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CLOUD TECHNOLOGIES: USE IN THE EDUCATIONAL PROCESS AS A WAY TO HIGH MANAGEMENT IN BUSINESS

Introduction

The improvement of modern education is currently associated with the introduction of new information technologies into the educational process. This approach is based on high requirements for the level of information and educational training of a modern specialist. The introduction of modern information technologies makes it possible to improve the quality of education, ensure the level of student motivation, organize independent work more effectively, and use an individual approach to learning. The use of information technologies allows to achieve such educational goals as the development of thinking (spatial, algorithmic, intuitive, creative, theoretical types of thinking), the formation of skills to make the best decision from possible options, the development of skills to carry out experimental research activities (for example, through the implementation of computer modeling), the formation of information culture, and the ability to process information [1, 8].

This leads to an acceleration of the pace of learning, frees up time, and thus intensifies the learning process. The development of new information technologies in education stimulates the development of software tools and applications that implement methodological ideas related to semi-automatic or automatic access to educational information, verification of the correctness of the obtained results, assessment of initial and ongoing training, etc.

In turn, the dynamics of information technology stimulates the development of the university education system, in particular, distance and online learning systems, which are characterized by a high level of interactivity and allow to participate in the learning process at any convenient time to people, who are in different countries and have access to the Internet at any comfortable hours for cognitive activity. Experienced users are increasingly using them in their daily work with information flows because of the convenience and time saving provided they have constant access to the Internet [7]. Many organizations have already changed their structure due to the introduction of new technologies. This has led

to important implications for both strategy and operations. The benefits of doing so are described by Casalino, et al. [10].

The number of individual services and integrated solutions from commercial companies that can be used to implement learning projects is constantly growing. In particular, cloud technologies from such leading companies as Google and Microsoft offer great opportunities for supporting and organizing students' learning and independent work. The question of which services from these companies should be used in the educational process when organizing students' independent work and under what conditions is on the agenda of many innovative teachers. Therefore, our task is to compare these services in the context of organizing students' project work and draw conclusions about the feasibility of using them for this purpose.

Many works by domestic and foreign authors have been devoted to the use of social networking services in education. Among them are works on the use of elements of distance learning in conducting classes and in individual work of students: Roman B.E., Kukharchuk R.P. [3], Gerasimenko I., Glushchenko V. [1]; the peculiarities of using cloud services in education are considered in the work of Shokalyuk S. [5]; the issue of using ICT in education is revealed in the study of Voronov V. [8]; the use of social networking services in education was considered by: Konovalenko S. [2]; the peculiarities of using the Internet as an educational technology in the higher education system and recommendations for their application are given in the work of Grandon Gill [3]; the effectiveness of using cloud computing in the process of teaching and training students is described in [1, 6]; the integrated use of cloud services in an e-learning course is described in the work of Gerasymenko I.V., Zhuravel K.I., Palamarchuk O.S. [1].

Having analysed the above publications, it was found that in most works the use of cloud technologies is described rather superficially, there are not many examples of their application in the educational process. It is necessary to analyze the functionality of the most well-known modern cloud services, to determine the possibility of using them in the educational process, in the process of independent training of students.

Purpose, subject and research methods

The purpose of the article is to research the use of cloud technologies in enterprise management and in the educational process; to conduct a comparative analysis of Microsoft and Google cloud services for organizing the work of a modern teacher, independent work of students and for becoming a convenient storage and a possibility for information exchange between users of modern cloud technologies to acquire professional skills and experience.

Materials and methods. The following methods were used in the study: analysis of theoretical sources on the use of cloud technologies in management

and the use of cloud technologies in the higher education system, generalization and evaluation of the results.

Research results

Cloud technologies, like all rapidly developing technologies, are penetrating all areas of human life due to their obvious advantages. Of course, their adoption is happening at different speeds in different areas.

Estimates of the cloud market are very optimistic. According to Gartner Inc. forecasts, global spending on public cloud services will grow by 20.7% to reach \$591.8 billion in 2023, up from \$490.3 billion in 2022. This is higher than the 18.8% growth forecast for 2022. One of the reasons for this growth is the increasing number of consumers using cloud computing for work and data storage, to improve their business efficiency and reduce IT infrastructure costs. New technologies and services in this area, such as quantum computing and machine learning, are also expected to develop, leading to even greater market growth.

There are many cloud service providers. The three largest are Amazon (AWS), Google (Google Cloud), and Microsoft (Azure). You need to know if there is only one CSP involved or if it is a multi-cloud technology.

An example of the successful use of cloud technologies is Airbnb, which uses Amazon Web Services to scale its infrastructure and provide high-quality service to its customers. Thanks to cloud technologies, Airbnb has been able to easily scale its computing resources and manage a huge amount of data.

Many major global brands use cloud technologies for their business needs:

Coca-Cola – to speed up time to market and improve the efficiency of business processes.

BMW – to develop and test new products and services, as well as to improve the performance and safety of its cars.

Adobe – to process and store large amounts of data used to develop and improve its software products.

GE Healthcare – to create digital data management platforms that help physicians and healthcare organizations improve the quality and outcomes of healthcare.

UPS – to optimize its logistics and transport processes and improve the efficiency of its cargo tracking systems [9].

So, in general, we can identify the types of cloud:

1. Public: usually a CSP where you will have access to services via the Internet. This is the most common type of cloud technology. In this case, computing power and services are provided in a public way via the Internet, which allows users to save on infrastructure and its management. Such clouds are used for both business applications and data storage.

2. Private: a third party from whom you rent infrastructure; a dedicated connection. This is a cloud that is used within a company and managed by its IT department. It can be physically dedicated hardware within an organization or a cloud managed by a provider but used by only one company. A private cloud provides a higher level of security and control over data, but requires a large investment in infrastructure.

3. Hybrid: a combination of public and private. In this case, companies can use public cloud services for non-sensitive data and use a private cloud with enhanced security for more sensitive data. Hybrid cloud allows companies to reduce infrastructure and management costs while maintaining control over critical data.

There are the following models of cloud services:

1. Infrastructure as a Service (IaaS): The cloud provides a common infrastructure for applications. This is a model that provides access to cloud infrastructure such as virtual servers, data storage and network resources. Customers can use this infrastructure to deploy and manage their own applications and services. Examples of IaaS providers include Amazon Web Services, Microsoft Azure, Google Cloud, etc.

2. Platform as a Service (PaaS): The cloud provides a shared/shared software/language (e.g. Java, Python, .Net, etc.). This service is usually used by developers to develop a product in a cloud environment. This model provides customers with a platform for developing, testing and deploying applications without having to buy and maintain their own infrastructures. PaaS includes application development tools, databases, analytics, and testing. Examples of PaaS providers: Heroku, Google App Engine, Salesforce, etc.

3. Software as a Service (SaaS): The cloud provides a subscription-based environment. This model provides access to software over the Internet. Instead of installing software on their own servers, customers can use applications in the cloud provided by SaaS providers. Examples of SaaS applications include Dropbox, Microsoft Office 365, Salesforce CRM, etc.

The choice of cloud service model depends on the needs and capabilities of each business. IaaS may be the best choice for organizations that want to have full control over their infrastructure, while SaaS is for those looking for out-of-the-box solutions without the need for additional software configuration and installation. PaaS may be the best choice for developers who want to deploy their applications quickly and don't want to worry about infrastructure.

There is also the multi-cloud model, where businesses use the services of several cloud providers at the same time. This allows them to manage their cloud resources more flexibly and take advantage of the best features of each provider.

For example, Netflix, Pinterest, Expedia, etc. use multiple cloud providers simultaneously to ensure maximum availability, performance and cost-effectiveness of their services.

In the modern pace of life, cloud storage solves the problem of convenient and fast synchronization of information across all devices of one or more users. Whether it's a smartphone, home or work computer, you always have access to the information you need: textbooks, assignments, lecture material, photos, projects and any other files are always at hand. Cloud services allow you to synchronize not only "traditional" files, but also notes, calendars, contacts, and mail, turning your gadgets into one bundle with all the necessary information accessible from anywhere in the world (where there is an Internet connection).

Let's take a look at the most well-known cloud services for storing information [1, 2, 7]:

1) Dropbox is a file sharing and file synchronization service from Dropbox Inc. that allows users to upload files to a Dropbox server. You can make your own files on Dropbox available to other users or to everyone. Dropbox was founded as a startup in 2007 by MIT students Drew Houston and Eresh Ferdowski, receiving its first funding from the Y Combinator business incubator.

Dropbox initially positioned itself as a file-sharing service (upload, send and delete), and it does a great job with these functions. The service now offers 2GB of cloud storage for free with the option to expand it to 16GB by inviting friends or completing tasks, such as installing its official app. 1 TB per year costs 2800 hryvnias.

Dropbox doesn't have its own cloud-based suite of software for working with office documents, but it does offer Microsoft Office Online. But it does have a Facebook add-on that allows you to transfer Dropbox files via Messenger without leaving the app.

Pros: Facebook add-on, synchronization with a PC.

Cons: small disk space in the free version.

2) OneDrive is a cloud storage service which main task is to provide file sharing between different devices, as well as additional storage space for important information. The rapid development of cloud technologies could not but attract the attention of such an IT giant as Microsoft. As a result, after several years of development, the OneDrive service was released. Initially, the cloud service was called SkyDrive and was available to a small number of users who participated in a narrow test. Over the years, the platform has evolved significantly, with many different versions of apps and programs for different operating systems.

OneDrive allows you to view documents in Portable Document Format (PDF) and Open Document Format (ODF), an XML file format supported by many word processing applications, including Microsoft Office, LibreOffice, OpenOffice.org, and Corel's WordPerfect. OneDrive's search function does not support searching PDF documents.

OneDrive includes an online text editor that allows users to view and edit files in text format, such as text and batch files. Syntax highlighting and code

completion are available for a number of programming and markup languages, including C#, Visual Basic, JavaScript, Windows PowerShell, CSS, HTML, XML, PHP, and Java. This online editor includes a search and replace feature, as well as a way to manage file merge conflicts.

OneDrive also allows you to: store text documents, spreadsheets, presentations, PDF files, photos, video and audio files for an unlimited period of time; create folders by topic, group or discipline, store different files (documents) in them; Word documents, Excel spreadsheets, PowerPoint presentations, OneNote notebook and Excel surveys; share individual files or entire folders (for viewing or editing) with a specified number of people or an unlimited number (colleagues, students); collaborate on documents; download selected files; copy and move items within the OneDrive workspace; delete and rename files and folders; create html code to embed a selected file or folder into a blog or web page, and readers (of the blog, website) will be able to view the selected item without logging into the service; for files created by MS Office or Office Online, a Version History is provided, which contains a list of changes, modifications to the file with the date, time and author of the changes.

The service from Microsoft offers its users 5 GB of free storage space, with support for cloud office and applications for Windows, Android and iOS. The main advantage of OneDrive over its competitors is its cheap premium plans: UAH 66/month for 50GB and UAH 1400/year for 1TB. The synchronization software is already installed in Windows 10, while users of other operating systems will have to install it themselves.

In addition to the terabyte plan, Microsoft provides a licensed office suite for PCs. The service also supports temporary links to shared files, which partially protects them in case the link is shared.

Pros: best price for 1 TB of storage, integrated office suite, temporary links to shared files

Cons: not enough free storage.

3) MEGA is a file sharing service by Kim Dotcom. It was launched on 19 January 2013, exactly one year after Megaupload was closed. Mega encrypts all content right in the browser using the AES algorithm. The service encrypts all data with a key that cannot be changed or recovered, so if it is lost, all data will be lost as well. Users can transfer files to each other in encrypted form, and all data is stored in the cloud. Access keys to files are not published in the public domain, but are distributed on a Friend-to-Friend basis between users who trust each other. As of July 2018, it is among the top 200 most popular websites in the world.

This is a cloud service with a huge amount of free storage, as much as 50 GB, compared to the above competitors. MEGA has mobile apps for Android, IOS, and a program for synchronizing folders with a PC.

The service has a data transfer limit, which is quite difficult to exhaust and can be easily increased by completing several tasks (installing a mobile app, inviting a friend).

Good points: a large free storage space of 50 GB, synchronization with a PC.

Minuses: traffic transfer restrictions, no office package.

4) Google Drive (<https://drive.google.com/drive/u/1/my-drive>) is one of the most reliable and convenient services for storing information in the cloud. In the free version, users have access to 15 GB of storage space and convenient apps for Android and IOS. If you have a Google account, you do not need to register for the service. Google Drive has a convenient search, a "quick access" field with the most recently added or modified files, and a field with folders and files [9].

The biggest advantage of Google Drive is its compatibility with other services of the company: documents (they can be edited, even by several users at the same time), calendars, mail, photos. By the way, Google gives you unlimited storage for photos, provided that you save them in medium quality, which is a very favorable compromise for a smartphone.

Another advantage of Google services and tools over their competitors is, first of all, the availability of a single sign-in and authorization system, as well as a centralized cloud data storage. Once you have created a Google account, you can use many products and services, such as iGoogle, Gmail (gmail.com), Google Groups (groups.google.ru), Picasa (picasa.google.com), AdWords (adwords.google.com), Google Docs (docs.google.com), Google Drive (drive.google.com), Web Search History (history.google.com) and many others.

The advantages of Google Drive are: free, unlimited photo storage, integration with other Google services, the ability to share drive resources with different access rights, the elimination of document loss, reduction of material costs for storing and exchanging information, and time savings.

Disadvantages: there is no complete trust in data storage and confidentiality, limited compatibility (not all formats are supported), stability of data access (a powerful Internet connection must be available at all times), there is no application for synchronization with a PC, not all users are psychologically ready to abandon simple and fairly understandable physical media and local network drives and move to cloud storage, which in one way or another uses its own interface that needs to be got used to.

Based on the research and analysis of modern cloud services, we can talk about the feasibility of using them in the educational process of higher education [2, 7, 8]. For the last few years:

- Google Drive is used in the educational process by the Department of Management, in particular, when teaching the discipline "Production Management" to students of all areas of study;

- MS OneDrive is used in preparation for classes in the discipline "Operational Management" for students of all study programs.

Where and how it is used in the educational process depends on the experience and willingness of the teacher to use modern technologies. However, the authors advise to use these services, for example, when organizing your own information. As practice shows, people involved in science have a lot of unorganized information about the discipline they study. Over time, on the way to the development of a specialist and the development of the field of knowledge as a whole, the amount of this information only increases, and the teacher is not always able to find what the student needs at a given moment, and may not always have his own computer or data disc at hand. If you store and organize your data in cloud services, this problem is solved by itself. This will allow the teacher to be mobile, up-to-date, quick in their searches and incredibly systematic. The Google Drive service allows you to store files and materials related to the discipline you are studying and have constant access to them.

In terms of communication, cloud services are not a means of communication as such, but this does not mean that they do not provide such an opportunity as part of their concept. Google Drive has built-in chat functionality that allows you to communicate. This wonderful feature allows the teacher to communicate with the student directly on the topic of their work, keeping it in front of their eyes, and you can also arrange group chats to explain ways to solve it, common mistakes, etc. on the example of one work.

Obviously, it is best to store course information – lectures, practical and laboratory assignments – in one place, so it is advisable to use services such as Google Drive and Dropbox. The teacher only needs to upload the necessary data to the server once and give access to students, and again, all changes, additions or deletions of materials will be synchronized and displayed for all participants. It is also enough to give students access to their notes and they will always have additional information on the course approved by their teacher.

On the other hand, submitting the result of the work by the student and checking it by the teacher is also simplified when using cloud services. Quite often, a lab report is either a text file or a presentation, and it is convenient to create these files on Google Drive, which immediately solves the problem of operating system compatibility, which is very important because universities use Windows products, and the use of free alternative products, in particular Linux operating systems, is growing everywhere, and the compatibility of files created in different systems is unfortunately lame. Using Google's capabilities, it is enough to complete an assignment and provide access to it to a teacher or methodologist who supervises the work. After checking, using the commenting mechanism, which is perfectly implemented in Google Drive, the examiner can leave comments, point out shortcomings and inaccuracies, and all this data will be permanently stored and can always be accessed when performing subsequent

tasks. Both the teacher and the student can see the work done at the same time, the same document is used to communicate about the results and errors, the history of corrections and adjustments to the document provides information about the intensity of the student's work on the work, etc.

The use of cloud computing offers a number of advantages to information technology (IT) over traditional technologies:

- The organization is run more efficiently;
- IT infrastructure is more manageable;
- Business continuity management is simplified, thanks to the built-in backup and migration systems for virtual machines;
- Reduced IT infrastructure costs, such as the maintenance of a fleet of computing resources, electricity, and personnel servicing this infrastructure;
- No need for powerful computers;
- Less expenditure on software purchases and systematic updates;
- Unlimited data storage;
- Accessibility from different devices and no binding to the workplace;
- Ensuring data protection against loss and performing many types of learning activities, control and evaluation, online testing, openness of the educational environment;
- Saving money on the maintenance of technical specialists.

On the other hand, all these benefits are relevant for educational institutions and for each individual university department and teacher. So, if we start implementing cloud technologies at the level of schools and universities, and every teacher uses them in the educational process, society will start to perceive cloud technologies as an integral part of their lives. Our students are future entrepreneurs and businessmen, and cloud technologies are already an integral part of their lives.

Using a similar cloud resource MS OneDrive in preparation for classes, the teacher has the opportunity to:

- create the necessary materials: text files, spreadsheets and presentations; download large files: manuals (in various formats), videos and software, the size of which often does not allow uploading directly to the SPDN;
- using Skype, Facebook, Google, Twitter and LinkedIn, create contact lists of students to whom access to work materials should be provided; create user groups for further access.

The teacher places the material prepared for the class (lectures, presentations, theoretical and methodological literature, audio and video files, test tasks) in the MS OneDrive cloud and sends students an invitation with a link to view it in the appropriate section of the LMS. Thus, students get access to all the information necessary for learning the material, which they can download to their computer or media or use online.

Thus, the most suitable and multifunctional services that can be used to implement various elements of the learning process are Google Drive and MS OneDrive. Hence, students in cloud services can perform:

- essays, individual assignments (independent, creative, research papers) and send links to the teacher for editing and review;
- collective projects, giving the project team permission to edit for collective work;
- control, course, diploma papers, sending the teacher a link with permission to edit for verification, which will significantly reduce the number of printed versions of documents [7].

The areas for further research on the use of cloud services include the following:

- in the process of forming and distributing the workload between the teachers of the department;
- in the formation of class schedules for university students;
- in working with the dean's office and the educational part of the university;
- to formulate an individual work plan for the department's teachers and monitor its implementation;
- to ensure the document flow of the department.

Conclusions

It is obvious that there are important arguments for moving computer infrastructure in educational institutions to the cloud today. For example, standard applications that are widely used in education (word processor, spreadsheet editor, graphic editor, email, etc.) will always be relevant, especially when using the cloud. However, the vast majority of educational institutions are only just beginning to introduce cloud technologies into the educational process and include the relevant disciplines for their study.

Therefore, the use of cloud technologies in education encourages students to work productively, arouses their interest, makes classes more diverse, and allows them to create an environment for independent personalized work and productive interaction of all participants in the educational process.

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Abstract

The article is devoted to a comparative analysis of the types of clouds and cloud technologies; the use of cloud services in the educational process, in particular, in the organization of students' independent work. The authors analyze the latest research in the field of cloud services. A comparative analysis of the most famous and most frequently used cloud services for data storage

is carried out. The tools and services of Microsoft and Google used in educational work are demonstrated. The advantages and disadvantages of using modern cloud services are identified.

Keywords: types of clouds, models of cloud services; Dropbox, Google Drive, OneDrive, cloud technologies, information technologies, cloud technologies in management

JEL Classification: M21,