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ASSESSING THE EFFICACY OF CLOUD SERVICES FOR DEVELOPING EDUCATIONAL PRESENTATIONS

Abstract. The article examines the most popular cloud services for creating educational presentations and seeks to determine the effectiveness of their integration within the educational framework. A webometric analysis of these cloud services resulted in the identification of the top 10 resources commonly employed for presentation creation, including Prezi, Sway, Slides, PowToon, Canva, ZohoShow, Genial.ly, Emaze, Piktochart, VideoScribe, among others. Our research conducted a comprehensive comparative analysis of these platforms, utilizing web analytics tools such as Ahrefs, Moz, and Similarweb to establish their respective rankings. This approach facilitated an encompassing selection of cloud-based educational tools capable of meeting the multifaceted requirements of all stakeholders in the educational process.

The analytical process unfolded across multiple stages: an initial description and assessment of key parameters of each cloud service, subsequent expert evaluations encompassing both parameter specifics and overall service quality, determination of individual parameter impact coefficients on service efficiency, service evaluations based on specific parameters, and a synthesis of both objective and subjective data to summarize outcomes.

In-depth analysis was conducted on the presentation creation features inherent to each cloud service, leading to the identification of evaluation parameters encompassing functionality, usability, cost-effectiveness, unique attributes, and overall user impression. Each parameter was assigned an impact factor to gauge its significance within the overall assessment of a given cloud service.

The culmination of expert evaluations culminated in the recognition of Prezi, Canva, and Google Slides as highly effective tools. This determination is grounded in their extensive functionality, provision of free accounts, and user-friendly interfaces. Analysis of domain ratings further highlighted the popularity of Sway, Canva, and Prezi, underscoring the pronounced demand for these platforms among users.

The evaluation methodology proposed within this study holds potential for application to other cloud services designed for educational content creation. By fostering effective organization of

educational activities across diverse subject domains, this approach contributes to the enhancement of the educational process as a whole.

Keywords: education; presentation; educational presentations; cloud services; effectiveness of cloud services.

1. INTRODUCTION

The problem statement. One of the main achievements of information and communication technologies (ICT) of the last decade is cloud technology. The use of cloud services has affected all spheres of life, including significant changes in the educational process. Cloud technology is one of the most promising areas in IT. We see that giants of the global Internet industry like Microsoft, Amazon, Apple, Google, HP, IBM are actively involved in their development. It's really the marker of a promising future for this technology.

Cloud services provide opportunities for remote data processing and storage, network access to the service without installation on the user's computer, scalability (work from anywhere in the world and from any device with Internet access), and many other useful functions. The effectiveness of ICT tools, cloud services, and multimedia in education has long been proven and confirmed by numerous scientific works on ICT use in education [2, 4-16], [18-20].

The importance of the use and implementation of ICT is also pointed out by the ICT Competency Framework for Teachers proposed by UNESCO. This framework makes brief reference to particular technology innovations. UNESCO proposes to use open educational resources (OER) (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by teachers and students, without an accompanying need to pay royalties or license fees [17].

Developers create open educational resources using different tools and web services. This paper will explore the effectiveness of cloud tools in creating multimedia resources.

The research goal is to analyze the most popular cloud services for creating presentations, determine evaluation parameters for these services, and assess their effectiveness in the educational process.

Analysis of recent studies and publications. Cloud services have become a very popular way to increase the effectiveness of education.

T.Vakalyuk, V. Polishchuk analyzed the prospects of cloud services such as Office 365, Google Apps, Prezi [19]. The authors give examples of the use of cloud technologies in the educational process of Ukrainian schools. According to the authors' research, cloud technologies easily solve the problem of educational institutions, which is the impossibility of timely updating of software and hardware. Analysis of the Prezi service, the authors point out one of the problems of use – the availability to use only an English interface. But they immediately simplify this statement, because, at the same time, students are developing foreign language competence.

A.Kumi-Yeboah and Y.Kim, A.Sallar, L.Kiramba identified that digital technologies and multimedia presentations (PowerPoint and Prezi) facilitate educational experiences and achievements of participants in asynchronous online learning environments [7]. The authors indicate the importance of using digital technologies and taking into account the socio-cultural context in education. Taking into account the socio-cultural aspect is important when choosing educational materials and enables students of different cultures to achieve high results. The authors define the following digital technologies: video lectures, voice thread, blogs/blogging, environment wikis and Google Hangouts, PowerPoint and Prezi multimedia

presentations, and instruments of social networks. There is also a problem of having multicultural educational resources and materials for independent work.

P. Sanchez, M.Pazmino, M.Gamez described Prezi as the tool for the strengthening of significant learning [14]. According to the authors, the use of technologies and innovations changes traditional practice and develops creative and constructive knowledge during task performance. A survey conducted by academics indicates that 76% of teachers believe that the use of technology is often necessary for meaningful learning. During teaching, teachers use PowerPoint more (30%) than Prezi (20%). However, the authors note that Prezi is an innovative software that allows teachers to create an organized, creative, and interactive presentation.

V.Tataurov and M.Shyshkina were offered the method of using Microsoft Office 365 services to support students' collaborative learning [16]. The authors note that cloud technologies are important in designing the educational environment of an educational institution. In their research, the authors consider the use of Microsoft Office 365 cloud services in the process of teaching the discipline «ICT in education». According to the authors, the use of these services will make it possible to increase the level of professional competence of future specialists, develop a creative approach to solving non-standard tasks, and contribute to their understanding of the methods of using the software.

Z. Pakholok, L. Myroniuk suggested the model of presentation of native land and methods of it making in Google Slides [11]. The authors suggest to prepare for the "Ukrainian language as a foreign language" exam, where students have to present a presentation about their native country, to use the author's presentation model created using Google Slides. In the paper, the authors analyze the characteristics of the Google Slides service: free and ease of use, the possibility of use from any device with the Internet, easy connection or download of a document, the possibility of joint editing of the document by users, regardless of on which device they work; import files from Microsoft.

L.Oktaviani and B.Mandasari researched to use Powtoon as a digital medium to optimize Students' Cultural Presentation in a class [10]. The authors analyze the Powtoon service and point out a number of features: the ability to edit text, add audio and animation, create a file in the form of a video, as well as the ability to use it for free. The conducted research showed positive motivation of students to study and drew their attention to language learning.

Y.Bhakti, I.Astuti, and E.Rahmawati investigated how students improve their ability through learning-based on the Videoscribe [3]. Scientists claim that video-based learning will make students more interactive and active, as they will be able to understand the concept of an essay and solve a physics problem related to everyday life. The authors found significant positive effects of using a video recorder during physics lessons.

Nosenko Y.G., Popel M.V., Shishkina M.P. substantiated the methodological principles of the formation of pedagogical and scientific research skills using Office 365, Google and SageMathCloud services. The authors also proposed recommendations for the formation of a cloud-oriented educational and scientific environment of a pedagogical educational institution [9].

Utami I., Fahmiyah I., Ningrum R., Fakhruzzaman M., Pratama A., and Triangga Y. investigated teachers' acceptance toward cloud-based learning technology, in particular, for Microsoft 365 that currently being used in facilitating the educational process in Indonesia. Teachers valued that online learning supported by Microsoft 365 applications is challenging since the technologies provide a lot of functional aspect for teaching practice that teachers are not familiar with before [2].

Al-Samarraie H., Saeed N. revealed a set of evidences supporting the use of certain cloud computing tools for certain collaborative learning activities categorized under sharing, editing, communication and discussion. The key opportunities and challenges associated with the use of these tools in a blended learning context were also identified and discussed.

Medvedieva M.O. has formulated problem that can be solved by using cloud technology, described the key characteristics of cloud computing, the main scanning model and service model, composed comparative description of functionality of existing cloud services for universities (Google Apps for Education, Microsoft Live@edu) [8].

Z. Amanov, O. Udovichenko in their research emphasize the high potential of multimedia resources. Researchers analyze and reveal the pedagogical conditions of using the Sway online service in the educational process [1].

Rzheusky A., Kunanets N., Malinovsky O. analyzed free web services for creating library multimedia products: presentations and video materials. Such products can potentially be used in the preparation of virtual exhibitions and promotion of events planned in the library. The authors also made a comprehensive comparative analysis using benchmarking methods of a large number of free web services that provide effective creation of information products with a multimedia component. Based on the study of the functional capabilities of each of them, the scientists identified the most convenient ones that maximally contribute to the creation of presentational information products with a multimedia component [13].

The authors of these research studies have made significant contributions to the theory and practice of using cloud technology in general. However, their investigations focused on specific cloud services or services from particular companies (like Microsoft or Google) and lacked a detailed comparison. In this article, we will attempt to synthesize researchers' findings and conduct a comprehensive comparison of the most well-known services of creating multimedia presentations.

The social significance of comparing cloud-based presentation services can be defined in several ways:

Accessibility to education: In a world where learning and education are becoming increasingly digital, the availability of effective and convenient tools for creating presentations is crucial for education. Comparing services helps educational institutions and students find the best solutions for learning and presenting.

Public speaking and communication: Presentations are widely used in the education and scientific community, and public activities. Using the best presentation creation services can enhance the quality of communication and public speaking.

Economic efficiency: Some cloud services can be free or offer affordable pricing plans, making it easier for users with limited budgets to access presentation creation tools. This is very important for educational organizations.

Globalization and collaboration: Thanks to cloud services, users from around the world can collaborate on presentations and projects. This fosters global collaboration and the exchange of knowledge and ideas.

Environmental impact reduction: The use of cloud services can help reduce paper consumption and other resources, promoting an environmentally friendly approach to creating presentations and documents.

In summary, the social significance of comparing cloud-based presentation services lies in improving the accessibility and quality of education, communication, and collaboration, supporting economically vulnerable organizations, and enhancing the quality of life by reducing environmental impact and increasing productivity.

2. THE RESULTS

2.1. Webometric rating of cloud services creating presentations

There are many cloud services for creating multimedia presentations and using them in the educational environment. Analysis of the literature shows that such services as Prezi

(<https://prezi.com>), Sway (<https://sway.office.com>), Slides (<https://www.slides.com>), PowToon (<https://www.powtoon.com>), Canva (<https://www.canva.com>), ZohoShow (<https://www.zoho.com/show>), Genial.ly (<https://www.genial.ly>), Emaze (<https://www.emaze.com>), Piktochart (<https://piktochart.com>), VideoScribe (<https://www.videoscribe.co>), and others are popular. We conducted a comparative analysis of these platforms, using web analytics tools Ahrefs, Moz, Similarweb to find out their ranking (figure 1, Table 1).

Table 1

Webometric rating of cloud services creating presentations (according to the services Ahrefs, Moz, Similarweb) in May, 2022

Services	Webometric rating (data at 60 days)		Data by Similarweb
	Ahrefs	Moz	Total number of visits (million)
Prezi	90	93	82.56
Sway	93	94	17.3
Google Slides	83	81	1.862
Powtoon	80	70	5.461
Canva	92	92	926.1
Zohoshow	91	87	154.3
Genial.ly	84	85	45.87
Emaze	75	79	1.617
Piktochart	83	84	3.525
VideoScribe	71	53	0.763

Based on the profile of backlinks of web analytics tools Ahrefs and Moz, also called «domain rating (DR)» it was found that the highest indexes (more than 50) have the next services: Sway, Canva, and Prezi, Zohoshow, Piktochart, Genial.ly, Slides, PowToon, Emaze, VideoScribe (figure 1).

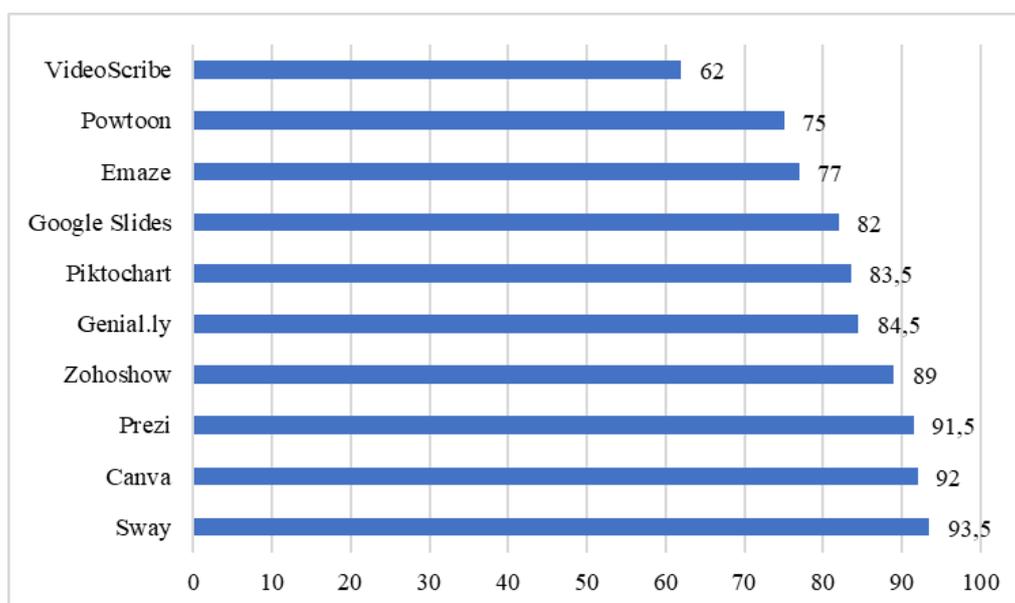


Figure 1. The average domains rating according to Ahrefs and Moz

Services Sway, Canva, and Prezi take the highest position in this ranking. The reason for the high ranking is the extended, multitasking format of service provision. The services offered by these resources allow users to create presentations and different graphics elements,

websites, flyers, blogs, photo albums, posters, and other multimedia content. In addition, the developers of these cloud services are responding quickly to new conditions, including the increased demand for distance learning due to the spread of coronavirus disease (COVID-19). For example, Prezi developers are gradually abandoning traditional slide technology and using integrated data visualization models. A new live video presentation tool brings content onto the screen with users, transcribes audio into text, and automatically generates subtitles, animations, etc. Cloud solutions provide an increased number of visitors and the popularity of cloud platforms through the functionality, evolution, support, and updating. Zohoshow and Slides have taken a reasonably high position in the web analytics ranking. They have a familiar minimalist interface and follow traditional presentation technologies like PowerPoint.

VideoScribe and PowToon do not rank high in this ranking. Nevertheless, these cloud services have their features. For example, VideoScribe is a service for automatically creating whiteboard animations and many other animation styles. It is a unique technology painting - scribing when the speaker's speech is illustrated with a felt-tip pen, pencil, or pen on the workspace. Powtoon combines presentation and cartoon technology. It allows users to create animated presentations by manipulating different multimedia objects. But these technologies are particular, so they are not widespread amount users.

2.2. Comparative analysis of cloud services

Analysis and evaluation of cloud services allow for a complex approach to the choice of cloud educational tools that would meet the requirements of all participants in the educational process.

Determining the effectiveness of the tools for creating presentation materials was in several stages (figure 2):

- Describing and analysis of cloud services' parameters.
- Involvement of experts to evaluate parameters and services in general.
- Determining the coefficient of influence of a parameter on service efficiency.
- Evaluation of services based on specific parameters.
- Synthesis of objective and subjective information to summarize the results.



Figure 2. Stages of comparative analysis of cloud services

In the first stage, we analyzed the features of creating presentation materials in each cloud service and determined the parameters of their evaluation: functionality, usability, price vs quality, individual characteristics, and the impression in general. Let's analyze each criterion.

1. Functionality

Probably the most critical parameter is functionality. This parameter, of course, depends on the quantity and quality of the detected functions in the system. It also needs to focus attention on the features of using these functions for the development of educational presentations.

We determined the following functions:

- Opportunities for collaborative work. This parameter is especially relevant if the teacher organizes group work, for example, on a project. This parameter becomes extremely important when 2 to 3 or more students are working on the project.
- Opportunities for communication. We can be evaluated this possibility in various ways. For example, commenting on a cloud presentation, writing a private message, chatting, etc. This parameter means people can use tools of communication realized on the site. Of course, the users must register on it.
- Converting to different formats. For example, the opportunity to convert to video format is significant in a pandemic when teachers can download presentation materials on video services, and students can view them with the teacher's comments.
- Opportunity to share (embed) the presentation on different services. The Internet has many resources that students and teachers use. However, the ability to physically place materials in one place and distribute it to other services is a unique technology. Teachers can embed the material on the school website, blog, and social and educational networks. It expands the borders of interaction with students and reduces the teacher's work.
- The opportunity to evaluate. Everyone doesn't like to be judged. However, everyone loves to evaluate. The evaluation is feedback, and it is an opportunity for everyone to understand in which direction to move. Therefore, the material evaluation is an essential function. There are different systems for evaluating presentations within various services. For example, the material can have marks "like" or "dislike" or scale rating (from 0-5), etc. But the availability of such tools impacts the use of the service.
- Multilingual interface. This parameter impacts the adaptation of the site for users from different countries. An opportunity to use a service in the native language is an important argument for choosing a service. Language localization of the service contributes to the efficiency of the user, who does not spend extra time translating interface elements and instructions. Multilingualism is a competitive preference of any resource and helps to expand its potential.
- Opportunity to work with user groups. It allows teachers to create classes and track students' activity on the service, evaluate their work, and do different classroom actions. This feature turns the cloud presentation creation service into a system of educational management like Moodle or Classroom.
- Mobile version. This parameter is not very important because editing presentations is still comfortable with a computer. But, the opportunity to view a presentation on a mobile phone and make several edits is a big plus.

2. Usability

The software usability is more related to the interface. The place of elements, access to them, the opportunity to use keyboard shortcuts, navigate the menu, edit presentations, etc. The opportunity to flexibly set up the service and the system's speed is essential too. The simplicity of use depends on the speed of learning work with tools and the effectiveness of their use.

3. Price vs Quality

A significant factor is price. Not every educational institution has the opportunity to use paid services, so one of the system's parameters is, of course, that it's free. However, it is also advisable to consider free features' compliance with the quality of given functions. For example, if the system is entirely free, but the number of saved files in it is small, the functionality of such a site is reduced. Therefore, when evaluating this parameter, it is necessary to evaluate the free opportunities of the service.

4. Individual Features

Each service has a list of standard functions in the set that are required to create presentations. However, each service also has features, unique offers, and technologies, thanks to them they stay popular and are needed in the services market. For example, Prezi has the opportunity to scale slides, Sway can focus on essential parts of the pictures, Emaze has 3D effects, and with PowToon you can use scribing video technology. The evaluation of this parameter also depends on how helpful, needed, and simple this feature is.

5. The impression in general

This parameter we added to evaluate the service in general. Quantitative assessment cannot predict personal feelings while using the service because some factors may provide a more favorable result than the quantitative indicator.

To assess these parameters' impact on the service's effectiveness, we involved experts in expressing their opinion and put the maximum scores for each parameter within 100 points. Table 2 shows the average of this evaluation.

Table 2

Expert assessments to determine the effectiveness of the resource

Number	Parameter	Coefficient of impact (Average)
1	Functionality	35
-	Opportunities for collaborative work	6
-	Opportunities for communication	6
-	Converting to different formats	5
-	Opportunity to share (embed) the presentation on different services	5
-	The opportunity to evaluate	5
-	Multilingual interface	3
-	Opportunity to work with user groups	3
-	Mobile version	2
2	Usability	30
3	Price vs Quality	15
4	Individual Features	10
5	The impression in general	10

The next stage of determining the effectiveness of services was evaluating each service according to the appropriate parameters and calculating the total evaluation of each resource.

$$E = \sum_{i=1}^n A_i K_i \quad (1)$$

E - total evaluation of resource;

n - number of evaluation parameters;

A_i - average of the criterion (10 – available, 0 - not available);

K_i - coefficient of impact.

We ranked the values of the total evaluation for each service in decreasing order (Table 3).

Table 3

Overall evaluation of experts by criteria

Cloud services	Parameters					Total evaluation, <i>E</i>
	<i>Functionality</i>	<i>Usability</i>	<i>Price vs Quality</i>	<i>Individual Features</i>	<i>The impression in general</i>	
Prezi	9	9	7	10	8	870
Google Slides	8	9	7	5	7	775
Canva	9	8	6	7	5	775
Sway	8	9	6	6	7	770
Emaze	7	8	7	10	8	770
ZohoShow	8	7	7	5	5	695
Genial.ly	7	6	6	6	6	635
Piktochart	6	7	6	6	6	630
PowToon	5	7	6	8	6	615
VideoScribe	4	6	4	8	3	490

As you can see, the rating of services (Table 1) and expert assessments (Table 3) have partly different indexes (figure 3).

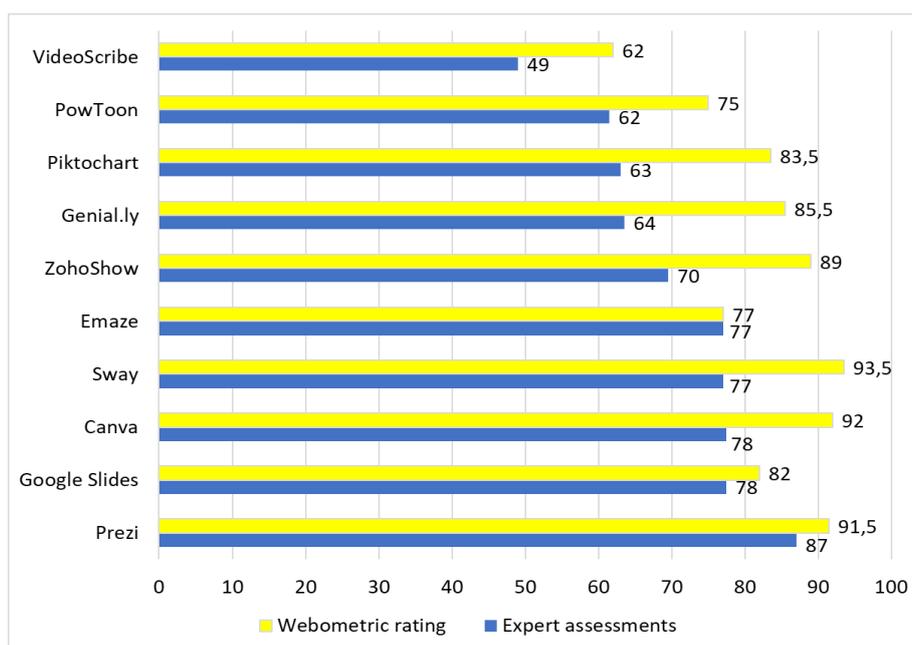


Figure 3. Comparison of average indexes of services by webometric rating and expert assessment

For example, the Sway service has the first rank in the analytical data of the Ahrefs and Moz services, while it is in the fourth position according to experts' assessment. The indicators of Prezi and Google Slides services have different positions, ranking 1st and 2nd in the experts' rating, but according to Ahrefs and Moz, they are in 3rd and 7th positions. There is also a difference in the rating of the Emaze service, where the expert rating is higher (5th position) than its webometric rating (8th position). There are also identical indexes. For example, Powtoon and VideoScribe services occupy the same places both in the webometric rating and in the assessment of experts.

3. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

Cloud services for creating presentations provide great opportunities to develop educational material. Each has many features that allow students to work more effectively and productively.

The services allow users to create presentations and different graphics elements, websites, flyers, blogs, photo albums, posters, and other multimedia content. What is important is that the services enable operational processing of data in real-time, centralized data storage, dynamism, independence from the platform, and simple organization of collaborative work on documents. There are also certain restrictions on the use of services. The main disadvantages are the need for a constant connection to the Internet and its quality.

In the article, we have analyzed the services Sway, Canva, and Prezi, Zohoshow, Piktochart, Genial.ly, Slides, PowToon, Emaze, VideoScribe. We have used such methods as the experts' assessment, rating analysis, and synthesis of objective and subjective information.

The comprehensive assessment of experts revealed the most excellent efficiency of Prezi, Canva, and Google Slides. And it is fair because these tools have a wide range of functionality, opportunities for free accounts, and a convenient and straightforward interface. Domain rating analysis has shown more popularity for Sway, Canva, and Prezi services, indicating the users' demand for these tools.

We see significant potential for further research in conducting such analyses of different services for creating educational materials because it gives a general idea of the effectiveness of its use in the educational process.

Besides, our research about cloud-based presentation services gives important social benefits, including accessibility to education, enhanced communication, and global collaboration. Effective presentation creation tools also promote economic accessibility and reduce negative environmental impact.

The way of evaluating cloud services we proposed in this paper can be used for other services to create educational products that can be effective in the education process. Findings from this study will certainly help academicians, practitioners and researchers to understand the potential of using cloud computing environments from a wider perspective.

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ОЦІНЮВАННЯ ЕФЕКТИВНОСТІ ХМАРНИХ СЕРВІСІВ ДЛЯ СТВОРЕННЯ НАВЧАЛЬНИХ ПРЕЗЕНТАЦІЙ

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Анотація. У статті проаналізовано найпопулярніші хмарні сервіси для створення навчальних презентацій та зроблено спробу визначити ефективність їх використання в освітньому процесі. Вебметричний аналіз хмарних сервісів дозволив виділити 10 популярних ресурсів, які зазвичай використовуються для створення презентацій. Зокрема популярними є Prezi, Sway, Slides, PowToon, Canva, ZohoShow, Genial.ly, Emaze, Piktochart, VideoScribe та ін. Ми провели порівняльний аналіз цих платформ, використовуючи інструменти вебаналітики Ahrefs, Moz, Similarweb, щоб визначити їх рейтинг. Аналіз та оцінка хмарних сервісів дозволяє комплексно підійти до вибору хмарних освітніх інструментів, які б відповідали вимогам усіх учасників освітнього процесу.

Аналіз та оцінка проходили в кілька етапів: опис та аналіз параметрів хмарних сервісів; залучення експертів для оцінки параметрів і послуг загалом; визначення коефіцієнта впливу параметра на ефективність сервісу; оцінка сервісів за конкретними параметрами; синтез об'єктивної та суб'єктивної інформації для узагальнення результатів.

Ми проаналізували особливості створення презентаційних матеріалів у кожному хмарному сервісі та визначили параметри їх оцінки: функціональність, зручність використання, ціна в порівнянні з якістю, індивідуальні характеристики (специфічні функції) та загальне враження.

Для кожного параметра було встановлено фактор впливу, який вказував на важливість цього параметра в загальній оцінці хмарного сервісу.

Комплексна оцінка експертів показала найвищу ефективність Prezi, Canva і Google Slides, що ми вважаємо справедливим, оскільки ці інструменти мають широкий функціонал, можливості безкоштовних акаунтів, зручний і зрозумілий інтерфейс. Аналіз рейтингів доменів показав більшу популярність сервісів Sway, Canva та Prezi, що вказує на попит користувачів на ці інструменти.

Запропонований у роботі спосіб оцінки хмарних сервісів можна застосувати до інших хмарних сервісів для створення освітніх продуктів, які можуть бути ефективними в організації освітньої діяльності суб'єктів освітнього процесу.

Ключові слова: навчання; презентація; навчальні презентації; хмарні сервіси; ефективність хмарних сервісів.

