

**MODERNIZATION OF THE
PEDAGOGICAL SYSTEM
OF TERTIARY EDUCATION
IN HIGHER EDUCATION
INSTITUTIONS**

Collective monograph



Ministry of Education and Science of Ukraine

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In the framework of the research, the team of authors analyzed the main issues of education development in Ukraine and proved that the pedagogical process of future teachers' tertiary education in higher education institutions needs constant modernization. In accordance with modern requirements (world trends, democratic values, principles of market economy, modern scientific and technical achievements; updating of methodological tools, expansion of innovative approaches to teacher training, etc.), new systems appear. They involve conceptual ideas, innovative theories and approaches to the strategy and main directions of improving national education. Therefore, the purpose of the collective monograph is to analytically consider the theory and practice of education, to determine the nature and dynamics of institutional changes in the educational paradigm in general and its specific areas or components in particular. Awareness of the conclusions made in the collective monograph will contribute to updating the pedagogical system of tertiary education in higher education institutions, future teachers' comprehensive development; promote effective improvement of the quality of their training, increase the number of competitive professionals and increase the competitiveness of domestic higher education institutions in the international labour market.

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FOREWORD

The development of the educational system in Ukraine is accompanied by significant changes in the pedagogical theory and practice of the educational process, which is determined by a system of conceptual ideas, innovative theories and views on the strategy and main directions of improving national education. This process leads to the need to conduct psychological, pedagogical and management fundamental studies in the field of education and to summarize the results to implement a strategic program of development of education as a holistic system and to identify optimal ways, forms, and methods of improvement in the current context.

The study of the problem of education in Ukraine covers issues of modern theory and is determined by the needs of practice related to the necessity to increase the educational potential of the nation, to ensure the competitiveness of educational institution graduates.

The problem of ensuring the quality of vocational education, in accordance with world trends, democratic values, market principles of the economy, modern scientific and technological achievements is of particular importance in modern education. In this context, it is valuable the experience and achievements of the international community in the field of education, where the quality of education is called one of the indicators of a decent quality of life, an instrument of social and cultural harmony, economic growth.

The presented monograph considers various aspects of the problem of education, the solution of which the authors associate with the definition, justification and implementation of theoretical-methodological, methodical and practical principles of development and improvement of educational activities in educational institutions. The studied aspects are related to management, content, tools etc. of education.

The monograph contains an analytical understanding of the theory and practical experience of education, including the nature and dynamics of institutional changes in the educational system in general and its specific areas or components in particular.

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10. Marusynets M. M. Profesiina refleksii maibutnoho vchytelia pochatkovykh klasiv: teoriia i praktyka formuvannia: monohrafiia. Ivano-Frankivsk, 2012. 419 s.

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14. Kharchenko S. Ya. Henderna osvita i vykhovannia studentskoi molodi v protsesi sotsializatsii : teoriia ta praktyka : monohrafiia. Luhansk : Vyd-vo DZ «LNU imeni Tarasa Shevchenka», 2013. 258 s.

15. Sustainable Development Goals: 17 Goals to Transform Our World. 2018. URL : <https://www.un.org/sustainabledevelopment/> (Access Oct. 24, 2021).

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**METHODICAL TOOLKIT FOR PROFESSIONAL TRAINING
OF FUTURE TEACHERS TO USE CLOUD SERVICES
IN THE EDUCATIONAL PROCESS**

© Khmil N., Kyselova O., Shcherbak I.

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In the article the authors highlight the problem of preparing future teachers to use cloud services in the educational process. It is emphasized that over the past 5 years there has been an increase in the number of publications in this area. The paper substantiates that the selection of methodological tools is important to rely on the principles of learning that help higher education students to better remember and independently develop new material: the principle of visibility, the principle of support, the principle of professional orientation, unity of individual and group approach, consciousness and activity in training.

The researchers also noted that for the organization of the learning process aimed at preparing future teachers to use cloud services in the educational process, elements of contextual, interactive and blended learning are important. It is taken into account that the organization of educational and cognitive activities of higher education seekers is ensured by the introduction of different groups of teaching methods: stimulating the motivation of educational activities; problematic presentation of material; monitoring and analysis of student academic achievements.

Emphasis is placed on the importance of using cloud learning tools in the training process, by which the authors understand cloud services used in various types of educational activities to solve specific educational problems.

The authors proposed the following groups: data storage services; services for creating postcards, resumes, movies, cartoons, online games; services for planning for teachers and students in the educational process; services for the organization of joint work; information visualization services; services for creating didactic tools; services for creation and filling with the developed didactic materials of the educational and information environment in the form of a site.

Keywords: cloud services, professional training, future teacher, methodical toolkit, educational process.

Хміл Н. А., Кисельова О. Б., Щербак І. В. «Методичний інструментарій професійної підготовки майбутніх учителів до використання хмарних сервісів в освітньому процесі».

У статті авторами висвітлено проблему підготовки майбутніх учителів до використання хмарних сервісів в освітньому процесі. Акцентується увага, що за останні 5 років спостерігається зростання кількості публікацій у цьому напрямі. У роботі обгрунтовано, що при доборі методичного інструментарію важливим є опора на принципи навчання, які допомагають здобувачам вищої освіти краще запам'ятовувати та самостійно опрацьовувати новий матеріал: принцип наочності, принцип опори, принцип професійної спрямованості, єдності індивідуального та групового підходу, свідомості та активності в навчанні.

Також науковцями зазначено, що для організації процесу навчання, спрямованого на підготовку майбутніх учителів до використання хмарних сервісів в освітньому процесі, важливим є елементи контекстного; інтерактивного та змішаного навчання. Ураховано, що організація навчально-пізнавальної діяльності здобувачів вищої освіти забезпечується запровадженням різних груп методів навчання: стимулювання мотивації навчальної діяльності; проблемний виклад матеріалу; моніторингу й аналізу навчальних досягнень здобувачів вищої освіти.

Акцент зроблено на важливості застосування в процесі професійної підготовки хмарних засобів навчання, під якими автори розуміють хмарні сервіси, застосовувані в різних видах навчальної й виховної діяльності для вирішення конкретних освітніх завдань.

Авторами запропоновано такі їх групи: сервіси зберігання даних; сервіси для створення листівок, резюме, фільмів, мультфільмів, онлайн-ігор; сервіси планування діяльності вчителів та учнів в освітньому процесі; сервіси для організації спільної роботи; сервіси візуалізації інформації; сервіси для створення дидактичних засобів; сервіси для створення і наповнення розробленими дидактичними матеріалами навчально-інформаційного середовища у вигляді сайту.

Ключові слова: хмарні сервіси, професійна підготовка, майбутній учитель, методичний інструментарій, освітній процес.

Relevance of research. The digital transformation of modern secondary education requires the modernization of the training of future teachers who will be able not only to adapt to educational innovations introduced by information and communication technologies, but also to effectively use it to solve professional problems. The modern school needs teachers who are able to generate, develop, implement and disseminate innovative ideas, find new tools, forms and methods of teaching; are aware of the didactic possibilities of modern digital technologies, are able to independently and competently use them for the comprehensive development of the student's personality. The growing didactic potential of cloud

technologies, the multifaceted nature of their of pedagogical opportunities, the rapid improvement of cloud services necessitate improving the quality of teacher training for the effective use of these services in the educational process.

A new impetus to the development and diversification of methods of using cloud services was provided by the spread of coronavirus infection and the need to organize distance learning in higher education. This allowed higher education institutions to keep pace in the implementation of vocational training tasks for future professionals and to implement personal communication with students when it was possible in an epidemiological situation.

Analysis of the recent researches and publications. Practices of using cloud services in the educational process are becoming more common in higher education. According to the indicators of the open search engine of full-text scientific publications Google Academy, the number of works on the above topics has been growing for the last 5 years (Fig. 1).

The theoretical and methodological basis for the study of our problem were the scientific works of domestic scientists, which highlighted a range of issues of training future teachers of various subject specializations to use cloud technologies, in particular: primary school (N. Bakhmat, O. Kuchai, E. Markova, O. Szyman and others); computer science (T. Arkhipova, T. Vakalyuk, T. Zaitseva, O. Korotun, V. Oleksyuk, N. Stetsenko, T. Tkachuk, etc.); mathematics (M. Popel); astronomy (I. Tkachenko); experience of training teachers-practitioners (A. Bukach, S. Kaplun, L. Klotz, S. Litvinova, N. Soroko, L. Familyarskaya, M. Shinenko, etc.). Despite the existence of existing scientific works on the preparation of future teachers for the use of cloud technologies in the educational process and the importance of this problem for higher pedagogical education, it remains underdeveloped. Various aspects of it need more thorough research.

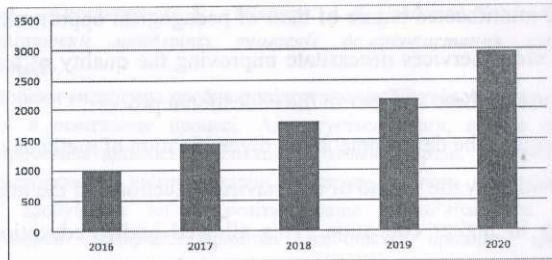


Figure 1. Growing number of publications in the Google Academy on the subject of cloud services

The purpose of the article is to substantiate the content, methods, forms and means of preparing future teachers for the use of cloud services in the educational process.

Presenting the main material. The selection of methodological tools is in accordance with the purpose of training. To do this, you must follow specific principles of learning. In the scientific and pedagogical literature, they are the most general guidelines, which reflect the basic patterns and requirements for the content, organization and methods of teaching [13, p. 193].

According to the logic of our study, we briefly will describe the principles of learning defined by us. They are all interconnected.

Following the *principle of visibility*, the learning process is intensified by regulating the ratio and relationship of illustrations, demonstrations, laboratory work, references to real-life examples and facts. Accordingly, this principle provides for the demonstration of cloud services websites, their interface, examples of training materials developed by means of cloud services, and created training and information environments.

The principle of support in the preparation of future teachers for the use of cloud services in the educational process is, in fact, work with didactic schemes, graphical algorithms, etc., in which the educational material is clearly structured. This makes it easier for students to understand the place of the phenomenon being studied in the general system of knowledge, as well as more effectively forming

a holistic system of ideas about the possibilities of using cloud services in future professional activities.

In compliance with the *principle of practical (professional) orientation* in the learning process it is necessary to introduce a set of professionally oriented tasks, performing which students simulate real pedagogical situations that arise in the pedagogical activities of teachers and to solve which cloud services can be used.

The purpose of the *principle of unity of individual and group approach* is to rely on individual characteristics of students, their life experience, abilities, needs and desires to improve the productivity of knowledge acquisition, improve skills and abilities to work with cloud services for further implementation in the educational process. The implementation of this principle is possible by organizing the educational activities of students during the implementation of both individual and group projects.

According to the *principle of consciousness and activity in teaching* future teachers to use cloud services in the educational process, the organization of their educational and cognitive activities is provided, which increases students' motivation, the need to acquire knowledge, improve skills and abilities. To implement it in the process of preparing future teachers for the use of cloud services, it is advisable to introduce active teaching methods. In this way, a friendly, calm, informal atmosphere is created, and this contributes to productive mental work and increased interest in the topic being studied.

To organize the learning process aimed at preparing future teachers to use cloud services in the educational process, it will be important to introduce elements of contextual, interactive and blended learning. Let us briefly describe them.

An essential characteristic of contextual learning is the modeling of the subject and social content of future pedagogical activity by symbolic means (language of academic disciplines) [9]. Training is carried out (T. Poveda) [15, p. 123] with the introduction of a system of new traditional forms and methods of teaching, modeling the subject and social content of future professional activity with

the reproduction of real professional situations. In contextual learning (I. Zhukova) [4, p. 143] it is important to form a professional motivation for personal development. Therefore, the content of the student's educational activity is not only the logic of academic subjects, but also the model of the professional, the logic of future professional activity.

The importance of introducing contextual learning is to organize the learning process of students, when their activities are aimed at reviving cognitive activity and developing their self-learning skills, as well as forming their ability to use cloud services in the educational process in solving specific professional problems.

Among the most important competencies of a modern specialist are the ability to act within the agreed goals and objectives; ability to coordinate their actions with the actions of the partner (respect the opinions of others); ability to live together: to cooperate, go to kompromis; the ability to develop independently, even if there is a lack of abilities. The formation and development of such competencies is provided by interactive learning [18], which plays an important role in the process of professional training of future teachers to use cloud services in the educational process. In particular, in the process of performing various educational tasks, students' motivation increases; the ability to think out of the ordinary, the ability to justify their own position is formed; the ability to cooperate is improved.

Blended learning provides a way to organize interaction, combining the benefits of face-to-face teaching and e-learning. This is a form of learning, the feature of which is the transfer of learning new material in the educational and information environment and the organization of interactive interaction of participants in the educational process in real time.

Given the purpose of our study, blended learning will mean an organization of learning in which the introduction of cloud services can combine different forms of learning and self-education to enhance the cognitive activity of students in mastering the principles of working with cloud services.

Recognizing that blended learning is characterized by interactivity, information accessibility, diversity of presentation of educational materials and ensuring network

interaction of all participants in the educational process, we believe that its introduction can increase the amount of material to learn and create an individual learning trajectory for each student. Such training will promote the development of critical thinking and the ability of future teachers to work independently.

The organization of educational and cognitive activities of students is ensured by the introduction of different groups of teaching methods.

Among all their diversity in our study, we will consider those that have been adapted and implemented by us in the process of training future teachers in this area.

The requirements for their selection include:

- formation of students' interest and motivation to use cloud services in the educational process;
- promoting the conscious development of information technology skills and abilities, as well as skills of joint interaction when working with cloud services;
- the desire for self-improvement in the direction of their active use in future professional activities.

Of particular interest for our study are the following methods:

- stimulating the motivation of educational activities («Press-method», the method of «Brainstorming», «Circle of ideas», collaborative learning);
- problem statement (problem learning, project method; web quest);
- monitoring and analysis of students' academic achievements (web portfolio, reflection).

The «*Press-method*» is introduced when students must not only express their own opinion on the solution of the task, but also justify it. With the introduction of this method, students develop the skills of reasoned expression of their own opinions on the issue under discussion. Note that to facilitate the organization of work by this method and the simultaneous demonstration of one of the ways to use cloud services in the educational process, we can refer to the capabilities of virtual interactive whiteboards services (Padlet, LinoIt, Jambord).

The «*Brainstorming*» method should be introduced for collective discussion of a problem that requires non-traditional approaches. With the introduction of this

method, finding ways to solve a specific problem encourages students to make creative statements – suggestions for further discussion.

The introduction of the «*Circle of Ideas*» method is, in fact, the involvement of all students in the discussion during the general discussion of a particular issue. The result is a list of ideas. For example, one of the options for its application may be to organize the search for ideas on possible ways to use the Google Forms cloud service by a teacher in the educational process, taking into account the types of his professional activities (teaching, educational, organizational).

Collaborative learning (cooperative learning) is aimed at the formation of certain skills and abilities, mastery of concepts, academic and professional knowledge provided by the program [18, p. 100], is introduced to improve the skills of cooperation of group members. As an option, this method can be offered during the development and joint creation by students of an educational web quest, website or blog, using cloud services. The introduction of this method helps to develop students' skills to organize joint activities based on the principles of cooperation, to participate in it, to form in them the skills of joint interaction and teamwork, which is so important in future pedagogical activities. The use of this method contributes to the formation of group consciousness for the quality of the task.

Introducing the *method of problem-based learning*, provides consistent proposals to future teachers of problem situations of professional and practical orientation with the use of cloud services. The problem is a cognitive difficulty, to overcome which students must acquire new knowledge or make intellectual efforts [14, p. 119].

It should be noted that during the implementation of the *method with the use of cloud services*, students' interest in learning the material increases, there is an opportunity to organize both individual work and communication in small groups. Thus, in the process of introducing the method of problem-based learning in classes, students' interest in learning increases, there is an internal interest; cognitive activity of future teachers on mastering of cloud services and definition of possibilities of their service in the future professional activity becomes more active; students develop skills of self-study. In this way, students not only acquire

knowledge, but also revive activity, independence in gaining some experience. With the introduction of the above methods, students have the opportunity not only to learn to analyze the task, proposals, formulate their own opinion, draw conclusions and reason them, but also to get acquainted with the methods of using cloud services, including interactive virtual boards.

The *project method* is introduced to stimulate students' interest in mastering the necessary knowledge and skills to solve a particular problem. With the introduction of this method, cognitive activity is activated, creativity develops and at the same time certain personality traits are formed.

Having introduced the project method, we focus students on the awareness of current knowledge and the acquisition of new ones (in particular – self-education), a combination of classroom and independent extracurricular activities. According to this method, we always focus students on independent activities: individual, pair, group, which they carry out during a certain period [10, p. 145; 18, p. 121]. In general, a project activity is an effective way to collaborate on an agreed topic or issue.

When introducing this method in the process of professional training of future teachers to use cloud services in the educational process, you can offer students to create a personal learning environment or a variety of subject projects using different cloud services. The main task of the teacher in organizing the work of students on the project is to bring them to an understanding of how exactly you can use cloud services in the educational process. Working on the project, future teachers not only participate as its participants, but also get acquainted with the methods of organization and implementation of project-based learning using the capabilities of cloud services.

The introduction of this *method stimulates the interest of future teachers to work with cloud services*; communicative and creative abilities develop, skills of goal-setting, self-organization and self-education are improved; joint interaction while working with different cloud services, the ability to develop criteria for evaluating

projects, to represent the process and results of research. Students are also encouraged to comprehend their own educational and cognitive activities – reflection.

Continuing, we testify to the importance of introducing the *method of «web-quest»* in the process of preparing future teachers for the use of cloud services in the educational process. Its introduction is aimed at the implementation of independent cognitive, research, creative activities through a specially created by the teacher Internet resource.

Introducing a web-quest as a didactic structure, the teacher forms the search activity of students, sets the parameters of this activity and determines its time limit [16, p. 69–70].

When introducing the above method in the process of forming the professional readiness of future teachers to use cloud services in the educational process, it is important to offer students topics that would be concise and at the same time easy to remember, for example, «Clouds travel in the educational process of the school», «Clouds in the informatization of the school». Work on such web-quests contributes to: the formation of understanding of the role and innovative potential of web-quest technology in the educational process, the importance of designing their pedagogical scenarios; revitalization of students' cognitive activity, improvement of creative abilities, development of research skills and solution of practical problems; gaining knowledge about data protection and copyright, awareness of responsibility for their violation; formation of the ability to generate and implement ideas for the implementation of cloud services; formation of skills to critically evaluate the information obtained from the Internet and knowledge of methods of checking its reliability; developing teamwork skills (planning, division of functions, mutual assistance, mutual control); formation of skills to find several ways to solve problem situations, to determine the most rational option, to justify their choice; improving communication skills.

Continuing, we emphasize the importance of introducing methods of monitoring and analysis of student achievement.

With the introduction of the *method «web portfolio»* it is possible to organize the work of students to collect, systematize, represent and analyze the results of educational achievements (reports on laboratory work, individual and joint research and creative tasks, projects, etc.) on a specially created web resource. They reflect the educational and professional achievements, which is an indicator of the formation of a sufficient level of acquired competencies in students [7].

The main purpose of the student's portfolio is to track and account for academic progress, demonstration of his creative abilities, discipline, ability to focus on various aspects of their own professional activities. To create a web portfolio, it is advisable to offer students to use such cloud resources as: 1) <https://drive.google.com/>; 2) <http://blogger.com>; 3) <https://sites.google.com/>; 4) <http://www.youtube.com/>.

As we noted earlier [7], the introduction of this method gives students the opportunity to develop the ability to structure their own work, creatively and aesthetically represent their own achievements in terms of implementing cloud services in the educational process, to determine the progress of their own educational achievements. Such activities intensify creative activity, increase the level of ICT competence of students. When applying this method, it is possible to organize a space for reflection, self-assessment and self-analysis of students, to form a new culture of learning.

The next method is *reflection*. Its essence lies in the active personal rethinking by students of the content and results of their own activities. We agree with the statement of G. Dyagtyar that for successful learning the student must be able, aware of the essence and basis of the actions, reflexcialy assess their compliance with the purpose and conditions of activity and determine on this basis the most effective ways of learning [2, p. 1].

We emphasize the importance of involving students in reflective activities with the use of cloud services. Gives the opportunity to visualize the algorithms for the proposed tasks, as well as helps to ensure the interactivity of the educational process, the organization of joint assessment activities of future teachers. This encourages them to self-assess to determine the level of mastery of cloud services,

self-analysis of pedagogical activities for planning and using them in the educational process; self-control and self-regulation of determining ways to improve pedagogical activities with the use of these services. For such activity it is expedient to offer: services of virtual interactive boards, for example: Padlet, LinoIt, Poplet; Google cloud services (Docs, Spreadsheets, Presentations, Forms, etc.); Office 365 services; knowledge map services, such as Bubbl.us, etc. [6].

Concluding the description of teaching methods, we note that in the learning process we introduce other methods, including the following: storytelling, conversation, explanation, instruction, practical exercises. We will not characterize these methods.

Given that the concepts of forms and methods of teaching are almost always considered together, we turn to the characteristics of forms of teaching, the introduction of which will form the professional readiness of future teachers to use cloud services in the educational process.

It should be noted that in the process of professional training of future teachers to use cloud services in the educational process, it is advisable to introduce both classical and innovative forms of education.

Among the classic forms are: lectures, practical and laboratory classes, consultations and independent work.

Types of lectures such as mini-lecture, lecture-visualization, lecture-dispute and lecture «brainstorming» are important for our research. Let us briefly describe them.

In preparing future teachers for the use of cloud services in the educational process, we consider it appropriate to conduct a *mini-lecture*. Its essence, according to O. Bryukhovetskaya, is that it can be held at the beginning of any type of classroom lesson (seminar, practical or laboratory) for ten minutes on one of the topics of study [1].

The visualization-lecture provides a coherent, detailed commentary on the prepared visual materials, which fully reveals the topic of the lecture. Using such materials, the teacher provides a systematization of students' knowledge,

providing new information, creating problem situations and the possibility of solving them [12, p. 221]. The importance of the lecture-visualization is that working with different visualization (visual algorithms for working with different cloud services; videos, such as serving a particular cloud service for classes, etc.) increases the level of learning material. Students are able to comprehend it, they have a growing cognitive interest, they perceive the material more accurately, and, as a result, will learn it more successfully. In the learning process, it is important to show students a wide arsenal of cloud services, their interface, principles and techniques of working with them, and examples of their application in the educational process. It is advisable to provide illustrations of algorithms for working with a particular cloud service and methods of creating a variety of teaching materials, using services.

The lecture-dispute provides for the presentation of lecture material as an exchange of views and views on a specific problem. Applicants for higher education learn to express themselves logically, argue and convincingly prove and justify their own opinion on the topic being studied and at the same time acquire new knowledge [13, p. 209]. Thus, in the lecture-dispute the educational and cognitive activity of students is activated, and the teacher corrects collective thoughts. Its effectiveness depends on the organization and proper selection of questions for discussion. As an example, the following issues can be discussed: Cloud technologies in the educational process at school: advantages and disadvantages; Restrictive reasons for the active introduction of cloud technologies in educational practice; Possible options for using cloud services in educational practice; You are a young teacher. What cloud services can you use to improve student learning? etc.

For the development of creative thinking, the formation of skills of cooperation in the process of joint decision-making is important *lecture-brainstorming* as a kind of problem lecture. During the lesson, the teacher creates a problem situation and encourages students to find a solution. He monitors not only the correctness of the answer, but also the argument, and if necessary, he gives a detailed comment [1].

We agree with L. Zelenska that «today such a lecture is effective, during which the leading role of the teacher is combined with high student activity based on the use of modern innovative (interactive, multimedia, information) technologies» [20, p. 223]. In this context, in the process of studying topics related to the peculiarities of the introduction of cloud learning tools in the educational process, it is important for future teachers to give lectures using the capabilities of cloud services to solve a problem. The peculiarity of such classes is the involvement of students in active activities, the development of new information to solve the problem and the constant interaction with the teacher.

In our research, this is a *lecture with an analysis of specific situations*. During such a lecture, the cognitive activity of future teachers to analyze and compare the capabilities of cloud services and identify ways out of the situation identified by the teacher with their application is revived. This contributes to a more optimal involvement of students in the learning process, the lecture becomes more dynamic.

Continuing our research, we note that in the process of preparing future teachers to use cloud services in the educational process, it will be important to introduce such non-standard forms of organizing their education as webinars, video lectures, trainings and workshops. Consider their capabilities more thoroughly.

The webinar («online seminar», «virtual seminar») reproduces the conditions of a common form of classes of different types with the use of audio and video data exchange and joint activities of its participants, despite a certain distance between them [11].

The peculiarity of webinars is that all participants can actively interact with each other in defining tasks or discussing ways to perform them. Also, the organizer of the webinar (it can be both a teacher and a student) has the opportunity, if necessary, to organize the work of participants in groups, to monitor or adjust their activities. As an example, we held a webinar "Organization of control of students' knowledge in the cloud environment Google Classroom" and others.

Video lecture [8] provides a consistently thought-out audio presentation of educational material using the capabilities of modern software for processing video and audio information.

V. Ekhalov, K. Kushch and N. Khobotova express the opinion that their main advantage «is the practical visualization of the material and the impact on visual, sound, logical, associative and other types of memory, which provides maximum quality and motivation for the learning process» [19, p. 41]. In our case, the importance of video lectures lies in the effective organization of independent work of students in the process of studying the possibilities of using cloud services in the educational process.

Educational *training* in our study will be understood as purposeful, specially organized active interaction of teachers and students in the process of their professional training.

In the process of professional training of future teachers for the use of cloud services in the educational process, students can be offered a set of training sessions, united by a common theme «The use of cloud services in the educational process». Their purpose is to form in students a conscious perception of the requirements for the modern teacher in terms of the introduction of cloud technologies in the educational process; acquaintance with pedagogical and functional possibilities of cloud services; formation of information-technological knowledge and instrumental-technological skills, on which the teacher's activity is based on the organization of pedagogical interaction between the subjects of the educational process due to various cloud services. When developing tasks, it is necessary to demonstrate to students the real situations that arise in the pedagogical activities of the teacher, to solve which you can use cloud services [5].

Master class in our study is understood as a form of training to create conditions for future teachers to develop skills to work with a particular cloud service. From the point of view of L. Solomenko, the master class creates conditions for full identification and improvement of the skills of its participants in the space organized for professional communication with the exchange of work experience [17].

In the master classes it is possible to involve students in practical work as much as possible, they increase their interest in the proposed problems and motivation for further deepening of knowledge for its solution, their mental activity is activated. Such classes are aimed at reproducing and modeling activities, communicative relations [5].

As an example, during the organization of the faculty week, students can be invited to prepare and conduct various workshops: «Using virtual interactive whiteboards in educational work», «Assessment in Google Classroom», creating collages using various cloud services on «School of the Future» and more. Their implementation is based on the position «learn yourself – teach others». During such activities, students develop various skills of working with the audience and reflection, and participants – skills of working with the service, the ability to analyze and compare the opportunities with the capabilities of other services.

Continuing, we note that important forms of organization of educational activities in the process of preparing future teachers for the use of cloud services in the educational process are practical and laboratory classes. In practical and laboratory classes, students are offered such practical tasks, performing which students would be involved in real situations that arise in the pedagogical activities of the teacher, to solve which you can use certain cloud services. For example, in the practical lesson «Google Forms cloud service in the educational process: creating questionnaires, questionnaires, quizzes with multimedia content», we offer students to complete tasks for competitions, evaluation forms (eg, presentations), collecting statistical information about students in the class (gender, date of birth, information about parents, availability of benefits, attendance at clubs, etc.).

When organizing such activities, students develop the following skills: to study independently, to obtain and use information resources to solve problems that arise in everyday life and the learning process, to work in a team, to work on creative ideas.

Given that the feature of cloud services is their constant updating, students should be prepared for lifelong learning. This requires the skills of self-mastery of new material for further implementation in professional activities. Performing

independent work contributes to the expansion, consolidation and deepening of knowledge acquired during classroom activities; active acquisition of new knowledge, skills development; formation of ability to self-study; implementation of a creative approach to solving the problem.

To develop skills of independent work with various cloud services, students can be offered to master the capabilities of services for creating smart maps, interactive posters or videos, comics, e-books and more. The peculiarity of such tasks is that future teachers must learn to work with the proposed services without the instruction of the teacher. Performing the task, they must not only determine for themselves the strategy of mastering the principles of working with a particular cloud service, but also to determine the possibilities of their application in the educational process, to propose an appropriate methodology.

Continuing our research, we will focus on the characteristics of the necessary learning tools.

In the educational and pedagogical literature, the means of teaching is understood as «a set of objects, ideas, phenomena and methods of action, due to which the educational process is realized» [3, p. 111]. Among this set, methodologists consider models, models, textbooks and manuals, technical, computer and electronic teaching aids, and so on.

In our study, we will focus on cloud learning tools, by which we mean cloud services used in various types of educational activities to solve specific educational problems.

In our study, we propose to use the following groups of cloud services:

- data storage services (Google Drive, One Drive тошо);
- services for creating postcards, resumes, movies, cartoons, online games (Canva, PownToo, LearningApps, ClassTools.net, WeVideo тошо);
- planning services for teachers and students in the educational process (Google Календар, Google Keep, Trello тошо);
- collaboration services (Google Docs, integrated office applications (Documents, Spreadsheets, Presentations, Forms), Google Site, Google Classroom; virtual interactive whiteboards (LinoIt, Padlet, etc.); Zoom, Hangouts, etc.);

- information visualization services (services for creating mental maps (Bubbl.us, Cacao, Mindomo, FreeMind, etc.), interactive posters (Glogster, H5P, etc.), e-books (Storyjumper, Ourboox, etc.), comics (Pixton, ToonDoo and others)) etc.);

- services for creating didactic tools (Kahoot, Quizizz, etc.); services for creation and filling with the developed didactic materials of the educational and information environment in the form of a blog or a site (Blogger, Google Site).

Conclusion. So, concluding, we state:

1. In selecting methodological tools for the training of future teachers to use cloud services in the educational process, it is advisable to adhere to such principles as: the principle of visibility (demonstration of cloud services websites, their interface, examples of educational materials developed by means of cloud services, created educational and information environments is provided); *the principle of support* (the student realizes the place of the studied phenomenon in the general system of knowledge, he has an idea of a holistic picture of the possibility of implementing cloud services in future professional activities); *the principle of practical (professional) orientation* (is realized by performance by students in the course of training of a complex of professionally oriented tasks with application of cloud services); *unity of individual and group approach* (is realized by the organization of educational activity of students during performance of various projects, both individual, and group); *consciousness and activity in learning* (learning to use the capabilities of cloud services in the educational process with the introduction of active learning methods).

2. Among the methods of teaching future teachers to use cloud services in the educational process, we consider the most effective: stimulating the motivation of educational activities («Press-method», «Brainstorming» method, «Circle of ideas», collaborative learning); problem statement (problem learning, project method; webquest); monitoring and analysis of students' academic achievements (portfolio, reflection). Among the forms of organization of the learning process leading in our study will be considered classical forms (lectures: introductory, mini-lecture, lecture-visualization, lecture-dispute and lecture brainstorming

«brainstorming», practical, laboratory, seminars, consultations and independent work), as well as innovative (webinars, lectures with analysis of specific situations, video lectures, training and master class).

3. In the process of professional training of future teachers to use cloud services in the educational process, it is important to use cloud learning tools. Among their significant number are important virtual interactive whiteboards, work with which in the process of preparing future teachers to use cloud services in the educational process will contribute to the formation of students' search, research, communication, reflective skills, collaborative skills; will stimulate their cognitive interest; will bring up responsibility for joint results.

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УПРОВАДЖЕННЯ ЕЛЕМЕНТІВ ДИСТАНЦІЙНОГО НАВЧАННЯ ПРИ ВИКЛАДАННІ МАТЕМАТИЧНИХ ОСВІТНІХ КОМПОНЕНТІВ

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У статті піднімаються питання зниження рівня знань здобувачів освіти з математичних освітніх компонентів, розглянуті основні напрями впровадження на заняттях елементів дистанційного навчання з урахуванням математичної специфіки. Перший блок впровадження елементів дистанційного навчання при викладанні математичних освітніх компонентів – це залучення здобувачів освіти до роботи з освітніми онлайн-платформами, зокрема

