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W ŁOMŻY

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Łomża 2023

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THE USE OF CLOUD TECHNOLOGIES IN THE PROFESSIONAL ACTIVITIES OF PEDAGOGICAL AND RESEARCH-PEDAGOGICAL WORKERS

Summary

Changes in social life require the development of new innovative ways of learning, the use of pedagogical technologies taking into account the specifics of the individual development of a modern learner, a creative approach to performing applied tasks, the formation of relevant competencies, the ability to project, model not only in professional activities, but also in everyday life. The purpose of this article is to analyze the features of the implementation of cloud technologies, in particular automated design systems in the educational environment of an educational institution as a key driver of the digital transformation of education. The article highlights the potential of introducing cloud technologies into the educational process, and determines their impact on the learning component. The analysis and evaluation of the experience of using individual services and components of the cloud environment in the process of training future teaching staff in educational institutions was carried out.

Keywords: cloud environment, cloud services, automated design systems, network, platform

Introduction

The process of formation and development of the cloud environment in educational institutions is aimed at achieving the goals of the pedagogical system: improving the organization of training and scientific and pedagogical research; development of joint projects; participation in educational, scientific and research-experimental activities; use of the most

modern means and technologies; improvement of information and communication technologies (ICT) - competence of participants in the educational process, etc.

Cloud technologies are a unique opportunity to create a new educational space with an appropriate information base. A promising approach to improving the quality of education is the use of cloud technologies to provide ICT support for the functioning and development of a cloud-based educational environment, which is characterized by such innovative characteristics as better adaptability, mobility, full-scale interactivity, free network access, unified infrastructure, and others. In such an environment, conditions are created for the implementation of various goals, strategies and trajectories of training and education of students, ensuring the adaptation of the components of the educational process to the individual capabilities and needs of the individual.

The need to design the ICT infrastructure of the environment in accordance with the educational needs of the applicants determines the need to find the latest pedagogical approaches and modern technological solutions. This approach is aimed at ensuring the learning process by expanding access to high-quality electronic resources, portals and open information systems - libraries, periodicals, video conferencing systems, communication with virtual reality, data storage and processing in distributed mode, individual and collective access to educational environment from virtually anywhere and at any time.

Purpose, subject and research methods

The purpose of the article is to carry out a general analysis of the features of the implementation of cloud technologies in the educational environment as a promising direction for the modernization of the educational process in educational institutions. Subject. Cloud technologies in the professional activity of pedagogical and research-pedagogical workers. Research methods. Theoretical and empirical research methods were used.

Research results

Cloud computing technology has become a new evolutionary stage in the development of modern Internet technologies. Experts define cloud computing technology as a dynamically scalable Internet technology with the possibility of free access to information computing resources in the form of services provided using the network.

Among the areas of ICT development, cloud technologies are one of the most attractive for educators. This especially applies to the independent work of students in the process of distance learning and collective educational research, where the possibility of constant contact between students, students with a teacher or a supervisor in order to ensure monitoring of the quality of the work of study subjects with the aim of timely correction of their activities is of primary importance.

Modernization and development of the educational and scientific environment of pedagogical educational institutions belong to the urgent problems of reforming modern education. In connection with the introduction of cloud services and technologies into the composition of this environment, new directions of scientific and pedagogical research are being formed, related to the provision of electronic resources and services, the possibility of collective work with software applications, the removal of geographical or time restrictions on the acquisition of education, and others. It is thanks to the use of cloud services that there are opportunities to solve urgent social and educational and cultural problems of modern society, including, in particular, increasing the level of accessibility and quality of education, improving the educational and scientific environment for personnel training, and the wider introduction of the most modern ICT into the educational proces [1].

The implementation of cloud technologies in education is characterized by three key points:

1) Content creation by the user himself - a teacher, pupil, student.

2) Storing user-generated content on a remote server, making it permanently available for viewing and editing online.

3) Demarcation of access rights: the content owner can specify who has the right to view and modify the materials created or uploaded by him.

The analysis of trends, directions and nature of education development shows the need for the emergence of new information and communication technologies in pedagogy; the gradual formation and development of a computer and technological platform for the information and educational space; creation and use of modern computer-oriented educational environment in pedagogical systems; electronic and informational educational resources and network services that fill them meaningfully and technically support them.

Improving technologies, updating software requires educational institutions and teachers to constantly change the system of computer devices and software in accordance with

the latest trends in the development of IR technologies. One of the ways to solve this problem is the introduction of cloud-oriented technologies into the educational process.

It is cloud technologies that best meet the needs of solving urgent social and educational and cultural problems of modern society, among the main of which are increasing the level of accessibility and quality of education, the interconnection of scientific research processes and the training of scientific and pedagogical personnel, improving the design, formation and ensuring the functioning of educational - the scientific environment of pedagogical educational institutions [2]. These promising technologies become a tool for implementing the principles of people-centeredness and equal access to education in pedagogical systems of higher education.

The current state of development of the educational-scientific environment (ESE) is characterized by increased requirements for the quality of electronic resources for scientific and educational purposes, the spread of more flexible, personalized, open organizational systems, which becomes possible with the use of services of cloud information and communication platforms.

Wider involvement in the practice of pedagogical educational institutions of network technologies of the open information and educational space, the capacities of which have recently increased significantly thanks to cloud-oriented approaches, can play a leading role in deepening the links between education, science and production; expansion of cooperation of educational and scientific institutions; the creation of various structures of a corporate nature (branches of educational institutions in production, training and engineering centers, etc.), aimed at the development of closer interaction with the higher education sector, wider participation in solving urgent social and economic problems, improving the intensity of scientific research and the process of training personnel, etc.

A wide variety of models of technological processes and apparatus designs requires the training of qualified specialists with knowledge of programming, design and optimization tools.

Representatives of new generations start the process of creating a modern business precisely with high technologies, for them it is best that the training of future specialists is conducted in a digital format. Employers seek to attract highly qualified specialists who not only have a high-quality professional education, but also the ability to be communicative, responsible, punctual, active, work in a team, have a creative approach to solving tasks, quickly learn new types of activities and have a great desire to achieve success in your career [3]. Therefore, the question arises about the qualification and quality training of such specialists.

The demand for IT specialists, without whom no company can do today, is constantly growing. One of the most popular directions in the field of information technologies is "Computer technologies". This direction is aimed at the active use of computers in science, technology, business, communications, health care and many other types of human activity, through the development of algorithmic, software and software-hardware systems for a wide range of practical applications.

The scientific and pedagogical community is actively discussing how Internet technologies can be used to provide millions of people with high-quality education and give them a chance for a better life. Such technologies as the web, virtual, and cloud are radically changing the nature of education and its accessibility. As the experience of developed foreign countries shows, an excellent solution to the above-described problems is the development of innovative institutions based on the introduction of "cloud technologies" into the educational process. Recently, the scale of implementation of cloud technologies is growing rapidly [4]. A real revolution is taking place in the field of education.

The purpose of forming a cloud educational environment is to create the most favorable conditions for personal development and the achievement of learning goals, which should collectively ensure adaptation, emotional and personal well-being, educational and professional motivation, personal achievements and other psychological characteristics of a person who is in a state of comfort, high work capacity and readiness for personal growth.

The defining components in the digital educational space are cloud services, the newest type of network services provided to the user of information and communication networks with virtualized ICT infrastructure. Cloud services are currently a full-fledged educational tool that allows the educational institution to create its own online space and to form the personal educational environment of students and teaching staff as efficiently as possible.

Cloud services are services that provide the user with network access to a scalable and flexibly organized pool of distributed physical or virtual resources, which are delivered in self-service and administration mode at his request (for example, software, data storage space, computing power, etc.).

Cloud services will provide not only unlimited access to electronic educational resources and create new learning environments, but also create new technologies for organizing educational activities and communication for those institutions that do not have appropriate powerful IT units and material and technical resources.

Studying the offers of cloud service providers, we singled out four main repositories (Table 1).

Table 1. Comparison of cloud storage

Source: Litvynova S. G. Designing a cloud-oriented educational environment of a general educational institution. Monograph. Kyiv. CPU "Comprint". 2016. 354 s.

Criteria	OneDrive	Apple iCloud	Google Drive	DropBox
Link	OneDrive.live.com	iCloud.com	drive.google.com	dropbox.com
Storage Size (Free)	25 Gbyte	5 Gbyte	Unlimited in GSuite	2 Gbyte
Maximum volume, (GB)	100	50	There are no restrictions in GSuite	1ТБ
Memory usage (file download, MB)	9	-	5 TB per download	53
File download time (s)	104	-	100	132
Data storage period	unlimited	unlimited	unlimited	unlimited
Direct link to download data	No	No	so	so
Stationary versions	Windows, OS X, Linux	OS X	Windows, OS X, Linux, Chrome OS	Windows, OS X, Linux
Mobile applications on such OSes	IPad, IOS, Windows Phone, Android	IPad OS	IOS, Ipad, Android	IPad, Windows Phone, Android
Access via the Internet	so	No	so	so
Remote access (from a PC)	so	so	so	so
Work with office software	so	so	so	so
Simultaneous editing of data on the Internet	so	No	so	so
Version tracking of edited files	so	No	so	so
Mobile versions of software	so	so	so	No
Slide show on the Internet	so	so	so	so
Electronic slide show	so	No	so	No
by mail	so	No	No	so
Publications in social networks	so	so	Separate programs	No
(Facebook, Twitter)	so	No	so	so
Displaying geotags	so	so	Powered by Google partners	No

Google Drive is a cloud data storage owned by Google that allows users to store their data on servers in the cloud and share it with other users on the Internet. Google Drive is characterized by a concise interface and offers to install convenient software clients for smartphones and tablets based on the Android operating system, PCs and laptops running the Windows or MacOS operating system, iPhone and iPad mobile devices. Closer storage

integration with Chrome OS and support for Linux are expected in the future. Each Google Drive user gets up to 15 GB of free space for all Google services (including Gmail and Photos) [5]. At the same time, he himself can decide how much space to allocate for mail and how much space to leave for important files. You can work with files in Google Drive directly in the browser. Google Drive can be turned into a separate folder in the documents of a smartphone, tablet or PC, and its contents will be synchronized automatically.

Microsoft Office 365 is a paid proprietary cloud Internet service and software from Microsoft. The Personal package includes access to Microsoft Excel, Microsoft Word, Microsoft PowerPoint, Microsoft Outlook, Microsoft OneNote, Microsoft Access, Microsoft Publisher for home/non-commercial use. Access to premium features is also provided on a single tablet (Windows RT, iOS or Android) or phone. The University package is available for higher education institutions and allows multiple users. The user is also provided with 60 minutes of international Skype calls and access to 1 TB of storage on OneDrive. Microsoft Corporation offers subscriptions to Office 365 for university students who have licensed Office at the faculty.

The iCloud cloud is a service that allows you to synchronize data with devices of one or another Apple ID. With its help, you can transfer information from a phone or tablet to new "apple" devices, as well as view them or restore them if necessary.

Dropbox is a cloud-based productivity tool built for individuals and teams that allows them to store and store documents or files or images in the cloud, thereby sharing with others as needed.

The global experience of the implementation and use of cloud technologies shows the prospects of its use in the domestic education system as well. Today, in the Ukrainian-speaking segment of the Internet, cloud computing services of Microsoft and Google are the most popular among educators (Table 2). It is these corporations, constantly improving their services, that enable the rapid introduction of cloud computing technologies into the educational processes of educational institutions. Powerful tools and innovative functionality of educational "clouds" allow modern teachers to use these technologies in their professional activities as effectively as possible.

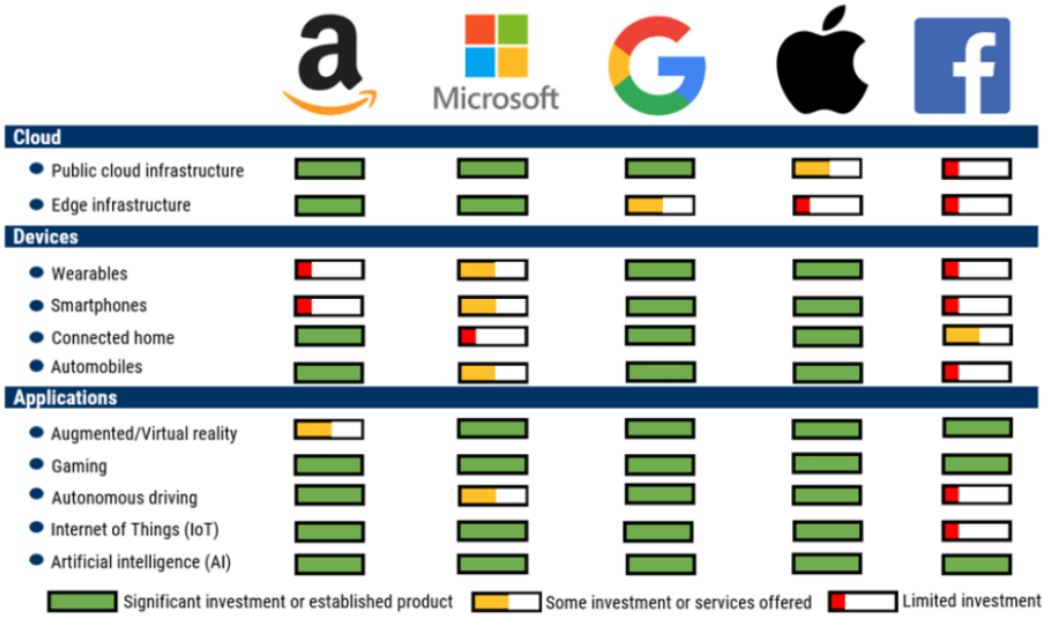
The most common service system based on cloud technologies used in the educational process is the G Suite for Education service (until recently known as Google Apps).

G Suite for Education is a set of standard cloud (i.e. hosted on Google servers) applications for planning joint activities, collective work and communication, publishing materials, hosting video materials and many other tools.

The need to create a cloud platform is especially important for innovative scientific and educational programs of universities. In particular, Microsoft offers the application of cloud technologies in the education system, which is based on the interaction of scientific and pedagogical workers and cadets (students) using the main services in the cloud, as well as the use of mini-sites for collaborative work. An important contribution to the development of cloud technologies for education is made by Google, whose free services are also actively used in the educational process (Google Apps Education Edition) [6]. Educational institutions get the opportunity to compensate for the lack of ICT resources, to solve problems related to administration, monitoring of educational achievements, etc.

Table 2. Cloud services from Microsoft and Google corporations

Source: Big Tech In Edge Computing: Amazon's Evolving Cloud Strategy, Microsoft's Augmented Reality Bets, Google's Autonomous Vehicle Play, And More. URL: https://www.cbinsights.com/research/edge-computing-big-tech-famga/



Cloud-oriented technologies are an environment for data storage and processing that combines hardware, licensed software, communication channels, as well as technical support for users.

The concept of cloud-oriented technologies includes many concepts: infrastructure, software, platform, data, workplace, etc. The structure of cloud-oriented technologies can be depicted in the form of a pyramid (Figure 1).

In the plane of the base of the pyramid lies the "infrastructure" - this is a set of physical devices (data processing center, cabinets, racks, uninterruptible power supplies, power distributors, ventilation and air conditioning, monitoring and remote control devices, passive equipment, etc.), above it is built a "platform" - a set of services and top - software, available at the request of users.

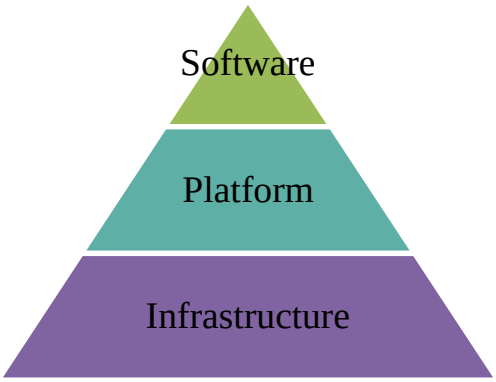


Figure 1. Structure of cloud-oriented technologies

Source: Cloud-oriented technologies. URL: https://www.researchgate.net/publication/325760592_Vikoristanna_hmaro_orientovanih_tehnologij_dla_udoskonalenna_profesijnoi_dialnosti_vikladaca

The difference in working with software is only in the methods of data processing and storage. When all operations take place exclusively on your computer, then this is not a "cloud", and if the process takes place on a server in the network, then you are using cloud-oriented technologies. So, these are various software, hardware, tools, and methodologies that are provided to the user as Internet services to implement their goals, tasks, and projects [7]. Cloud-oriented technologies are an effective tool for scientific activity and management of all processes carried out in the educational process.

Cloud-oriented information and communication technologies of education are defined as a set of methods, means and methods of activity used to organize and support the educational process, collect, systematize, store, process, transmit, present messages and educational data and use a dynamic array of virtualized hardware and software resources available through the network regardless of the terminal device.

Advantages of using cloud-based technologies:

1) Availability. Anyone with a computer, tablet, or any mobile device connected to the Internet can access information stored in the cloud.
2) Mobility. You can work from different devices (smartphone, tablet, netbook, etc.).

3) Convenience. Regardless of which operating system the user prefers, web services work in any browser.
4) Economy. The user does not need to buy expensive, high computing power computers and components, software.
5) Flexibility. All necessary resources are automatically provided by the provider.
6) High manufacturability. Large computing power provided to the user, which can be used for data storage, analysis and processing.
7) Reliability. Thanks to the use of virtualization of modern protection systems and constant monitoring by professionals, a high level of security and preservation of client data in the cloud is guaranteed.
8) Scalability or flexibility. As necessary, the user has the opportunity to increase or decrease the number of resources used at any time.
9) Cooperation. Both you and your colleagues can edit and view the same materials from different devices at the same time.

The use of cloud-based technologies in education provides a number of advantages in the activity of a teacher:

1) the teacher has access to his materials and documents at any time;
2) the teacher gets the opportunity to shape the development trajectories of each student from a specific academic discipline;
3) the organization of communication with subject departments of higher educational institutions is facilitated (conducting online lectures, trainings, round tables);
4) you can use video and audio files from the Internet without additional downloading to the computer;
5) fundamentally new opportunities appear for the organization of project activities, research and adaptation of educational material to real life;
6) available innovative methods of knowledge transfer: webinars, integrated practical classes, cooperative laboratory work, online communication with students from other cities, countries, etc.

The cloud-oriented educational and scientific environment (CEO) of a higher educational institution can be understood as the ICT environment of the educational institution, which provides for the use of cloud computing technologies (CCO) to provide ICT support for its functioning and development.

Indicators of the development of the educational and scientific environment of a higher educational institution are: the quality and availability of its services, adaptability, integration,

full-scale interactivity of ICT teaching aids, mobility; free network access; unification of environment infrastructure; security of use and others, which is achieved thanks to the use of cloud technologies.

The factors of formation of a cloud-oriented environment of pedagogical systems are: modernization of the educational environment of higher educational institutions; unification of the processes of education, scientific research, their implementation and use thanks to a single information technology platform; elimination of the gap between the level of scientific and pedagogical research and the implementation of their results; formation of integrated (industry, national) databases, data collections, resources available for various institutions; creation of conditions for access to the best examples of EOR in the system of higher education by means of cloud technologies [8; 10].

The use of cloud solutions in educational work increases the competitiveness of the educational institution, since the ability to work with modern information technologies contributes to the successful career of the graduate in the labor market.

Conclusions

Therefore, the content of education plays a key role in the development of the national education system, ensuring its innovative development, bringing it into line with European and world standards. Improvement of the educational process, accessibility and effectiveness of education, preparation of the younger generation for life in the information society requires significant intellectual resource costs of the teacher. The use of cloud-oriented technologies in the educational process provides an opportunity to work together regardless of the location, software or capabilities of the technical device (PC, netbook, smartphone, etc.), which ensures mobility, improves the quality of educational services, and facilitates access to data. The use of cloud services in scientific and innovative activities in the education system contributes to the popularization and implementation of educational innovations in accordance with the demands and problems of the development of society.

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