Result”.
3. It includes tools for organizing effective interaction and collaboration of all participants in educational relations. Each of the participants in the cloud has access to personal space and shared documents in each section of the interactive multifunctional cloud portfolio (“My individual educational route”, “My lessons”, “My studios”, “My affairs”).
4. The central element of the model, which is the key to the implementation of the process of individualization of education and upbringing, is the block "Portfolio Properties", which allows for the organization of joint work using cloud technologies in the single educational space of URISE KR.

This study convincingly proves that the cloud portfolio can become an effective multifunctional tool for implementing educational and extracurricular activities of a student under the following conditions:
• 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 of students' activities: it is necessary to provide in the cloud portfolio the possibility of supporting all stages of students' project activities.

The use of the proposed model and tools of cloud services makes it possible to determine the best options and solutions that contribute to the personal development of students, their pre-profile preparation and the conscious choice of the profile of education in high school.

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