DATA & METADATA

Check for updates

REVIEW

The use of Google web applications to create a learning environment in war conditions

El uso de las aplicaciones web de Google para crear un entorno de aprendizaje en condiciones de guerra

Olha Voron[1] ✉, Yaroslav Kichuk[2] ✉, Olena Yemelianova[3] ✉, Sergii Stepanov[4] ✉, Nataliia Shevtsova[5] ✉

[1]Department of Pedagogical and Educational Innovations, Rivne Regional Institute of Postgraduate Pedagogical Education, Rivne, Ukraine.

[2]Department of Law and Social Work, Izmail State University of Humanities, Izmail, Ukraine.

[3]Department of Germanic Philology, Faculty of Foreign Philology and Social Communications, Sumy State University, Sumy, Ukraine.

[4]Department of Combined Military Disciplines, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Khmelnytskyi, Ukraine.

[5]Department of Theory and Practice of Romance and Germanic Languages, Faculty of Foreign and Slavic Philology, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine.

ABSTRACT

Introduction: in the modern world the digitalization of educational trends offers many mechanisms for implementation. At the same time their use depends on many conditions. The purpose of this article is to study the peculiarities of using Google web applications to create an accessible and interactive learning environment in wartime. The main objective are using Google tools to implement education in wartime, describe the results of their use, finding its efficiency.

Method: the realization of this goal involves the use of certain scientific methods. In particular, we are talking about the use of a survey and the method of content analysis of scientific literature, which made it possible to compare the Ukrainian experience with the existing paradigms of perception of Google tools in education.

Results: the study results show that Google web applications are an important part of the modern educational process. All applications have a simple and user-friendly interface. The measurements showed that Google Classroom (33,33 %) and Google Meet (26,67 %) are the most used applications. This proves their important role in organizing online classes both at the organizational and direct learning levels. Teachers also use Google Drive, Google Docs, and Google Forms, which fulfill their function in organizing the modern educational process.

Conclusion: the conclusions note that the importance of further research is dictated by the need to take into account new changes and capabilities of the tools.

Keywords: Google Tools; GAFE; Digitalization; E-Learning; Surveys.

RESUMEN

Introducción: en el mundo moderno, la digitalización de las tendencias educativas ofrece muchos mecanismos para su implementación. Al mismo tiempo, su uso depende de muchas condiciones. El propósito de este artículo es estudiar las peculiaridades del uso de las aplicaciones web de Google para crear un entorno de aprendizaje accesible e interactivo en tiempos de guerra. El objetivo principal es utilizar las herramientas de

Google para implementar la educación en tiempos de guerra, describir los resultados de su uso y encontrar su eficiencia.

Método: la realización de este objetivo implica el uso de ciertos métodos científicos. En particular, se trata del uso de una encuesta y del método de análisis de contenido de la literatura científica, lo que permitió comparar la experiencia ucraniana con los paradigmas existentes de percepción de las herramientas de Google en la educación.

Resultados: los resultados del estudio muestran que las aplicaciones web de Google son una parte importante del proceso educativo moderno. Todas las aplicaciones tienen una interfaz sencilla y fácil de usar. Las mediciones mostraron que Google Classroom (33,33 %) y Google Meet (26,67 %) son las aplicaciones más utilizadas. Esto demuestra su importante papel en la organización de clases en línea tanto a nivel organizativo como de aprendizaje directo. Los docentes también utilizan Google Drive, Google Docs y Google Forms, que cumplen su función de organizar el proceso educativo moderno.

Conclusión: las conclusiones señalan que la importancia de seguir investigando está dictada por la necesidad de tener en cuenta los nuevos cambios y capacidades de las herramientas.

Palabras clave: Herramientas de Google; GAFE; Digitalización; E-Learning; Encuestas.

INTRODUCTION

Information technology plays an important role in the development of modern education. They are especially effective in times of crisis or war, when traditional teaching methods may be difficult or even unavailable. In such difficult conditions, Google's web applications contribute to the formation of unique opportunities that affect the creation of a flexible learning environment. Various works by modern scholars have proven the importance of digital education as an important tool for further transformation of the entire educational system.[1,2] Modern researchers have also emphasized the possibilities of improving learning through the use of integrated digital applications.[3]

Google web applications help to provide teachers and students with convenient tools for organizing and monitoring the learning process.[4] Besides, it has also been determined that certain platforms allow for the formation of effective virtual classrooms, online classes, and the storage and distribution of educational materials.[5,6] All of these processes are extremely important in a challenging environment where it is difficult to realize a physical presence in an educational institution.

Peculiarities of the use of modern educational relations are a topical topic that can be traced in numerous modern studies. According to the results of a number of scientists, in recent decades, innovative technologies have completely changed all approaches to learning.[7,8] They contribute to improving the quality of digital or electronic education and provide new opportunities for the development of an innovative learning environment. [9] In addition, the works found in the scientometric databases confirmed that the use of digital technologies contributes to the formation of a person-oriented trajectory, that is, the individualization of education.

According to the results of modern scientists, digital resources make it possible to adapt educational materials to the needs of each student.[10,11] This, in turn, contributes to the formation of a personalized approach to learning. Also, according to Zaitsev,[12] modern technologies contribute to the implementation of successful management, in particular, of an educational institution.According to other studies, it has been determined that modern mobile applications contribute to the formation of individual study plans.[13] It also ensures the calculation of the level of preparation and the speed of assimilation of the material by the students of education. An important direction presented in modern science is highlighting the role of digital means to support the provision of education in conditions of war or other crisis situations.

Aboagye, Yawson & Appiah[14] determined the effectiveness of using e-learning during the COVID-19 pandemic. A study by Meletiou-Mavrotheris, Eteokleous & Stylianou-Georgiou[15] presents the problem of implementing distance learning technologies during a pandemic. The research of Anggraini & Handayani[16] belongs to the theoretical works in which the features of the digitization of education are presented. Besides, the literature has proven that interactive learning materials and multimedia technologies contribute to student engagement.[13,17]

According to Parshyn[18], gamification is also an important trend, as modern digital learning resources built on game elements help engage students in active learning. According to a study by Gupta & Pathania,[19] those students who actively use the technologies of digital tools demonstrate a higher level of communication skills in a digital environment, compared to those who learn by traditional methods. Therefore, the author comes to the conclusion that it is important to integrate innovations into education.

However, the issue of using digital tools in education is still an open and incomplete research. In particular, the authors focused on the use of learning management tools (LMS) and on the analysis of other platforms, in particular Zoom. Therefore, it is important to characterize the potential of using Google tools to support education in the context of war.

Therefore, this study will aim to highlight the importance of Google web applications for the formation of a learning environment in war, focusing on their functionality and accessibility in the context of the implementation of a continuous learning process. Therefore, the purpose of this paper is to analyze the peculiarities of using Google web applications to form an accessible and interactive learning environment in wartime. The main research questions are:

1. What Google tools are used to implement education in wartime?
2. What is the result of their use?
3. Are these applications effective in the educational process?

METHOD
The study was written using a mixed-methods approach. The paper uses materials from a survey of teachers on the key aspects of using Google tools in education and analysis of scientific literature.

Data collection and participants
The process of collecting data for the study took place in stages. First, the scientific literature was found. For this purpose, Google Scholar was used: the following keywords were entered into the search queries of this system: digitalization of education, electronic technologies, Google, digital tools, education, innovative educational technologies, education in war.

A total of 976 results were found. After that, the following date range was entered: from 2018 to 2024. The list of results was reduced to 456. After a brief analysis of the topics and the selection of only those publications related to innovative education or education in war conditions, 254 items were selected for which the following criteria for analyzing abstracts were applied for further inclusion of literature

1. The study characterizes the general state of the use of electronic technologies
2. The paper describes various tools to support education
3. The study has a detailed methodology
4. Contains scientific novelty
5. Inclusion of both theoretical and empirical research

Based on these criteria, 115 papers were selected. The next stage involved analyzing the results and including those papers that met the following criteria:

1. The study characterized the implementation of education in the context of war or pandemics
2. The study indicates the specific stages of its implementation
3. There are references to tools for validating the results
4. The study characterizes the features of using Google platforms
5. Preference was given to empirical research
6. The work has practical significance

Thus, in this way, 40 works were selected for further analysis. The second stage involved collecting data from the survey. In particular, 45 educators from different educational high institutions were selected using snowball sampling. All respondents subsequently agreed to participate in the survey and further interpretation of their answers. The educators had different levels of use of digital tools (see table 1). All of them are from the Zaporizhzhia region (non-occupied part of this region).

Table 1. Teaching Experience and Levels of Use of digital tools in War Conditions				
Teaching experience	**Not used**	**Basic level of use**	**Medium level**	**High level of use**
Up to 5 years	0 %	25 %	50 %	25 %
6-10 years	0 %	20 %	60 %	20 %
11-15 years	0 %	15 %	50 %	35 %
More than 16 years	0 %	15 %	60 %	10 %

Instruments
To implement this study, a survey was conducted among teachers, which addressed the main issues of using Google tools to support learning in war. Initially, the survey focused on the level of use of digital tools and teaching experience. The main part of the survey was devoted to the peculiarities of using Google web applications. Some questions were about assessing the effectiveness of Google tools based on a Likert scale (from 1 to 5).

1. Do you use GAFE to support learning in war? If not, please list other applications you use.
2. What are the main Google tools you use (Google Classroom, Google Meet, Google Forms, Google Drive, Google Docs)?

3. What additional GAFE do you use?
4. For what purpose do you mainly use these applications: for communication, for organizing tasks in a remote format, for distributing educational materials, for organizing test control?
5. Are there any difficulties in using these platforms?
6. How effectively do you evaluate the work of Google applications? (rate from 1 to 5).
7. Please provide further suggestions for improving these tools

Data Analysis

The primary patterns and attitudes of teachers on the use of Google web applications were found through the use of theme analysis techniques in the data analysis process. Key variables, including the frequency of application use, the proportion of teachers and students actively involved, and the effect on educational results, were also processed and quantified using statistical research techniques. These results were compared with findings from related studies using comparative analysis, which revealed trends of higher student participation and better assignment completion rates as a result of using Google products. This method made it possible to describe broad patterns and offered a thorough quantitative evaluation of how Google's capabilities aid in wartime education.

RESULTS

Google's web platforms are available digital tools in the innovative e-learning space. They constitute a complete system to which every Google account holder has access. For this reason, an account user can grant other account holders access to any files, including educational materials. Thus, Google services are characterized by accessibility and speed.

At the same time they help to organize an e-learning environment and create a new educational environment outside of traditional educational institutions. These factors contribute to the intensification of effective cognitive work among students and the development of their digital and analytical skills. Modern teachers use Google Classroom and Google Meet (17,78 % and 13,33 %, respectively) to support learning in the context of war. However, they also use other platforms, with Zoom (33,33 %) and Moodle (26,67 %) leading the way (see table 2).

Table 2. Use of Google Platforms Within the System of Other Educational Platforms in War Conditions		
Platform	**N**	**%**
Zoom	15	33,33 %
Moodle	12	26,67 %
Google Classroom	8	17,78 %
Google Meet	6	13,33 %
Microsoft Teams	4	8,89 %

The most popular service among Ukrainian teachers is Google Classroom, a tool aimed at creating assignments and classifying them, and at speeding up file sharing among all participants in the learning process. Google Classroom has all the necessary features required for the effective implementation of e-learning through the integration of online education. It's worth noting that Google has shaped the learning process in a variety of ways.[20,21]

The teacher-student system is the easiest part to distribute roles.[22] Teachers facilitate the uploading of materials, attach files, and formulate interactive tasks.[23] Comments are added as needed. Other important GAFE are Google Docs and Google Drive, which allow for the publication of individual assignments, videos, texts, and images. All participants have access to a wide range of interactive learning tools in these systems. Quite often, the surveyed teachers use Google Forms to create tests, i.e. to exercise control over learning (see table 3).

Table 3. Usage Distribution of Basic GAFE for Creating a Learning Environment in War Conditions		
Tools of Google	**N**	**%**
Google Classroom	15	33,33 %
Google Meet	12	26,67 %
Google Drive	5	11,11 %
Google Docs	3	6,67 %
Google Forms	10	22,22 %

Google's functionality also includes other additional applications. The authors of the article have identified them as additional because they are not used by all teachers and without other digital tools they do not provide e-learning. In particular, a popular digital tool is Google Pictures, which allows teachers to quickly create a diagram or chart accessible to students.[24] This application is integrated with the Google Docs suite. Other important resources include Google Sites, which helps to create educational websites without requiring users to have deep knowledge of the programming system.

Such additional services as Google Keep (for creating notes), Google Alerts (for creating new publications), and Google Scholar (for finding publications) play an important role. Other additional tools of GAFE are Google Translate and Google Calendar, which have their own advantages and capabilities to help organize the learning process in a timely manner in a time of war. Table 4 shows all the additional tools and the number of responses to them (all responses are taken into account).

| Table 4. Additional Google Apps for Education for Enhancing Learning in War Conditions		
Google tools	N	%
Google Photos (creating tasks)	7	15,56 %
Google Sites (creating a website for training)	2	4,44 %
Google Alerts (creating new publications)	4	8,89 %
Google Scholar (search for scientific publications)	15	33,33 %
Google Translate (translator)	12	26,67 %
Google Calendar (time management)	10	22,22 %

Teachers use the aforementioned Google applications for various purposes, including communication. Google web applications are effective for realizing communication between all participants in the learning process, they facilitate quick messaging from any location.[25,26] In addition, they are important for organizing tasks in a remote format.[27] These web applications also play a separate role in the distribution of educational materials.[25] The web application Google Forms is important for organizing test control, where teachers can create their own tasks (See Table 5).

Table 5. Purposes of Using Google Apps for Education in War Conditions		
Purpose of use	N	%
For communication	14	31,11 %
To organize tasks in a remote format	12	26,67 %
To distribute educational materials	10	22,22 %
For the organization of test control	9	20,00 %

When asked whether there are difficulties in using these platforms, most teachers admitted that there are such applications that are difficult for them to understand. Therefore, an important direction of further improvement of electronic education in the conditions of war is the improvement of digital literacy among teachers. Others also drew attention to certain technical problems, including the remoteness of the Internet.

However, the majority of teachers (48 %) admitted that the Google tools they use are accessible and improve the work of teachers. In addition, they contribute to effective communication and the organization of a person-oriented approach. Therefore, these applications contribute to the optimization of the organization of e-learning in the conditions of war. Evaluations of the effectiveness of applications from Google indicate the importance of their use in the modern educational process. In particular, 6,67 % rated it ineffectively, and 17,78 % rated it satisfactorily. However, the majority of respondents rated the work of these tools as effective and very effective (33,33 % and 40 %, respectively) (See figure 1).

■ %	1	2	3	4	5
	2.22%	6.67%	17.78%	33.33%	40%
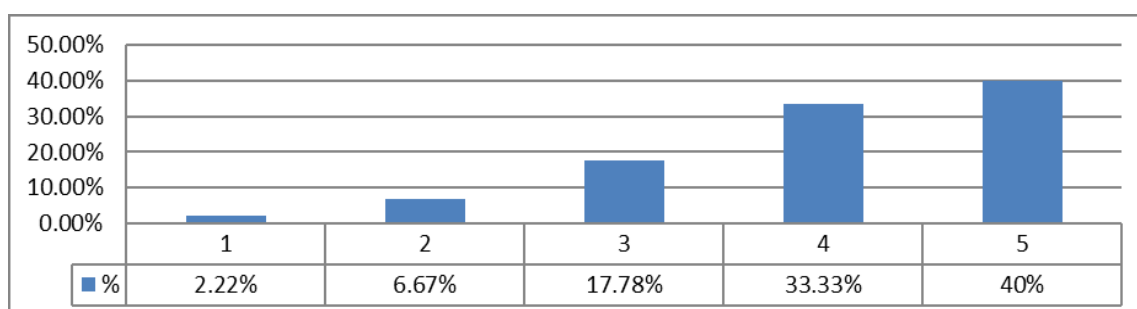
Figure 1. Evaluation of the effectiveness of the use of Google web applications

Thus, modern teachers have highly appreciated these applications. However, in order to further use them, teachers should use and develop skills in using Google's digital tools both when organizing and implementing the direct learning process in electronic or blended form in critical environments.

DISCUSSION

The proposed results were aimed at investigating the use of Google applications by teachers to organize and support the educational process under martial law. The findings made it possible to identify the importance of using such tools in wartime education. Despite the fact that the subject of this study was the analysis of Google web applications, this work has shown that Zoom (33,33 %) and Moodle (26,67 %) are the most popular platforms among teachers. These opinions are in line with the findings of Vasilache,[28] who found that Zoom was the most commonly used blended learning tool during the COVID-19 pandemic.

However, the use of Google Classroom (17,78 %) and Google Meet (13,33 %) in this study is also supported by other sources that emphasize the growing popularity of Google for education. The proposed results indicate the relevance of Google Classroom and Google Meet in the organization of the educational process, which is generally consistent with the results of other researchers,[29] who noted that the proposed tools provide convenient access to educational materials and the ability to conduct online classes.[30,31] Other studies indicate[32,33] that teachers often use Google Drive and Google Docs to collaborate on documents, which is confirmed by our data (22,22 % and 11,11 %, respectively).

These results also indicate the active use of other tools that are important for understanding the functionality of Google web applications. In particular, the Google Calendar function and its popularity revealed in the survey (22,22 %) generally confirms the findings of other researchers who note the importance of such a tool in the field of planning and coordinating classes, organizing the educational process.[34] It is also noted that the results emphasize the active use of Google Translate by teachers (17,78 %). This coincides with the findings that it is also actively used by teachers, which coincides with Yonata[35] about its role in overcoming language barriers in the educational process.

The proposed study demonstrates that the main purpose of using Google applications is to establish communication and organize tasks for conducting classes in a distance (blended) format. These results generally confirm the findings of other researchers on the importance of such functions to support distance learning.[36] It is important that under martial law, distance elements have become a reliable way to organize the educational process. Therefore, taking into account the importance of supporting distance learning is an extremely relevant challenge for the Ukrainian education system.

The use of web applications to use teaching materials and set up test controls can also be confirmed by the findings of other researchers who have also empirically demonstrated the convenience of such functions for teaching.[37,38] Besides, the majority of respondents identified Google apps as effective tools. This is in line with the findings of other researchers.[39,40] Moreover, a fairly small proportion of teachers who have worked with Google tools evaluate them less positively (satisfactorily or ineffectively), which can be explained by individual technical problems in their work or gaps in the acquisition of relevant digital competencies. Such reasons are most often mentioned in the scientific literature.[41,42,43]

So, in general, the results confirm the global trends in the use of digital tools in the educational process, especially in times of crisis, including those related to military events.[44,45] Google applications are important elements in the field of continuing education, which allows teachers and students to receive the necessary tools for further effective communication, conducting classes, taking into account the results of tasks of using educational materials.

The proposed methodology has certain limitations. First of all, the survey was conducted in the context of the military aggression of the Russian regime and its troops against Ukraine. For this reason, some results may be recorded in a hurry, taking into account only the subjective experience of the respondents. This means that answers may vary not only depending on the professional training and skills of teachers, but also on the conditions (including extreme ones) in which they have to work. In such circumstances, certain errors in the survey could be introduced, as respondents might have provided different answers under different conditions. The use of Likert scales also has a certain degree of subjectivity, as it may sometimes be difficult for respondents to distinguish between their experiences and demonstrate them clearly in related scores. Given this, individual results may also be subject to adjustment, albeit only slightly, as all respondents are able to justify a low or high score.

Another methodological limitation is the emphasis on the use of English-language literature, which to some extent affects the final results and discussion. Taking into account the positions of English-language articles and monographs makes it possible to assess the state of development of the problem on a global scale. However, some opinions published in works written in other languages may have fallen out of the scope of the study. In view of this, it is important to identify foreign-language works in future studies that may become a significant source of information in the future.

When working with the proposed results, it is also worth considering that the used snowball sampling method has its limitations that must be taken into account. First of all, it is said that this methodology is not a random sampling method. Its feature is the attraction of new respondents through already existing persons who have agreed to participate in the survey. Such a phenomenon can lead to bias and unreliable results, because individual respondents may prefer contacts with people with similar interests. Therefore, the quality of the sample strongly depends on the choice of the first respondents. Under such conditions, it is difficult to fully verify the received data. However, even taking into account possible distortions, this methodology is often used and has its positive aspects.

CONCLUSIONS

Thus, Google web applications have become an integral part of the modern efficient and organised educational process under martial law in Ukraine. All applications have a simple and user-friendly interface, which facilitates their active use in educational institutions. The study conducted on the example of higher education institutions in Zaporizhzhia showed that the most popular tools for organising online classes are Google Classroom and Google Meet, which indicates their key role both at the organisational level and directly in the learning process.

In addition, Google Drive, Google Docs, and Google Forms are widely used, mainly for storing, processing, and evaluating learning materials. Additional popular tools include Google Calendar, Google Translate and Google Scholar, which are important for planning, communication and dissemination of professional scientific publications, which contributes to the organisation of effective learning.

The main areas of use of Google applications in Zaporizhzhia higher education institutions include communication and organisation of tasks in a remote format. Modern teachers also use these tools to distribute teaching materials and organise test control. The study fills a gap in determining the role of Google tools in supporting learning during the war in Ukraine and demonstrates the effectiveness of their further use. It should be noted that Google applications are constantly evolving, changing their functionality and scope. In such circumstances, further study of these issues is extremely relevant, as changes and transformations will require further scientific analysis and understanding.

REFERENCES
1. Ebner M, Schön S, Braun C, Ebner M, Grigoriadis Y, Haas M, Leitner P, Taraghi B. COVID-19 epidemic as e-learning boost? chronological development and effects at an austrian university against the background of the concept of "e-learning readiness". Future Internet. 2020;12(6):94. https://doi.org/10.3390/fi12060094

2. Rahmanov F, Neymatova L, Hashimova A, AghazadaT. Quantitative appraisal and scientometric exploration into the digitization of education. Financial and Credit Activity Problems of Theory and Practice. 2024;2(55):588–606. https://doi.org/10.55643/fcaptp.2.55.2024.4385

3. Parlińska A. E-learning challenges in Poland during the covid-19 pandemic. Zeszyty Naukowe SGGW, Polityki Europejskie, Finanse i Marketing. 2022;27(76):80–88. https://doi.org/10.22630/pefim.2022.27.76.7

4. Varianytsia L, Musiienko V, Kolenko A, Huda O, Stozub V. Google Classroom Learning Cloud Environment in the Modern Information and Digital Society. Journal of Curriculum and Teaching. 2023;12(5):14. https://doi.org/10.5430/jct.v12n5p14

5. Fauzan F, Arifin F. The Effectiveness of Google Classroom Media on the Students' Learning Outcomes of Madrasah Ibtidaiyah Teacher Education Department. Al Ibtida: Jurnal Pendidikan Guru MI. 2019;6(2):271. https://doi.org/10.24235/al.ibtida.snj.v6i2.5149

6. Abazi-Bexheti L, Kadriu A, Apostolova-Trpkovska M, Jajaga E, Abazi-Alili H. (2018). LMS Solution: Evidence of Google Classroom Usage in Higher Education. Business Systems Research Journal. 2018;9(1):31–43. https://doi.org/10.2478/bsrj-2018-0003

7. Barakat N, Al-Shalash A, Biswas M, Chou S-F, KhajahT. Engineering experiential learning during the COVID-19 pandemic. In Mobility for smart cities and regional development - challenges for higher education. Springer International Publishing; 2022, p. 991–1003. https://doi.org/10.1007/978-3-030-93907-6_105

8. Gaman P, Yarovoi T, Shestakovska T, Akimov O, Akimova L. Institutional platform to ensure the interaction between the subjects of combating medical and biological emergencies mechanism. Economic Affairs. 2022;67(4):765-775. https://doi.org/10.46852/0424-2513.4s.2022.10

9. Muzaffar AW, Tahir M, Anwar MW, Chaudry Q, Mir SR, Rasheed Y. A systematic review of online exams solutions in e-learning: techniques, tools, and global adoption. IEEE Access. 2021;9:32689–32712. https://doi.org/10.1109/access.2021.3060192

10. Muliarevych O, Saienko V, Hurbanska A, Nowak B, Marushchak O. Digital learning hubs as a component of the information and digital learning environment. Journal of Curriculum and Teaching. 2023;12(5):24-35. https://doi.org/10.5430/jct.v12n5p24

11. PoórJ, Sasvári P, Szalay Z, Pető I, Gyurián N, Suhajda C, Zsigri F. The implementation and management of e-learning in companies: The state of e-learning in Hungary based on empirical research. Journal of Engineering Management and Competitiveness. 2020;10(1):3–14. https://doi.org/10.5937/jemc2001003p

12. Zaitsev S. The role of management accounting in the sustainable development of small enterprises: an analytical review of challenges and opportunities. Law, Business and Sustainability Herald. 2023;3(1):33–45. https://lbsherald.org/index.php/journal/article/view/42

13. Shevchenko Y, Dubiaha S, Huz V, Melash V, Varenychenko A, Saenko Y. Training of Primary School Specialists Taking Into Account Up-to-Date Opportunities for Self-Improvement. Journal of Higher Education Theory and Practice. 2021;21(14). https://doi.org/10.33423/jhetp.v21i14.4815

14. Aboagye E, Yawson JA, Appiah KN. COVID-19 and E-Learning: The Challenges of Students in Tertiary Institutions. Social Education Research. 2020;109–115. https://doi.org/10.37256/ser.122020422

15. Meletiou-Mavrotheris M, Eteokleous N, Stylianou-Georgiou A. Emergency remote learning in higher education in Cyprus during COVID-19 lockdown: A zoom-out view of challenges and opportunities for quality online learning. Education Sciences. 2022;12(7):477. https://doi.org/10.3390/educsci12070477

16. Anggraini R, Handayani Y. Digitalisation in education: A literature review. Journal of Digital Education, Communication and the Arts. 2022;4(2):62–73. https://doi.org/10.30871/deca.v5i01.2942

17. Méndez VG, Suelves DM, Méndez CG, Mas JAR-L. Future teachers facing the use of technology for inclusion: A digital competence perspective. Education and Information Technology. 2022;28:9305–9323. https://doi.org/10.1007/s10639-022-11105-5

18. Parshyn I. Gamification in teaching the history of the middle ages: creating an interactive school textbook. Collection of Scientific Papers "SCIENTIA". 2024;157–158. https://previous.scientia.report/index.php/archive/article/view/1814

19. Gupta A, Pathania P. To study the impact of Google Classroom as a platform of learning and collaboration at the teacher education level. Education and Information Technologies. 2020. https://doi.org/10.1007/s10639-020-10294-1

20. Heggart K, Yoo J. Getting the most from google classroom: a pedagogical framework for tertiary educators. Australian Journal of Teacher Education. 2018;43(3):140–153. https://doi.org/10.14221/ajte.2018v43n3.9

21. Zawacki-Richter O. The current state and impact of Covid-19 on digital higher education in Germany. Human Behavior and Emerging Technologies; 2020. https://doi.org/10.1002/hbe2.238

22. Danilyan OG, Dzeban AP, Kalinovsky YY, Kalnytskyi EA, Zhdanenko SB Personal information rights and freedoms within the modern society. Informatologia. 2018;51(1-2):24–33. https://doi.org/10.32914/i.51.1-2.3

23. Iskakova M. Electronic technologies to ensure individual learning of education seekers with special needs. Futurity of Social Sciences. 2023;1(1):4–20. https://doi.org/10.57125/FS.2023.03.20.01

24. Storonyanska I, Kinal N. Investing of the sphere of culture in Ukraine: Sources and peculiarities. Financial and Credit Activity Problems of Theory and Practice. 2023;1(48):127–138. https://doi.org/10.55643/fcaptp.1.48.2023.3973

25. Warid H, Musyarofah L, Taufik KS. (Sustainability of a moodle-based learning management system (lms)

based on post-graduate students' perspectives. Budapest International Research and Critics Institute (BIRCI-Journal); 2022. https://doi.org/10.33258/birci.v5i1.4250

26. Wiyono N, OktabriantoO. Implementasi dan Evaluasi Moodle dalam Menunjang Pembelajaran Daring Menggunakan Technology Acceptance Model. Jurnal Basicedu. 2021;5(6):5929–5936. https://doi.org/10.31004/basicedu.v5i6.1681

27. Buriak I, Skaletska Z, Rezvorovych K, Gigin O. Future legal culture as an element of the legal system. Futurity Economics & Law. 2023;3(2):39–47. https://doi.org/10.57125/FEL.2023.06.25.03

28. Vasilache S. Suddenly online: Active learning implementation strategies during remote teaching of a software engineering course. In Mobility for smart cities and regional development - challenges for higher education. Springer International Publishing; 2022, p. 395–402. https://doi.org/10.1007/978-3-030-93904-5_40

29. McKenzie D. Intellectual disability in inclusive education in South Africa: Curriculum challenges. Journal of Intellectual Disability Policy and Practice. 2020;18(1):53–57. https://doi.org/10.1111/jppi.12337

30. Kumar JA, Bervell B. Google Classroom for mobile learning in higher education: Modelling the initial perceptions of students. Education and Information Technologies. 2019;24(2):1793–1817. https://doi.org/10.1007/s10639-018-09858-z

31. Rudenko O, Kharkov S. Philosophical studies of the future in the context of postmodern knowledge: theory, methodology. Futurity Philosophy. 2023;2(3):4–16. https://doi.org/10.57125/FP.2023.09.30.01

32. Swain S, Londhe P, Patil J, Bansu PS. Rewards system for google classroom. International Journal for Research in Applied Science and Engineering Technology. 2022;10(11):1397–1425. https://doi.org/10.22214/ijraset.2022.47595

33. Wray E, Sharma U, Subban P. Factors influencing teachers' self-efficacy in inclusive education: A systematic review of the literature. Teaching and Teacher Education. 2022;117:103800. https://doi.org/10.1016/j.tate.2022.103800

34. Martin BA. Teachers perceptions of google classroom: revealing urgency for teacher professional learning. Canadian Journal of Learning and Technology. 2021;47(1). https://doi.org/10.21432/cjlt27873

35. Yonata F. Teaching and assessing intercultural communicative competence – revisited. Intercultural Education. 2022;33(3):355–357. https://doi.org/10.1080/14675986.2022.2071038

36. Korol S. Integrated thinking in business: conditions and advantages of implementation (the context of integrated reporting). Financial and Credit Activity Problems of Theory and Practice. 2024;2(55):519–530. https://doi.org/10.55643/fcaptp.2.55.2024.4333

37. Williams TL, Walker E, Ludlum M, Edwards M, Gregory K. Online learning during the Covid crisis: Student perspectives. Journal of Higher Education Theory and Practice. 2023;23(2). https://doi.org/10.33423/jhetp.v23i2.5818

38. Svensson E, Pendrill A-M, Pelger S. Teaching with Google Classroom. Educare - Vetenskapliga Skrifter. 2020;(4):158–191. https://doi.org/10.24834/educare.2020.4.7

39. Perrotta C, Gulson KN, Williamson B, Witzenberger K. Automation, APIs and the distributed labour of platform pedagogies in Google Classroom. Critical Studies in Education. 2020;1–17. https://doi.org/10.1080/17508487.2020.1855597

40. Rajab KD. The effectiveness and potential of e-learning in war zones: an empirical comparison of face-to-face and online education in Saudi Arabia. IEEE Access. 2018;6:6783–6794. https://doi.org/10.1109/access.2018.2800164

41. Kalmykova O. Ukraine, Russia, and international law: occupation, armed conflict and human rights. Law, Business and Sustainability Herald. 2022;2(2):4–10. https://lbsherald.org/index.php/journal/article/view/36

42. Syakur A, Sugirin, Widiarni. The effectiveness of English learning media through Google Classroom in higher education. Britain International of Linguistics Arts and Education (BIoLAE) Journal. 2020;2(1):475–483. https://doi.org/10.33258/biolae.v2i1.218

43. Kharchuk T, Purdenko O, Melnik V, Shkolenko O, Kosmidailo I. Conceptual approach to formation of innovative entrepreneurship`s creative potential. Financial and Credit Activity Problems of Theory and Practice. 2023;1(48):362–377. https://doi.org/10.55643/fcaptp.1.48.2023.3967

44. Vasiutiak I, Babych O, Shoptenko-Ivanova O, Zhuravlova A, Myroniuk N, Nebesnyk A. The role of sports dance in ensuring the motor activity of students. International Journal of Human Movement and Sports Sciences. 2021;9(6):1299–1305. https://doi.org/10.13189/saj.2021.090625

45. Vanahans M, Timosztsuk I, Uibu K. Preschool and primary school teachers' assessment of their training, competence and experience in teaching newly arrived migrant students. Eesti Haridusteaduste Ajakiri. Estonian Journal of Education. 2023;11(1):103-129. https://doi.org/10.12697/eha.2023.11.1.05

FINANCING

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION
Conceptualization: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Data curation: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Formal analysis: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Research: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Methodology: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Project management: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Resources: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Supervision: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Display: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.
Writing - proofreading and editing: Olha Voron, Yaroslav Kichuk, Olena Yemelianova, Sergii Stepanov, Nataliia Shevtsova.