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*Article*

# The Importance of Using Distance Technologies in Improving The Quality of Education

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**Abstract:** The rapid informatization of education has led to the emergence of digital platforms enabling flexible, remote access to educational resources. In this context, cloud technologies offer scalable, user-friendly, and functionally rich platforms that enhance the quality and accessibility of education, particularly in higher education institutions. Despite global interest and initial adoption, the practical implementation and didactic potential of cloud technologies in education remain underexplored. This study analyzes the role of cloud technologies in improving educational processes, focusing on their models, benefits, and challenges in higher education settings. The findings demonstrate that cloud technologies facilitate collaborative learning, improve content accessibility, reduce infrastructure costs, and support blended learning formats. Various cloud models SaaS, PaaS, IaaS are evaluated for their relevance and effectiveness in academic settings. The article presents a comprehensive analysis of the didactic opportunities enabled by cloud systems, offering a structured evaluation of deployment models and user benefits in real educational contexts. These insights underscore the transformative potential of cloud technologies in education, promoting enhanced interactivity, resource sharing, and individualized learning experiences while highlighting the need for further research into optimized integration strategies.

**Keywords:** Informatization of Education, E-Learning Resources, Information-Educational Environment, Distance Education, Cloud Technologies, Platforms, Services, E-Education, Authorization, Scalability, Reliability, Flexibility

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## 1. Introduction

In the process of informatization of education, all higher education institutions have their own websites on the Internet. This, in turn, has created opportunities for collective use of electronic educational resources, dissemination of information relevant to students, establishment of interaction between subjects, as well as constant familiarization of professors and students with the news of the educational institution [1]. At the same time, the use of distance learning technologies in education has created the opportunity to receive knowledge from anywhere and at any time [2].

One of the main conditions for organizing distance learning is the possibility of simultaneously managing the educational process and monitoring the quality of knowledge received. The selection of software for distance learning should be carried out in accordance with the requirements and goals of the customer, that is, the educational institution. Such requirements are determined mainly based on the qualification requirements of the educational direction.

When choosing software tools for distance learning, it is advisable to take the following criteria as a basis [3], [4]:

1. Scalability: the platform should be able to expand not only due to an increase in the number of students, but also due to the introduction of new subjects.
2. Multimedia: the technical potential of the platform should allow students to use text and graphic files, video and audio, animation and 3D graphics as teaching aids.
3. Functionality: the presence of necessary options, including chat, forums, course management, interactive communication between subjects, analysis of student activity, etc.
4. User-friendly interface: considered as one of the main parameters affecting the quality of the educational process.
5. Modularity: an educational course may consist of several blocks (modules) of educational material, if necessary, this information can be included in other courses [5].

## 2. Materials and Methods

In recent years, the world has been paying more attention to the use of cloud technologies for distance learning. Cloud technologies are the latest in a series of innovative platforms that are increasingly penetrating the education system.

Cloud technologies are a new service that involves the remote use of data processing and storage facilities. With the help of “cloud” servers, you can access information resources of any level. To do this, it is enough to connect to the Internet and a web browser. This technology is called “Cloud Computing”. The use of these distance learning technologies in education has begun relatively recently and is gradually entering the educational environment.

## 3. Results and Discussion

The new format of teaching is important, because this distance learning technology allows, on the one hand, to provide a high level of learning opportunities, and on the other hand, to improve its quality. However, the use of blended learning is more effective and gives better results than switching to completely electronic learning. As a result of the use of cloud technologies in education, "clouds" allow science to overcome all existing geographical, technological and social barriers [6].

Cloud technologies are electronic storage systems that store data on the Internet, allowing users to edit them, as well as exchange files, documents, and communicate with each other. The US corporation Google has shown great interest in developing such technologies and has succeeded in creating the Google Docs system. In recent years, Google and Microsoft have created new platforms for teachers and students of educational institutions to use cloud servers. Such servers can implement e-mail, instant messaging, calendar planning, personal document creation and storage, and WEB sites available in an educational institution [7].

According to V.A. Koroleva, cloud technologies are a new paradigm that allows for distributed and remote processing and storage of data . In this case, software and information technology infrastructure are delivered as a service via the Internet. This network service is called the cloud, and each user can access and use cloud resources via a mobile phone or computer [8].

Prestigious higher education institutions around the world, including Kaunas University of Technology in Lithuania, Microsoft Live@edu, and Hofstra University in the USA, Google Apps, are using cloud services. Another cloud technology that has become widespread in the education sector is the transfer of learning management systems to the cloud (Learning Management Systems, LMS) [9].

Cloud technologies are not the Internet itself, but a set of hardware and software tools that provide processing and execution of client programs. The use of the “cloud” in the education system is of great importance in ensuring its quality [10].

The possibilities of cloud technologies in e-learning have not yet been sufficiently studied, therefore, it is urgent to pay special attention to this topic and study it in more depth.

Currently, 4 different models of cloud system deployment are used. These include:

1. Private cloud. It is intended for use by a single organization with multiple departments. It can be owned by the organization itself or by a third party
2. Public cloud. It is intended for the general public. It can be owned by commercial, scientific, and government organizations
3. Hybrid cloud. It represents a combination of different cloud infrastructures (private and public) of several distinct objects that are not interconnected
4. Community cloud. It is intended for use by a specific community of consumers with common tasks.

The main models for building a cloud were considered and analyzed to determine their use in the educational process:

Software as a Service (SaaS) - a model for providing cloud services when the provider offers its applications for use, these applications are launched in the cloud infrastructure, and the client can use them using a web interface or interface program;

Platform as a Service (PaaS) - "platform as a service". In this case, the user is given the opportunity to use the software platform (operating systems, database management systems, application software, software development and testing tools);

Infrastructure as a Service (IaaS) - "infrastructure as a service", a model for providing cloud services, in which the user has the opportunity to manage processing and storage facilities, as well as other fundamental computing resources [11].

Analyzing all cloud models and studying some of the experience of their application in foreign countries, it can be said that the “Data as a Service” (SaaS) cloud model is the most frequently used model by educational institutions. The advantages of using this model are that it does not require the educational institution to create its own center for data processing and servicing, it allows reducing financial and organizational costs, and it also allows the installation of its own applications on the provider's platform [12].

Cloud technologies in education began to develop after the creation of e-learning and Internet simulators. This is one of the most promising innovations in the education system in recent years. Cloud technologies significantly reduce the cost of information infrastructure, and also allow the creation and distribution of additional services to improve the quality of education [13].

The introduction of cloud technologies into the educational process is one of the most promising innovations in the education system today. Due to them, the costs of information infrastructure are significantly reduced, additional services are distributed and used to improve the quality of education in the educational environment. In addition, cloud services are a very effective tool for developing individual teaching methods, allowing you to create this process, providing the Internet with a browser or any other network application. Unlike the usual method of working with DT, the user receives not the resources of his computer or the server of his local network, but the capabilities provided to him as an Internet service.

This allows the user to access their data in unlimited quantities and work from any location with a device convenient for them, while the user does not control the operating system, software and other processes that make this work possible. Data and applications are stored in the “cloud”, the user retains a minimum amount of functionality. All software updates, virus scanning and other services are performed by the cloud service provider. This means that managing documents, editing them, etc. is much simpler than if they were on the user’s computer [14].

Cloud technologies represent resources as an online service, in which the need for a flash card disappears, since information is stored in a cloud storage, and additional software is not required to be installed on the user's computer. The main function of cloud technologies is to satisfy the needs of users who need to process data remotely. In e-learning, the main essence of which is the possibility of distance learning, cloud technologies are the main means of improving the quality of education and the mobility of students [15].

Cloud technologies provide users with the following opportunities:

1. Accessibility - anyone with access to the Internet can access the necessary information from anywhere
2. Massive storage - large amounts of information are stored in cloud storage and can be accessed at any time
3. Flexibility - computing resources are not limited by memory, microprocessors, and other devices
4. Reliability - data processing centers have additional power sources, data is constantly backed up
5. Security - "cloud" servers have a sufficient level of security
6. High computing power - there are opportunities to use all the computing capabilities of cloud technologies [16], [17].

Cloud technologies, which have great potential, are currently not sufficiently used in the education system. The use of cloud technologies in the education system allows solving two important problems. Firstly, it creates opportunities for educational institutions and each student to use modern and relevant computer infrastructure, software tools, electronic educational resources and services. Secondly, it allows individual educational institutions and the entire education system to significantly reduce the costs of creating a local information infrastructure and reduce the financial costs allocated for software and hardware through the effective use of computing resources of cloud technologies [18].

According to V. Tkachenko, cloud technologies differ from other Internet resources in their characteristics and capabilities in the following ways:

a. The user himself establishes the number of resources necessary for his work, does not require interaction with their suppliers and service providers
b. All services provided are carried out from anywhere in the world and do not depend on the platforms on which the user works
c. Automatically combines all distributed physical resources into a single unit using software platforms without the user noticing
d. Service payments are made not for the entire service, but for the actual work used [19].

Cloud technology involves constant and convenient access to configured computing and information resources (data transmission networks, servers, databases, applications), as well as providing the user with the ability to work with selected resources and exit the system at his request.

The most important positive aspects of cloud technologies are manifested in the following aspects:

a. Economic (this is one of the main advantages for many educational institutions)
b. Technical (minimum requirements for hardware are imposed, the only mandatory requirement is the presence of an internet network)
c. Technological (many high-level cloud services are very convenient to use or require minimal support)
d. Didactic (the availability of a wide range of online tools and services and the ability to interact with teachers and students) [20].

On the basis of the considered services, we create didactic opportunities that confirm the feasibility of using cloud technologies in the modern school education process:

a. The ability to organize joint work of a large team of teachers and students

b. Providing both teachers and students with the opportunity to jointly use and publish documents of various types and applications
c. Rapid introduction of created products into the educational process due to the lack of territorial ties between the service user and the place of service provision
d. Organization of interactive exercises and group lessons
e. Preparation for lessons, including the implementation of collective projects of teachers in conditions where there are no restrictions on the "audience size" and "time of the lesson"
f. The ability to collaborate and work together within the framework of colleagues (only them), regardless of where they are located
g. Placement of necessary materials (music for listening, lesson plans, educational games, links to internet resources, images, etc.) In the cloud and their use.

The main didactic value of using cloud technologies in the educational process is the organization of joint work of teachers and students, which, since these technologies are highly technological, relevant and promising, help to increase the effectiveness of the educational process and achieve the goal. Cloud technologies offer an alternative to the traditional form of the educational process, creating opportunities for individual learning, interactive lessons and group teaching. The introduction of cloud technologies not only reduces the costs of purchasing the necessary software, but also increases the quality and efficiency of the educational process, prepares the student for life in a modern information society, helps to organize qualitative and fast methodological work with the teacher.

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Some problems may also arise when introducing cloud technologies.

Including:

1. Dependence on network connectivity.
2. The need to store copies of documents on computers or media.
3. The need to protect personal data.

The use of cloud technologies in higher education institutions increases the mobility of students, and they have the opportunity to receive and use electronic educational and methodological materials using any modern communication devices (standard computer, laptop, netbook, smartphone, tablet computer, mobile phone).

In addition, students can perform experiments or practical exercises using modern software tools, connecting to virtual machines. To do this, students do not need to install software on their personal computers or place it on the local network of the educational institution administrator.

Cloud technologies expand the following opportunities for the teacher: • licensed software is not required:

a. An effective tool for developing individual teaching methods;
b. Work can be done not only directly in the classroom, but also at any point where there is internet access;
c. One document can be edited by several people at the same time (organization of group projects, remote work).

Let's look at how group project preparation is implemented in practice in distance learning. Students are divided into groups and receive a topic for their project. The teacher prepares the necessary documents separately for each group and makes them available to all group participants via e-mail. An optional document can be created - a text file, presentation or booklet. The creators of the Yandex service believe that cloud technologies should provide the following scheme of action: a person can start work on his computer,

leave home, continue it on his phone, and send the results of his work via a tablet. Approximately according to this scheme, students can work on their projects at home, at the university, or in any other place. The teacher will have the opportunity to edit and annotate the document that students can read. At the same time, it will be possible to determine how much each student contributed to the project.

In addition to working with students, teachers can also actively use cloud technologies for themselves. Examples include creating schedules for classes, consultations, projects, and abstract submission deadlines, and informing students about the cancellation or transfer of classes.

Having studied examples of cloud computing applications, it can be noted that educational organizations often use the "software as a service" cloud model. This is justified by the fact that educational institutions in this case avoid the economic and organizational costs of creating and maintaining their own server, and the service provider has the opportunity to install their own applications on the platform.

## 4. Conclusion

Cloud technologies are currently characterized by the fact that they are just entering our country, so the experience of their application in the field of education, compared to other countries, is practically absent, but the possibilities of these technologies are very wide, so the active spread of cloud technologies in education will not take long to wait. The essence of cloud technologies is to transfer data processing from personal computers and workstations to servers of the World Wide Web. The user does not buy computing programs and complexes, but works with them as a tenant. In the transition to new educational standards, cloud technologies form a new information culture of teachers and students, and allow to make the educational space more open.

In conclusion, it is worth noting that the main positive aspects of cloud technologies in the education system include the ability to use information collectively, organize collaborative work, work with electronic resources and software at any time, avoid the need to purchase and install additional software, and work with a convenient interface. In our opinion, in the future, the importance of cloud technologies will increase and they will play an important role in higher education institutions. This, in turn, will ensure the optimization of the educational process and serve to improve the quality of education, increasing its level of openness, objectivity, and creativity.

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