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Применение облачных сервисов для активизации информационного взаимодействия при электронном обучении для повышения качества образовательных результатов

Проблема и цель. Новые вызовы и требования общества, государства к системе электронного образования обуславливают необходимость формирования у обучающихся навыков активного информационного взаимодействия и познавательной деятельности в цифровом пространстве. Авторы предлагают для организации учебного процесса, интеграции и коммуникации участников e-learning, расширения дидактического инструментария и повышения качества подготовки выпускников в электронной образовательной среде, использовать облачные сервисы.

Методы исследования. В качестве основных методов применяются теоретико-методологический анализ и обобщение фундаментальных научных работ по проблеме исследования, обработка результатов контрольных мероприятий и контента облачного сервиса Google Classroom (назначенные задания, объявления, инструкции, ссылки на дополнительные ресурсы). В педагогическом эксперименте задействованы 52 обучающихся (45% девушек и 65% юношей) из юридического института Вятского государственного университета. В качестве метода статистической обработки используется критерий знаков G.

Результаты. Сформулированы особенности организации электронного обучения в цифровой школе для активизации информационного взаимодействия на базе применения облачных технологий через сервис Google Classroom: интеграция обучающихся и преподавателей в единое информационно-образовательное пространство, расширяющее возможности обучения и коммуникации; «синхронизация» учебно-познавательной деятельности в разных цифровых ресурсах; ориентация контента сервиса на особенности восприятия современного обучающегося, возможность работы в формате мобильных приложений активизирует познавательный интерес, поддерживается исследовательская деятельность и коммуникативная практика. Полученное в ходе эксперимента эмпирическое значение $G_{\text{emp}} = 3 < G_{\text{cr}} = 10$ (для $p = 0,01$) подтверждает, что сдвиг в сторону повышения качества образовательных результатов после применения облачного сервиса Google Classroom является не случайным.

Заключение. Использование облачных сервисов при организации информационного взаимодействия в системе электронного обучения позволит повысить качество образовательных результатов при обеспечении комплекса условий: активизация познания, подключение обучающихся к информационному взаимодействию новыми способами, расширению границ образовательной среды, видоизменение ролей участников дидактического процесса, применение мобильных приложений.

Ключевые слова: образовательная среда, цифровые технологии, информационные ресурсы, коммуникация, мотивация, познавательная активность, Google Classroom

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The use of cloud services to enhance information interaction in e-learning to improve the quality of educational results

The problem and the aim of the study. New challenges and requirements of society and the state to the e-education system necessitate the formation of students' skills for active information interaction and cognitive activity in the digital space. The authors propose to use cloud services for organizing the educational process, e-learning participants integration and communication, expanding didactic tools and improving the quality of graduate training in the electronic educational environment.

Research methods. The main methods are theoretical and methodological analysis and generalization of fundamental scientific works on the research problem, processing of the results of control events and the content of the Google Classroom cloud service (assigned tasks, announcements, instructions, links to additional resources). The pedagogical experiment involved 52 students (35% of girls and 65% of boys) from the Law Institute of Vyatka State University. The G sign criterion is used as a statistical processing method.

Results. The features of the organization of e-learning in a digital school have been formulated to enhance information interaction based on the use of cloud technologies through the Google Classroom service: the integration of students and teachers into a single information and educational space, expanding the possibilities of learning and communication; "synchronization" of educational and cognitive activities in different digital resources; the orientation of the service content to the peculiarities of the modern student's perception, the ability to work in the format of mobile applications activates cognitive interest, research activities and communication practice are supported. The empirical value $G_{emp}=3 < G_{cr}=10$ (for $p=0.01$) obtained during the experiment confirms that the shift towards improving the quality of educational results after using the Google Classroom cloud service is not accidental.

Conclusion. The use of cloud services in organizing information interaction in the e-learning system will improve the quality of educational results while providing a set of conditions: enhancing cognition, connecting students to information interaction in new ways, expanding the boundaries of the educational environment, modifying the roles of participants in the didactic process, and using mobile applications.

Keywords: educational environment, digital technologies, information resources, communication, motivation, cognitive activity, Google Classroom

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Introduction

The ongoing process of digitalization of education, as substantiated by S. Zenkina, T. Suvorova, O. Pankratova, L. Filimanyuk, makes special demands on improving the methodological system of e-learning [1]. Digital technologies, interactive resources, educational gaming platforms, cloud services appear in the arsenal of mentors [2]. However, in a digital society, not only are the means of presenting and processing information are changing, but the very way, the style of interaction between participants in the information process is changing. In the context of the formation of health-preserving practices, more and more people, including students, communicate through gadgets and social networks, preferring digital interaction to live dialogue between people [3]. This means that the development of the information environment of educational institutions should involve the use of new developments in the field of digital technologies, such as, for example, cloud services CoCalc, ISpring, Geenio, Google Classroom [4]. Their use, according to A. V. Bogdanova, V. F. Glazov, A. A. Korosteleva [5], contributes to the solution of problems of supporting motivation and involvement of students, enhancing knowledge, inclusion in collaboration and monitoring attendance. New digital technologies, as noted by S. D. Karakozov, N. I. Ryzhova [6], have a positive effect on the quality of educational results, increase the socio-economic stability of society, while taking into account the long-term experience of the traditional methodological system of Russian full-time education. In addition, the functions of teachers are changing: they, like students, must adapt to new teaching methods. The role of the digital school mentor, according to V. M. Moroz, V. P. Sadkovy, V. M. Babaev, S. A. Moroz, is now to a greater extent to guide students, help them learn and self-develop, manage information interaction [7]. E-learning should not be limited to listening to the theoretical material, solving problems according to instructions, but involves the intensive use of cloud services for interactive communication between all participants in the didactic process. U. S. Zakharova, K. I. Tanasenko note that a future graduate of a digital school should be immersed in an environment of like-minded people focused on a deeper understanding of the subject of study [8].

In world science, at a sufficiently detailed theoretical level, the didactic potential of using e-learning technologies has been identified and confirmed, effective forms of organizing classes using digital tools and cloud services have been worked out. N. Selwyn, L. Pangrazio, S. Nemorin, C. Perrotta distinguish the Learning Management System technology as one of the trends in e-learning, which is a learning management system [9]. Many tutors use cloud services primarily to deliver teaching material, using similar styles for each course: a block of information followed by a short test [10]. As a result, students perceive working with information resources in e-education as a routine, and not as a portal for interaction, gaining new skills and acquiring valuable knowledge.

Thus, there is an objective problem, which is expressed in the need to implement the capabilities of modern electronic educational resources and cloud services to motivate, involve students in active learning, improve the competencies and skills demanded by the digital society by expanding the ideas of teachers about tools for supporting information interaction and managing the activities of participants in didactic process in e-learning. So, the aim of the work is to study the features of e-learning organization in a digital school based on the use of cloud services to enhance information interaction. The research hypothesis is

that the use of cloud services in organizing information interaction in the e-learning system will improve the quality of educational results.

Materials and methods

The methodological basis for studying the effectiveness of the use of cloud services in e-learning to improve the quality of educational results is the main provisions of the system-activity approach. The system-activity approach makes it possible to implement the methodological ideas, that organizational management and control over the results of e-learning contribute to the assimilation of knowledge by the subject of cognition and the methods of his activity, through the inclusion of active forms of information interaction in the solution of educational and cognitive tasks [11]. The system of activity is considered in the cloud environment in the following ways: the use of cloud service tools by a teacher to provide material; the use of functional of the technology by students in cognitive activities; the organization of interaction between teachers and students that organizational management and control over the results of e-learning contribute to the assimilation of knowledge by the subject of cognition and the methods of his activity, through the inclusion of active forms of information interaction in the solution of educational and cognitive tasks. The communicative approach as a research method allows:

- define the functions of e-learning participants in the research tool environment – the Google Classroom cloud service;
- describe the conditions for the implementation of information interaction with the service, highlighted by I. N. M. Shaharane, J. M. Jamil, S. S. M. Rodzi [12]: electronic document flow between teachers and students, allowing to streamline the process of exchange of educational and organizational information (for example, setting a topic for general discussion, posting news, announcements, offers; the ability to conduct a quick test of knowledge by creating surveys using Google forms; joint teaching of the course by inviting other teachers).

In the study, to diagnose the quality of educational results, taking into account the provisions of the personality-oriented approach, the evaluative functionality of the Google Classroom cloud service is used: the problem of “forgetting a task for independent completion” is solved; the opportunity to indicate the timing of work is realized; tools are used not only for assigning marks, but also for commenting them in real time, etc.

Empirical methods (observation, analysis of problem solving, performing independent and homework assignments, intensity of information interaction) were used to obtain relevant information about the quality of educational results: assimilation of the concepts of the topic, methods of solution, presentation of results, argumentation of answers, etc. The experimental check was carried out within the framework of teaching the discipline "Legal Informatics" for the educational program of higher education in specialty 40.05.02 Law enforcement (specialist level) on the basis of the Law Institute of Vyatka State University (Kirov). The study involved first-year students, the average age of the respondents was 20 years. A total of 52 students took part in the experiment (35% of girls and 65% of boys). Information interaction using the content of the Google Classroom cloud service does not impose special requirements for software and hardware, and allows the use of both a computer and other gadgets, mobile devices. The G sign criterion was used as a statistical processing method [13].

Literature review

J. A. P. Bato, D. E. Marcial note that the development of e-learning [14] is one of the trends in the world educational policy. In the work of U. S. Zakharova, K. I. Tanasenko various aspects of e-education, problems and prospects of distance learning are investigated [8]. N. Selwyn, L. Pangrazio, S. Nemorin, C. Perrotta define the trends in the digital school and the correspondence of the e-learning system to these trends [9]. Scientists identify as priorities: mobile technologies, cloud services, gamification of education, video conferencing, cybersecurity, expanding the educational space outside the classroom. N. V. Busarova, T. K. Reshetina study the issues of network interaction, the processes of formation and development of a single educational space [15]. S. Seok, B. DaCosta, R. A. Hodges conduct a systematic analysis and substantiate the need for comprehensive adaptation to global realities and new approaches to e-learning. The authors analyze the reasons why some educational institutions introduce e-learning into their practice, while others refuse it [16]. T. B. Makarova, D. A. Makarov identify the problems of using cloud technologies in higher education and formulate methodological features of filling the relevant information resources for e-learning [17]. M. Marienko describes the didactic potential of cloud services for the training of specialists in demand, highlighting the forms of collaboration and information interaction [4]. With the introduction of new health-saving practices, educational institutions are massively switching to e-learning, which requires a global restructuring of the entire didactic process and information interaction between its participants. However, reviews and surveys of experts indicate that many of the students, parents and teachers discredit the format of e-education. Among the actual reasons are the unsatisfactory quality of the content of the educational material, a decrease in cognitive interest, research activity of students, a lack of communicative practice, the intensity of information interaction, etc. As T. Dean, A. Lee-Post, H. Hapke substantiate, it is the intensive communication between the participants in the educational process that qualitatively transforms e-learning [18]. The authors consider strategies and methods for enhancing information interaction between participants in the didactic process. They say that management effectiveness is determined by three factors: the time allocated for training; the involvement of students and the choice of the method of influence. Summarizing their conclusions, we conclude that there are many methods and ways of influencing a person, but there is a general global tendency to increase scientific interest in research on technologies of influence at the level of interpersonal relationships.

The intensification of interaction leads to an increase in the quality of educational results. S. E. Bahji, J. Alami, Y. Lefdaoui identified the following didactic opportunities arising from the use of digital resources: immediate feedback between the user and the software, “defining the implementation of an interactive dialogue; visualization of educational information about the studied object, process” [19]. In the opinion of N. V. Busarova, T. K. Reshetina [15], cloud services are very effective in terms of supporting motivation and involvement of students, enhancing cognition, engaging in collaboration and monitoring attendance. The authors note that teachers who love their subject will not always be able to interest a modern student (overloading with fundamental concepts and laws, focusing only on a specific curriculum without variability in the pace of work, limited communication channels). The use of cloud services makes it possible to organize at a high-quality level in the e-learning system:

- immediate feedback between the user and digital tools, determining the implementation of the interactive dialogue;
- to visualize educational information about the studied object, process (visual representation on the screen: an object, its constituent parts or their models; process or its model; graphic interpretation of the studied pattern, the studied process);
- to simulate and interpret information about the studied or investigated objects, their relations, processes, phenomena - both real and virtual (presentation on the screen of a mathematical, descriptive, visual model adequate to the original);
- to perform archiving, storage of large volumes of information with the possibility of easy access to it, its exchange, replication;
- to automate the processes of computational, information retrieval activities, as well as processing the results of an educational experiment with the possibility of multiple repetition of a fragment or the experiment itself;
- to automate the processes of information and methodological support, organizational management of educational activities and control over the results of assimilation, which includes automation of design, operational planning and management of the educational process in an educational institution, automation of information activities and information interaction between participants in the educational process using local and global computer networks.

In addition, interaction through cloud technologies allows you to move away from the authoritarian style of communication, remove the temporal and spatial limitations of the traditional class, etc. The most popular of them (Class Dojo, ClassCraft and Google Classroom) are reviewed and analyzed by E. V. Soboleva, N. L. Karavaev [2]. In the global practice of e-education, the Google Classroom cloud service is an effective way to improve the efficiency of information interaction when modern digital technologies are included without special game content [11]. Google launched this application in 2014. According to R. A. S. Al-Marooof, M. Al-Emran, Classroom is an online learning resource that allows you to work with mail, storage and documents [20]. The class can be used from a mobile device. The service helps to quickly organize a lesson, make announcements and communicate with students. Google Classroom is available in Russian and 42 other languages. The application also allows you to create a class and add students to it. A code is generated for each class, which students can use to join the community. Using this online resource, J. Amantha, B. Bervell, S. Osman noted the following features: integration with Google Drive; the ability to specify the deadline for the completion of the work, set the assessment scale tracking the delivery of work, put preliminary marks and add comments; the ability to add colleagues to your class; the ability to assign an individual task for the student; systematization of courses and work schedule in Google Calendar; function of quick quizzes [21]. Thus, Google Classroom has a simple and user-friendly interface, but unlike ClassDojo and ClassCraft, the service lacks game components (glasses, badges, leaderboards, etc.) [15].

Another advantage of this cloud service, noted by M. I. Wan, A. R. Wan, A. I. H. Suhaimi, N. Noordin, A. Harun, J. Ismail, R. The [22], is the ability to use both on a personal computer and on a mobile device. This practice, according to L. Abazi-Bexheti, A. Kadriu, M. Apostolova-Trpkovska, E. Jajaga, H. Abazi-Alili, meets the needs and interests of both higher education itself and modern students [23]. The specifics of each lesson in e-learning will be determined by the capabilities of the cloud service, the teacher's individual experience, the level of theoretical and practical training of specific students, the characteristics of a particular discipline, etc.

Research program

The main aim of the experiment was to test the didactic potential of the Google Classroom cloud service, firstly, to form of knowledge, methods of activity and experience in solving information problems, i.e. to improve the quality of e-learning in terms of mastering the tools of intellectual work; secondly, to support the achievement of the level of competencies, styles and qualities of thinking demanded by the digital society.

At the preparatory stage of the experiment, a general assessment of the existing level of theoretical knowledge, skills in solving information problems (ability to analyze, compare, classify), practice of arithmetic-logical activity and work with information resources was carried out. As part of the control event, the students were offered three tasks: a reproductive task (to create an information resource, restrict access rights, protect information according to the disassembled algorithm); a task requiring the transfer of knowledge (on the choice of the optimal method for protecting information, the use of information search algorithms), and a research task (to classify legal information, information technology and information systems on various grounds). Thus, it was possible to collect experimental data on 52 students. The sample was not random. The experimental group included 35% of girls and 65% of boys, which is due to the demographic characteristics of the recruitment of that period.

Further, at the formative stage of the experiment the teacher conducted methodological work with all participants of the didactic process to master the functionality of Google Classroom. To organize the educational process in the e-learning format and the constant access of students to information, course materials, the mentor posted a resource and posts about the activity plan corresponding to the current topic of study. Google Classroom was used for individual work with students: to exchange personal messages, to formulate personal tasks, to correct errors found in a completed assignment, etc. With the help of Google Classroom students published the results of their research projects, problem solutions, a glossary on the topic, overview of information resources, etc.

The mark "excellent" or "5" was given when the student showed systematized, deep and complete knowledge in the section "Information Society and Legal Informatics", applied the terminology correctly; guided in the concepts, legal methods of information protection, reference and legal resources and gave them a critical assessment; showed elements of creativity and independence in his work; stylistically competently, correctly and exhaustively answered all additional questions.

The mark "good" or "4" corresponded to those cases when the student had deep, but not always systematized knowledge on the topic; knew the terminology and features of legal informatics; was guided in the concepts, methods of information protection, reference and legal resources, but could not give them a critical assessment; in most of the work showed elements of creativity and independence; adhered to the aims and objectives of educational and cognitive activities proposed by the teacher; answered most of the additional questions competently and logically correct.

The mark "satisfactory" or "3" was given for works in which the students showed an insufficient amount of knowledge on the topic; used the terminology of legal informatics, but could not always answer additional questions on an independent assignment; could not navigate in the concepts, methods of information protection, reference and legal resources;

made fundamental mistakes when developing documents, differentiating access rights; made substantive and logical mistakes when registering the results of the study; violated the design requirements.

If the students showed only fragmentary knowledge in the section "Information Society and Legal Informatics", could not use terminology, could not answer additional questions, could not explain the findings, showed dependence in the application of methods of legal informatics and information protection, made gross mistakes in the design, then the teacher put the mark "unsatisfactory" ("2") for the work.

Research results

Summarizing the results of the practice, we conclude that the peculiarity of interaction using the cloud service Google Classroom is that Google Class is available to all users who have their own Google account. You can go to Google Classroom using the main menu in your browser. Further, the system offers to choose the status of a student or a teacher. When choosing the second choice, the mentor gets the opportunity to create a new course. In the window that appears, the characteristics of the course are set: title, section, subject, audience, after which the tabs become available: ribbon, tasks and users (see Fig. 1.).

Figure 1 An example of working in a service: interface and content

The Stream page displays all assignments and announcements that the instructor will publish to students. When creating a new announcement, the teacher can post it immediately after writing, indicate the date of its appearance in the stream, or save a draft announcement and finish later. If the initiator permits, some students will also be able to publish the announcement to the stream. In the Stream menu, in the "Upcoming" section, all users will see the tasks to be completed and their due dates.

The Classwork page supports the content of the course. Using the Create button you can create assignments, questions, post any material, set course topics. All uploaded material is placed into the "Classroom" folder on Google Drive, which is the same for all course

participants. A link to the added content is displayed at the Stream page. When creating an assignment, you must enter the title of the assignment in the dialog box, if necessary, enter the instructions for implementation. You can also add a topic name, set the number of points for completing this assignment, add a due date or time and publication date at the Stream page. It is also possible to attach additional information to the assignment: file, video, link to an Internet resource. Similarly you can create questions, announcements and reuse assignments (including from another course). The assignment can be posted both for all students, and for a group or one person. In this case, a notification about the task will be sent to e-mail. The created assignment will appear in the Stream page. A link to it will lead to a window with this assignment.

After the primary information on the course is ready, you need to invite students to it using the People page. This can be done either by entering the email addresses of everyone whom the teacher wants to invite in the "Students" section, or by sending them a class code that is automatically assigned upon creation (which can be found later in class settings). In the second case, participants are added to the class on their own. Similarly, you can invite other teachers to the class. There are some restrictions on the number of participants in each class. So, the class should have no more than 20 teachers and no more than 1000 participants (students and teachers). In the future, using People page, you can manage actions with users: send a letter to a specific user or block communication with a student (ignore).

After the student completes the assignment and sends the answer in the form of a file, the teacher can start checking the students' work. To do this, you should organize the transition to the assignment and open the section "View assignment". Next, you need to select a student from the list, look at the work and give a grade (see Fig. 1.). The system displays the number of assigned, turned in, graded and returned works. In order for the student to receive a notification about the check and the grade, it is necessary to press the "Return" button, along the way the teacher can comment on the work. This process of assessing the work covers all students in the group, even if such was absent from the lesson for any reason. Students and teachers can track the due dates for assignments and assigned activities in the Class Calendar. Thus, the GoogleClass service can be considered one of the modern ways of integrating students and teachers into a single information and educational space, which expands the possibilities of learning and communication. The functionality of Google Classroom can be applied to any type of class and to any form of study. A wide range of tools in Google Classroom allows you to intensify information interaction between participants in the educational process in e-learning. At the same time, the use of Google Classroom does not set the task of fundamentally changing the existing e-learning technologies, but only making minor adjustments to them [24].

In the experimental work, thanks to the Google Classroom service, the possibility of organizing constant feedback in e-learning was implemented to activate information online interaction in the following educational and cognitive situations: with an introduction to Legal Informatics as a branch of general informatics and applied legal science; when applying methods of Legal Informatics to study its objects; when solving problems of a professional nature and a variety of ways to present them.

Using the functionality of the application, the basic concepts of the topic, the historical and legal aspects of digitalization of society, methods of protecting information (including legal ones) were studied. In the digital environment, the practice was implemented to safely search for information, create your own information resources, grant access rights,

use information protection methods, classify reference and legal systems, study modern threats of theft, violate data integrity, etc. The activity on the use of digital technologies in the development and examination of law enforcement acts was supported with the described functionality. In addition, the content of the cloud service allowed the teacher to activate knowledge, increase involvement in solving professional problems, using posts and messages to select the most appropriate search method, provide access, and protect information.

At the fixing stage of the experiment, a repeated measurement was carried out, also containing three tasks designed according to the principle described earlier. In the course of studying the topic using the Google Classroom service both individual and team work were organized. To check the improvement in the quality of e-learning, the criterion of G signs was used which makes it possible to assess the random / non-random nature of changes in the skills and abilities being formed. The measurement results before and after the experiment are presented in Table 1.

Table 1

Measurement results at the beginning and end of the experiment

Num.	Mark at the beginning of the experiment	Mark at the end of the experiment	Shift	Num.	Mark at the beginning of the experiment	Mark at the end of the experiment	Shift
1	2	3	+1	27	4	5	+1
2	3	4	+1	28	4	5	+1
3	3	4	+1	29	4	5	+1
4	2	2	0	30	4	5	+1
5	4	5	+1	31	4	3	-1
6	5	4	-1	32	4	5	+1
7	2	3	+1	33	2	2	0
8	3	4	+1	34	4	5	+1
9	3	4	+1	35	4	5	+1
10	2	2	0	36	4	5	+1
11	3	4	+1	37	4	5	+1
12	3	4	+1	38	2	2	0
13	3	4	+1	39	4	5	+1
14	3	4	+1	40	4	5	+1
15	3	4	+1	41	5	4	-1
16	3	4	+1	42	3	4	+1
17	5	5	0	43	3	4	+1
18	2	2	0	44	2	2	0
19	5	5	0	45	3	4	+1
20	4	5	+1	46	3	4	+1
21	5	5	0	47	3	4	+1
22	4	5	+1	48	3	4	+1
23	4	5	+1	49	3	4	+1
24	2	2	0	50	2	2	0
25	5	5	0	51	3	4	+1
26	5	5	0	52	2	2	0

According to the table, we have 14 "zero" (discarded shifts), 35 "positive" (typical shift), 3 negative (atypical) shifts. The essence of the methodology assumes that only positive and negative shifts are taken into account, and zero ones are excluded. The calculation was carried out using an online calculator (<http://www.infamed.com/stat/s03.html> [13]) and using special tables. Let us formulate a hypothesis:

H_0 : the shift in improving the quality of online learning outcomes following the Google Classroom cloud service is accidental.

H_1 : the shift in improving the quality of educational outcomes after using the Google Classroom cloud service in e-learning is not accidental.

Analyzing the values according to the table of G signs and the data of online calculations, we find that for $n = 35$ (according to the number of "typical" shifts) and the calculated $G_{emp} = 3$ and the critical statistical value from the tables, the following is true: $G_{emp} = 3 < G_{cr} = 10$ (for $p=0.01$) и $G_{emp} = 3 < G_{cr} = 12$ (for $p=0.05$). Since $G_{emp} < G_{cr}$, the hypothesis leans towards the alternative hypothesis H_1 , i.e. the shift in improving the quality of educational results after using the Google Classroom cloud service in e-learning can be considered not accidental.

Discussion

The results obtained expand and supplement the conclusions of I. N. M. Shaharane, J. M. Jamil, S. S. M. Rodzi [12] in relation to the organization of information interaction in the e-learning environment for the system of higher education. In addition, it was possible to confirm the position of the work of E. V. Soboleva, A. N. Sokolova, N. I. Isupova, T. N. Suvorova [11]: with the activation of information interaction in the context of e-learning, the functions and roles of the teacher and students are modified partially, and sometimes completely. The teacher's activity takes on new shades. In particular, the teacher's role is becoming less authoritarian. As practice has confirmed, this is supported by the ability to work with Google Classroom through a mobile application. The result is in line with the global trend, formulated in the study by M. I. Wan, A. R. Wan, A. I. H. Suhaimi, N. Noordin, A. Harun, J. Ismail, R. The [22], that mobile learning is the dominant mode for online education. Interaction in the Google Classroom cloud service meets the interests of today's young people, their expectations: such learning is "synchronized" with their lifestyle. In practice, the teacher was able to realize the possibility of each individual student passing a personal trajectory. The participants themselves determined the pace of online learning, tracked their results.

Summarizing the results of the experimental work, we reasonably conclude that the teacher has more opportunities for a creative approach to the educational process. Cloud technology frees the digital school mentor from routine operations, allowing him to focus on helping learners. For example, if in traditional teaching the teacher spent time checking the students' knowledge in writing, now he gets the opportunity to automate and synchronize this process. A temporary resource for the correction of students' knowledge, correction of errors appears. The activities of students are also undergoing a number of changes. The experiment revealed that the process of mutual assistance of the group members is intensified when performing collaboration. When accompanying cloud services, students have the opportunity to interact with each other at a qualitatively different level. On the example of the sections "Information

Society and Legal Informatics", students independently used cloud data storage, organized channels of information exchange among themselves, jointly performed group assignments. The study of methods of legal protection of information made it possible to get deeper, fundamental knowledge using a variety of information resources at the stage of performing independent assignments. During the development of information search algorithms, creating documents, methods of restricting access rights, using reference and legal systems, the percentage of research work performed by students has significantly increased. As the experiment proved, this also contributed to the development of in-demand skills, the ability to plan and organize their work, the formation of basic supra-professional competencies.

Conclusion

Based on the analysis and generalization of the possibilities of digital resources for e-learning, priorities in the development of information technologies and tools, the authors reasonably highlight a promising direction in the new educational realities - the use of cloud services to support information interaction of participants in the didactic process. For the successful implementation of the proposed areas of information interaction based on a cloud service in e-learning to improve the quality of educational results, it is recommended:

- to pay special attention in the presented learning format to the process of creating and solving problem situations that take into account the interests of students;
- to include in educational and cognitive activities work with information resources, mobile technologies;
- to create and maintain safe information digital environment for the development of a system of significant social and interpersonal relations, value-semantic attitudes;
- to support the formation of skills in action planning, self-criticism and self-analysis, development of skills in project activities, management of an individual educational trajectory;
- to include assignments for professional self-determination in educational and cognitive activities to obtain professional and supra-professional competencies in demand by the digital society;
- to use the capabilities of cloud technologies not only for motivation, but also for the study of theoretical concepts, fundamental scientific laws.

The Google Classroom application is used as a cloud service to support e-learning, the didactic potential of which has been confirmed by world scientific research. An important pedagogical condition for the effective use of Google Classroom is the necessary modification of the activity and role of the teacher and students. The effectiveness of the proposed approach was confirmed by a pedagogical experiment, during which educational results were assessed, firstly, through a control event, and secondly, on the basis of the intensity and quality of information interaction between e-learning participants analysis. The results can be used to improve the methodological system of e-learning, improve the quality of education in a digital school by enhancing information interaction not only between teachers and students, but also with parents and school administration in the new social and environmental conditions.

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