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# The Construction of Educational-Methodical Complexes in the Information and Educational Environment on the Basis of Cloud Technologies

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**ABSTRACT**
The article considers the informational educational environment based on cloud technologies that underlies the implementation of the strategy for the development of the information society in Russia, which allows organizing various types of interaction between student and teacher, student and student, the educational process organizer with students and teachers. Cloud technology is data processing in which computer resources and capacities are provided to the user as Internet services in the cloud services market. In the context of the development of modern promising cloud technologies, the authors proposed a scheme for providing a networked educational process based on virtual representation. To realize all the capabilities (of the service) of virtual representation provided by a student in organizing a network educational process with remote access, a network educational and methodological information complex (SUMIK) has been developed. As part of the online learning process, the service "1C: Enterprise 8 via the Internet" is proposed. The article describes the experience of its use to provide an automated information system for collecting and analyzing statistics of the learning process.
***Keywords:*** *information and educational environment, information technology, cloud technology, 1C: Enterprise 8 platform, services, trends, e-education, electronic educational resources*

## 1. INTRODUCTION

The Decree of the President of the Russian Federation dated 05.09.2017 No. 203 defines the goals and objectives of creating a strategy for the development of the information society in the Russian Federation for 2017-2030, aimed at the use of information and communication technologies and the formation of a national digital economy. Among the many tasks that determine this strategy, V.V. Putin called cloud computing that provides ubiquitous and convenient access via the Internet to a common set of configurable computing resources (the "cloud"), storage devices, applications and services that can be quickly provided with minimal operating costs [1].
It should be recognized that today many factors change our life day after day, including the rapid development of the high-speed Internet, creating a new cultural space with its own language, with holding and rapidly changing publicly available information of gigantic volume in world information flows. There is an expansion of the mobile coverage area and devices, as well as tendencies of cheaper and multifunctional gadgets. The growth of the information industry indicates the need to analyze the latest technologies through the prism of educational activity. In this regard, despite the ongoing qualitative changes in the knowledge space, it is important to train students to rank the information that underlies fundamental scientific knowledge. There is no doubt that the modern model of education should be built taking into account the ongoing information acceleration and forecast, taking into consideration the future development of society. In the works of both domestic and foreign researchers [2; 3; 4; 5; 6; 7] it is emphasized that under the conditions of a gigantic amount of knowledge, mixing of different types of information, types of knowledge and methods of their interaction in single information flow is observed, therefore, the ability to not only determine the area of significance and insignificance in it, but the ability to operate with knowledge-information is crucial. Analyzing the specifics of educational activities against this background, we can note several possible areas due to which cloud technologies are actively being introduced into the field of education:

- the world in the clouds - learning in the clouds;
- mobile gadgets, as a tool in almost all spheres of human life, including education;
- cloud services provide an opportunity to organize effective infrastructure management, serve various user groups within the same cloud.

At the same time, it is important for all scientific pedagogical communities to clearly determine: how to use cloud technologies in the educational process? Remote use services of data processing and storage tools allow access to various information resources with the separation of the rights of various user groups in relation to resources from any device with Internet access. They form the information and educational environment (IEE). IEE is the most important condition and at the same time a means of forming a new education system, they help to increase the rate of assimilation of educational material, as a whole they have a positive effect on the quality of education, and they can significantly personalize the educational process. Increasing the effectiveness of pedagogical activity is carried out everywhere by expanding the possibilities of using both teachers and students of modern information technologies that contribute to the formation of various competencies, including information and communication [8].

That is why the purpose of this study was to consider the influence of building educational-methodical complexes based on cloud technologies on expanding the possibilities of using cloud technologies in the educational information environment of the university.

## 2. METHODOLOGY OF THE STUDY

The methodological basis of the study consists of leading positions and ideas: in the field of development and application of information and educational environments; works devoted to the implementation of information and communication technologies in the pedagogical process; works on the development of a unified educational information environment; development of Internet technologies, in the direction in education e-learning, including both the management of information transfer and knowledge control.

The following research methods were used to solve the tasks and verify the initial assumptions: analysis of the existing regulatory documents of the Russian Federation that determine the development of information and communication technologies in educational activities in the era of the digital economy and the introduction of cloud technologies; analysis of the psychological and pedagogical literature of domestic and foreign authors on the topic of research, teaching materials on creating a unified information educational environment, specialized literature in the field of the use of information technologies in education; comparing and summarizing Internet resources containing multimedia teaching aids; conducting experimental work on the introduction of cloud technologies in the educational process; examination of the software used; monitoring the activities of students, questioning, testing and processing of the results.

## 3. RESULTS AND DISCUSSION

The main conceptual documents governing the development of information and communication technologies in Russia are: "The Strategy for the Development of the Information Society in the Russian Federation for 2017-2030" [1] and the program "Digital Economy of the Russian Federation" [9]. Domestic teachers-researchers [10; 11; 12; 13; 14], given the global trends in innovation in the field of pedagogy, computer science and technology [5; 15; 16; 17; 18; 19], note the importance of creating an educational information environment based on cloud technology that allows organizing various types of interaction between student and teacher, student and student, the organizer of the educational process and students, and the teacher. For this, the information environment provides the participants of the educational process with a wide range of technologies for synchronized interaction (various online events: webinars, chats, Skype, etc.) and asynchronous (information portal, forum, email, blogs, wikis, social networks). At the same time, the role of the teacher is changing, who begins to act not as a distributor of knowledge and information (in traditional education), but becomes the organizer, consultant, coordinator, and assistant in the student's complex, intense, independent cognitive process of acquiring scientific knowledge. We agree with the point of view of N.S. Malchenko that the introduction of an educational information environment in training increases the variety of teaching aids, and therefore, increases cognitive activity in the course of students' independent work [10]. Students do not just assimilate ready-made knowledge, but become involved in solving arising educational and scientific problems, see contradictions, and find alternative solutions to them. With this approach, not only students' knowledge is formed, but a person who is able to independently find a creative solution to the problems that arise in front of her.

Figure 1 shows the organization of the provision of educational services based on network information technologies that ensure the virtual representation of their functions. In addition to didactic support, the mandatory types of support that should be developed when designing an educational network process include:

- software:
- information support;
- organizational and pedagogical support;
- technical support .

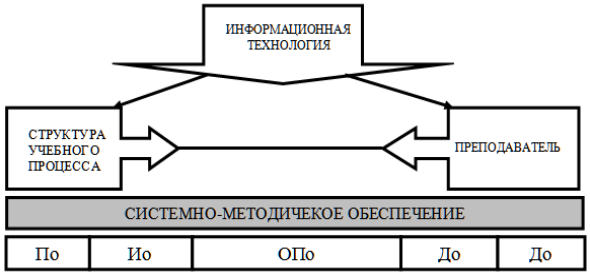


**Figure 1** Scheme of providing a networked educational process based on the virtual representation

Thus, the development of systematic and methodological support in IT areas makes it possible to qualitatively design any of its components.

To realize all the capabilities (of the service) of the virtual representation provided by the student during the organization of the network educational process with remote access based on the network educational and methodological information complex (SUMIK), the development of the following is required:

- the structure and content of the training module, which sufficiently fulfills the information and didactic support of the network learning process;
- a typical pedagogical scenario for the organization of the educational process, which, taking into account the canonical didactics, plays the role of the organizational and pedagogical support of the network educational process (in essence, the methodology for conducting classes using information technology);
- recommendations to the teacher on the design of the educational module;
- instructions to the student when organizing the educational process in a network mode in a virtual representation.


**Figure 2** Diagram of the pedagogical scenario for studying the training course

The general principles of organizing a network educational process in a virtual representation based on a network educational and methodological complex in IT areas are presented in Figure 2.

The general principles of the student's work with the teaching materials should be provided with the software and hardware complex of the virtual representation and the requirements of the SUMIK:

- the student begins to study the discipline from the first section and only with recommendations for independent study of the course;
- in parallel with the study of educational material, the student is acquainted with the basic terms and concepts that he needs to know when studying this section;
- after this, the student should complete the practical exercises provided for in the course program;
- at this stage, the trainee should use his own tests to control his knowledge;
- at the last stage, the student passes control testing, the results of which are then transferred to his dossier and become available at any time for the teacher to ensure control over the mastery of the course materials by the student. Only those tests to which the student did not respond in the control process can be received in the dossier. If the student, based on the results of the control testing in the section, receives an unsatisfactory mark, the software package will not allow him to study the next section, but will "force" him to repeat this section again;
- after studying the specified pedagogical scenario of the entire course, the student is required to pass control testing throughout the course. A student trained while working with the educational module can at any time ask a teacher a question and receive an answer to it in the established mode. Questions for preparing for exams serve as a navigator for the student's summary, detailed answers to which are essentially his summary.

The supporting material in the study of educational material on the discipline of the curriculum within the framework of the educational information environment for the student is detailed annotations on the recommended educational literature and the fund of the most frequently asked questions and answers by students.

The networked educational process designed in such a way, its organization and structure allows, along with the implementation of didactic principles in conducting training sessions, the following didactic tasks to be especially effectively solved:

- to increase to a very high efficiency the teacher's control over the degree of assimilation of the teaching materials by the student, which is achieved by constant monitoring (for example, testing) and interactive communication between the participants of the educational process;
- to activate the mechanism of the student's mental activity through the implementation of cognitive ability when working with information resources and a high proportion of the time allocated for independent study of the subject.

A part of such a network educational process is the service "1C: Enterprise 8 via the Internet" www.1cfresh.com [20], which allows organizing automated data collection, processing, and storage, which makes up the core for managing the educational process and provides its support. Our school was registered in the cloud a few years ago. During this period, we not only actively mastered the technologies, capabilities, and applications provided, but also gained some experience working with the automated information system for collecting and analyzing 1C: Enterprise 8 service statistics for educational institutions via the Internet.

Cloud computing provides a high level of customer service and government training standards. This technology has influenced the architecture, existing services, and the steps involved in implementing training courses. For educational institutions of trainees, cloud technologies provide the opportunity to use modern services, while minimizing the cost of finance.

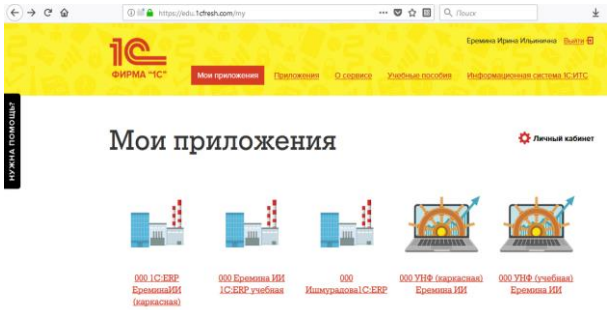


**Figure 3** The start window in the service for the user

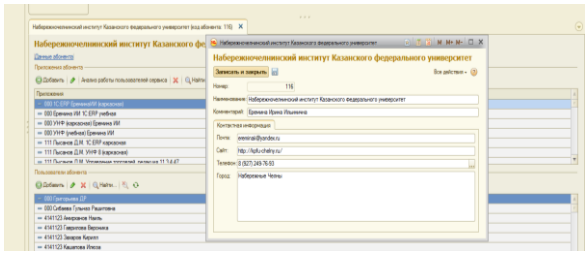

**Figure 4** Data on registration of the Institute, for registration on the service the standard form is filled

Having received confirmation, we get to work. The service requires the registration of trained users and the addition of the corresponding information databases of software products. Note that when adding wireframe (working) application databases for students, a certain input mask was set for the name of the database: "XXXXXXX Last name First name Application name", where the first 7 digits indicate the student's group number. This is convenient not only for registering databases (students work with us for several courses with different databases), but also for analyzing the work of this user.

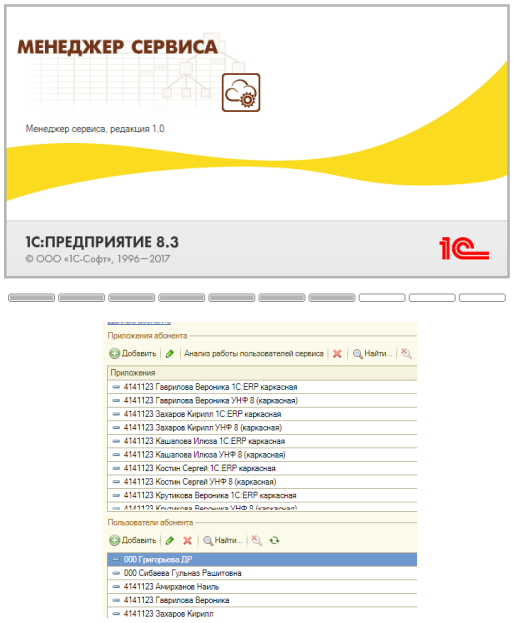


**Figure 5** Login to your account

User registration is carried out according to the proposed instruction, students are registered by the teacher at the provided email address. After passing the registration procedure, students are provided with a framework application base and a training base. In the frame base, the student works and performs tasks on the proposed training manual in the service. The training base is given to the student for an example, you can open it, see documents, directories, and the entire organizational structure, which is important for independent work.

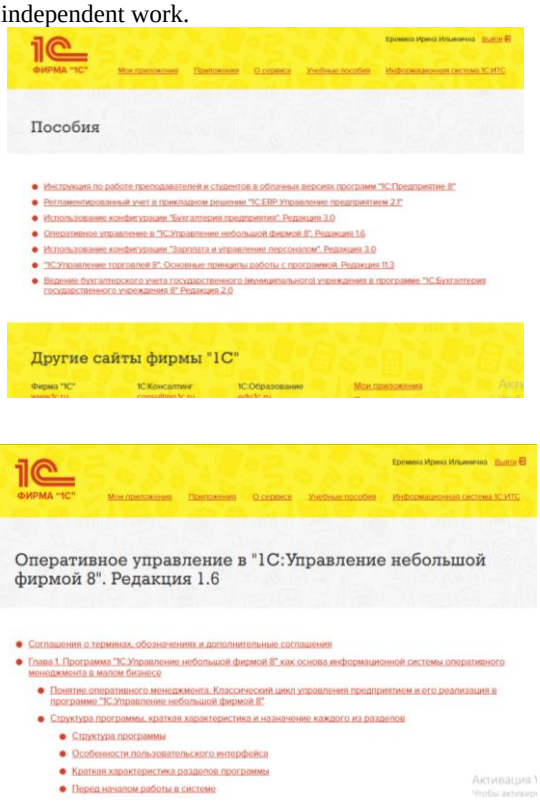


**Figure 6** Service-provided Tutorials

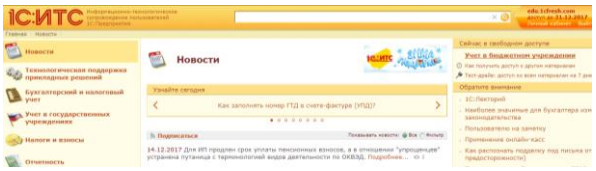


**Figure 7** Login

I would like to thank the developers for the opportunity to use the service here in the cloud, without switching to another space.

Throughout the world, interest in statistics is growing. The statistics showing the students' work with the information base show dynamics and intermediate results. Moreover, one of the indispensable conditions for the correct perception and, especially, the practical use of statistical information, qualified conclusions and reasonable forecasts is the knowledge of the statistical methodology for studying the quantitative side of the learning process. Currently, the teacher and the service "1C: Enterprise 8 for educational

institutions via the Internet" are faced with urgent problems of further improving the system of indicators, techniques, and methods for collecting, processing, storing, and analyzing statistical information.

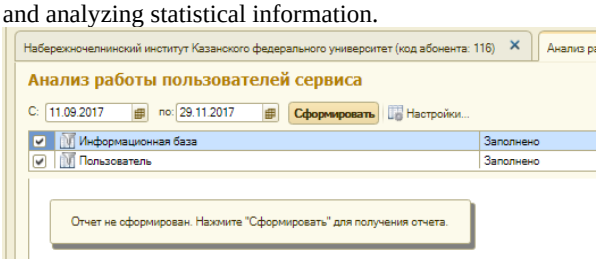


**Figure 8** Analysis of the work of service users

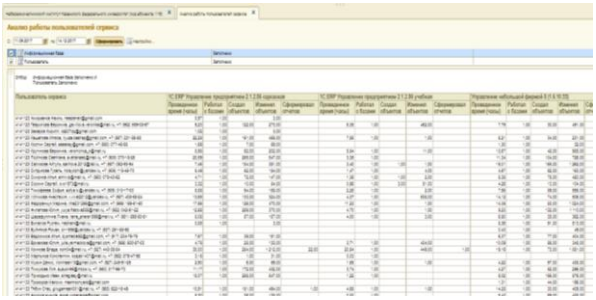

**Figure 9** Generated user activity report

The generated report is re-saved to the Excel .xls, .xlsx sheet format, and then the data is processed in a form convenient for analysis. Such binding allows analyzing and interpreting the results. This is important both for the teacher and for students with the goal of developing and increasing the efficiency of working with software (important at the stage of students' independent work with bases).

An important role in organizing a networked educational process on the basis of a networked educational-methodological information complex (SUMIK) is the control over the student's knowledge. Control in the educational process consists in checking the course and results of theoretical and practical mastery of the training material by the student in the context of the organization of the network learning process, which means that in the absence of constant direct contact between the student and the teacher, the assessment of knowledge acquires special significance.

We agree that the use of cloud technology services practically does not require financial costs, at the same time it turns out to be more reliable than their placement in the educational institution itself [6, p. 285].

## 4. CONCLUSIONS

The creation of a high-quality and high-tech information educational environment is considered mainly as a rather complicated technical task, which allows radically modernizing the technological basis of the education system and moving to a new open educational system based on information and communication technologies that meet the requirements of a post-industrial society. As our study showed, the use of "cloud technologies" increases the efficiency of the educational process, but, unfortunately, it is included in it with a delay and has not yet found widespread use. Although modern students read about "cloud technologies", some successfully use some of them in their personal activities. However, the sooner teachers and other users begin to use cloud services in their work, the sooner they will acquire an effective tool for creating a personal learning path, the more efficient and interesting they will be able to make the learning process itself. This is not just a task facing the entire pedagogical community - it is our responsibility to future generations.

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