



Digital Tools for Optimizing the Educational Process of a Modern University under Quarantine Restrictions

Nadiia A. Bachynska¹

Oksana Z. Klymenko²

Tetiana V. Novalska³

Halyna V. Salata⁴

Vladyslav V. Kasian⁵

Maryna M. Tsilyna⁶

Journal for Educators, Teachers and Trainers, Vol. 13 (5)

<https://jett.labosfor.com/>

Date of reception: 21 Aug 2022

Date of revision: 12 Oct 2022

Date of acceptance: 20 Oct 2022

Nadiia A. Bachynska, Oksana Z. Klymenko, Tetiana V. Novalska, Halyna V. Salata, Vladyslav V. Kasian, Maryna M. Tsilyna (2022). Digital Tools for Optimizing the Educational Process of a Modern University under Quarantine Restrictions *Journal for Educators, Teachers and Trainers*, Vol. 13(5). 418-426.

¹PhD in Pedagogics, Head of the department, Department of Information Technology, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

²PhD in History, Head of the department, Department of Science Publications, Institute of Library Science, V. I. Vernadskyi National Library of Ukraine, Kyiv, Ukraine.

³Doctor of History, Professor, Department of Information Technology, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

⁴Doctor of History, Associate Professor, Department of Information Technology, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

⁵PhD in Philosophy, Senior lecturer, Department of Document Science, Information and Analytical Activities, Faculty of Information Policy and Cyber Security, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

⁶PhD in Philology, Associate Professor, Department of Documents and Informationanalytical Activities, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.



Digital Tools for Optimizing the Educational Process of a Modern University under Quarantine Restrictions

Nadiia A. Bachynska¹, Oksana Z. Klymenko², Tetiana V. Novalska³, Halyna V. Salata⁴, Vladyslav V. Kasian⁵, Maryna M. Tsilyna⁶

¹PhD in Pedagogics, Head of the department, Department of Information Technology, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

²PhD in History, Head of the department, Department of Science Publications, Institute of Library Science, V. I. Vernadskyi National Library of Ukraine, Kyiv, Ukraine.

³Doctor of History, Professor, Department of Information Technology, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

⁴Doctor of History, Associate Professor, Department of Information Technology, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

⁵PhD in Philosophy, Senior lecturer, Department of Document Science, Information and Analytical Activities, Faculty of Information Policy and Cyber Security, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

⁶PhD in Philology, Associate Professor, Department of Documents and Informationanalytical Activities, Faculty of PR, Journalism and Cybersecurity, Kyiv National University of Culture and Arts, Kyiv, Ukraine.

Email: na.bachynska@gmail.com¹, klymenko.oz@ukr.net², tetiana.n.1000@gmail.com³, salata.hv@bigmir.net⁴, kasjan.vv@gmail.com⁵, macilin@ukr.net⁶

ABSTRACT

Aim: The study is topical because of the provision of distance learning based on the experience of Kyiv National University of Culture and Arts. **Method:** Systemic, socio-communicative, competence approaches, sociological methods (questionnaires and interviews) were chosen as methodological tools of the research. **Participants:** The sample consisted of 120 students and 30 teachers of the Department of Information, Library and Archival Affairs who were selected during the draw. **Data collection:** The survey was conducted using Google Forms and mathematical package of statistical data processing Statistica 6.1. **Data analysis and results:** The results of a survey of teachers and entrants to higher education institutions on the topic "Using social networks and digital platforms for online classes under the conditions of quarantine restrictions" allowed to scientifically substantiate the need for deeper knowledge of such tools as Google Meet (79%), Zoom (13.78%) and Google Classroom (11.62%), which are preferred by entrants. Almost a third of entrants (34.26%) noted the lack of scientific and methodological support for learning the subjects. The study showed high efficiency of messengers in distance education. The study found that in the process of organizing communication in the student-teacher system, it is necessary to consider the priority of Telegram on the basis of which it is necessary to implement a chatbot for convenient and effective exchange of information about the educational process. Further research should focus on the effectiveness of the use of Telegram. The effectiveness of using chatbots should also be considered. Chatbots can be used to automate routine components of the learning process.

Keywords: Digital competencies, Digital education, Educational platforms, Messengers, Social networks.

INTRODUCTION

In today's information society, without mastering interactive technologies and the ability to use computer tools to solve everyday tasks, the realization of a person's creative potential in science, culture, production, business, and other spheres of life is unthinkable. In pedagogical practice, the concept of "active methods and forms of learning" has long been used. It unites a group of pedagogical technologies that achieve a high level of student activity (Ortynskiy, 2017).

Given the quarantine restrictions and the introduction of distance learning formats for higher education, it is important to determine the most effective teaching methods and communication tools for the introduction of interactive interaction between key actors in the learning process. A large number of specialized educational platforms that require the formation of a high level of digital competencies of teachers and students, including students majoring in 029: Information, Library and Archival Affairs, encourages the identification of the best

tools for training under quarantine restrictions. The introduction of a student-centred approach to the organization of the educational process involves monitoring students' satisfaction with the rationality and efficiency of building two-way communication links in the system "Student — Teacher" through an anonymous online survey. This is consistent with the policy of development of the Kyiv National University of Culture and Arts as a leading institution of higher education in the field of culture and art, positioning it as a digital university of the XXI century. In the conditions of quarantine restrictions the qualified scientific and pedagogical personnel actively and purposefully introduces new approaches to the organization of distance forms of training taking into account needs and wishes of applicants.

Education, as a result, implies a set of acquired knowledge, abilities, skills, value attitudes, experience, and competencies of a particular volume and complexity with the aim of intellectual, spiritual and moral, creative, physical, and (or) professional development of a person, the satisfaction of his needs and interests (Kovalchuk, 2020). Education is a single purposeful process of upbringing and learning, which is a socially significant good. The use of digital tools is, first of all, dialogic learning, built on the interaction of students with the learning environment, the educational environment, which serves as the domain of learned experience, during which the teacher and student interact (Chugh & Ruhi, 2018). Based on the use of digital tools, the educational process is organized in such a way that almost all students are involved in the learning process, and they have the opportunity to understand and reflect on what they know and think. In mastering the educational material, students carry out joint activities.

The purpose of the article is to identify the best digital distance learning tools based on the feedback of students and teachers on the convenience of using social networks and distance learning platforms for online classes as an important component of the educational process of students majoring in 029: Information, Library and Archival Affairs under quarantine restrictions.

The task of the study is to analyse and interpret the results of the questionnaire in order to implement recommendations for the use of the most productive social networks and platforms to optimize the learning process under quarantine restrictions.

In order to objectively and comprehensively present the results of the questionnaire, its classical algorithm was used: formulation of the purpose of the questionnaire — questions — answers — processing of the results — interpretation of the results.

LITERATURE REVIEW

Quarantine restrictions have led to a significant transformation in the activities of higher education institutions, which have introduced an online format of the educational process. It is worth noting that researchers are constantly studying the possibilities of the Internet in meeting the information needs of participants in higher education analysis of features and abilities of online systems and tools meeting information needs of HEI's entrants (Zhezhnych et al., 2019) educational process in higher education (Al-Rahmi et al., 2015; Anderson, 2019; Dumpit & Fernandez, 2017; Hung & Yuen, 2010) and as technologies for continuing education in pandemic and quarantine conditions (Anisimova, Kovalska & Peleshchyshyn, 2019). Thorough analysis of modern approaches to the use of technology and social media in higher education abroad Technology and Social Media Usage in Higher Education was presented by Aldahdouh, Nokelainen and Korhonen (2020) and Chugh and Ruhi (2018). We agree that it should be borne in mind that social networks cannot replace distance learning, but their synergy in information and significantly increase opportunities for communication and practical communication opportunities, interest students and promote their inclusion, etc. active participation in the learning process. "At the same time, it should be borne in mind that social networks cannot replace distance learning systems, but their synergy within information and communication work and practical work opportunities will significantly increase communication opportunities, interest students and promote their inclusion and more active participation in the learning process" (Anisimova, Kovalska & Peleshchyshyn, 2019, p. 139).

Peculiarities of the organization and methods of distance learning are covered in the works of Artyushina, Kotykova and Romanova (2007), Bogaychuk (2018), Burdeyna (2019), Ortynskyi (2017), Pidlasyi (2004), Pometun and Pirozhenko (2002). Among the effective teaching methods, experts justify the need to attract interactive Internet resources, which allows the use of text, audio and video materials in order to intensify the formation of knowledge, skills and abilities of students (Bogaychuk, 2018). The latest interactive teaching methods help to accelerate the change of the traditional model of learning (reproductive, informational and explanatory, i.e. the transfer of ready-made knowledge) to personal-developmental, which involves the development of creative abilities of the student (Kovalchuk, 2013). The World Economic Forum (2020) has announced a list of "future skills" for the next five years. Among them, for the first time - and immediately in second place — appeared "active learning and learning strategies". The main means of improving the efficiency of the educational process are the use of problem-based and interactive teaching methods, including in the distance format. According to researchers Ortynskyi (2017) and Slepkan (2005), as well as the World Economic Forum (2020), the optimization of the educational process in higher education institutions involves the choice of

methods that ensure the best results in the minimum time and with minimal effort of the teacher and students under these conditions. It is worth agreeing with Burdeyna (2019) that optimization is impossible without monitoring the level of satisfaction of students with the quality and efficiency of the educational process, the establishment of effective feedback channels in the system "Student — Teacher".

Improving the quality of teaching disciplines with the use of distance technologies during the quarantine period has already been the subject of a survey of students of domestic higher education institutions (Antonyuk & Kos, 2020; Bila Tserkva National Agrarian University, 2020; Kovalchuk, 2020).

The study of this experience allowed the departments of information technology, document science and information-analytical activities of Kyiv National University of Culture and Arts to improve the method of questionnaires and conduct it among participants in the educational process of students majoring in 029: Information, Library and Archival Affairs on "Using social networks and distance learning platforms for online classes under conditions of quarantine restrictions". The main principles of the survey are voluntariness, anonymity and confidentiality. Based on them, a questionnaire was developed, the answers to which were joined by 107 applicants for three educational programs: "Management of social communication networks, Internet marketing", "Management of library and information systems and technologies", "Documentation, management of public authorities and administration". The questions of the questionnaire were aimed at studying the quality and effectiveness of communication links in the subject-subject interaction of teachers and students, the comfort of organizing their educational environment. The main purpose of the questionnaire is to identify problems and find ways to solve them in order to improve the educational process in terms of distance student-centred learning.

Research questions

1. To study the opinion of students regarding the ease of use of platforms for organizing online education.
2. Identify optimal communication channels in the "Student-Teacher" system in the conditions of distance education.

METHODS

Research design

Systemic analysis of the content and technologies of teaching, reliance on the didactic law of integrity and unity of the pedagogical process, based on the principles of clarity, complexity, accessibility of educational content, allowed to determine criteria for evaluating the effectiveness of various types of digital learning tools.

The study was conducted in several stages.

The experimental work took place in three stages.

Stage I of the experiment (2020) is summative. Experimental work at this stage involved preparation for the study.

Stage II of the pedagogical experiment (February - May 2021) is formative. At the formative stage, the content of the experimental work included:

- development of the Experimental Work Programme;
- introduction of pedagogical conditions of the use of digital educational tools;
- control over the course of the pedagogical experiment with the help of questionnaires;
- analysis and processing of the results obtained during the experiment;
- summarizing the results of the pedagogical experiment.

Stage III of the pedagogical experiment (September 2021) is final. The content of this stage of the experiment included systematization and generalization of the results of experimental work, drawing conclusions.

Participants

The sample consisted of 120 students and 30 teachers of the Department of Information, Library and Archival Affairs who were selected during the draw. Such a sample allowed conducting a representative study. All respondents were informed about the need to answer the questions contained in the questionnaire honestly and truthfully. Respondents' consent for the processing of their data and the use of the obtained results in scientific work was obtained. The distribution of the sample was as follows: men — 41.2%, women — 58.8%. The main contingent of students who took part in the survey are students aged 18-20. Respondents from among teachers were distributed as follows: 25-35 years — 10.1%, 36-50 years — 83.1%, over 51 years — 5.8%, 1% of respondents did not indicate their age.

Data collection tools

Systemic, socio-communicative, competence approaches, sociological methods (questionnaires and interviews) were chosen as methodological tools of the research. The combination of heuristic potential of systemic and socio-communicative approaches allowed identifying key actors in the educational process — teacher and student, to model the system of direct and feedback communication provided in distance learning by specialized

educational platforms based on additional, more efficient and flexible communication tools (messengers of social networks Telegram, Instagram, Viber, etc.).

The methodology chosen for the study allowed considering the subject of study — the results of a survey of teachers and applicants for the Major 029: Information, Library and Archival Affairs of Kyiv National University of Culture and Arts at two levels — current and prognostic.

University students were asked to answer a number of questions related to their satisfaction/dissatisfaction with the learning process and the work of the teaching staff; the difficulties they encountered in the online learning process, as well as the use of information and communication technologies during the studies and the ability of teachers to use them to achieve learning objectives. It was also important to find out if students would like to continue their studies online. Moreover, the current sanitary and epidemiological situation in the world, in the country and in our university has forced us to switch to the distance education again, and the success of the whole learning process depends on how students react to the new requirements.

Data analysis

Scientific generalization of the results of the survey allowed not only to establish the level of compliance of expectations of applicants with the real state of effectiveness of distance learning technologies, but also to determine the reserves of improvement, organization of the educational process under quarantine restrictions. The survey was conducted using Google Forms and mathematical package of statistical data processing Statistica 6.1.

RESULTS

The survey was a real opportunity for students to objectively assess the quality of educational services and develop recommendations for improving the organization and efficiency of distance learning. The obtained data in the form of statistical generalizations helped to identify reserves for optimizing the educational process at the Faculty of Information Policy and Cyber Security of Kyiv National University of Culture and Arts, which is a prestigious institution of higher education and has a good reputation for high quality teaching, democracy, friendliness and tact. In total, the questionnaire consisted of ten questions. The last question — suggestions for improving online learning — was the most valuable in terms of the number of answers offered.

Determining the most convenient platform (question 1, Table 1) 76,82% of students preferred Google Meet, 11,04 % — Zoom and 9,52 % — Google Classroom. In fact, two thirds of respondents (74,14%) preferred lectures-presentations (question 2, Table 2) as the optimal form of learning material online and almost a third (27,46%) of respondents were in favour of a traditional lecture.

Table 1: The most convenient platform for online classes

What is the most convenient platform for you to conduct online classes				
course	Google Meet	Zoom	Google Classroom	other
1.	82.6 %	8.69 %	–	13.04 %
2.	63.63 %	22.72 %	–	13.63 %
3.	85.71%	7.14 %	14.28 %	–
4.	69.04 %	–	33.33 %	4.76 %
5	83.33 %	16.66 %	–	–

Thus, the data presented in Table 1 indicate the willingness of students to use distance education tools. However, the share of students who prefer the traditional lecture remains quite large. However, despite this, we can conclude that the level of digitization of education is currently relatively high.

Table 2: The optimal form of learning material online

To learn the material online in your opinion, the optimal form of filing is			
course	traditional lecture	traditional lecture	other
1.	26.08 %	95.65 %	–
2.	13.63 %	72.72 %	13.63 %
3.	42.85 %	64.28 %	7.14 %
4.	21.42 %	71.42 %	11.9 %
5.	33.33 %	66.66 %	–

To question 3, which concerned the adequacy of scientific and methodological equipment for mastering the discipline on the Google Classroom platform, 65,72% of students gave an affirmative answer, and 34,26% — noted the need to increase the number of guidelines for independent work of students.

Google Meet (97,22%) was unanimously recognized as the most convenient platform for group teacher consultations (question 4), and the Google Classroom educational environment received the least positive answers (3,46%).

Answers to the relevance of using communication channels of students with teachers for educational, educational purposes or to address organizational and personal issues (question 5, the number of answers — unlimited) are: social network messengers — 69,22%, digital platform for online classes — 44,36%, by phone — 41,89%, via e-mail — 36,4%. Table 3 demonstrates the ranking of sympathies of students' responses in courses regarding the preference of social network messengers for students to communicate with teachers for educational, educational purposes or to address organizational and personal issues. It should be noted that the data of our study correlate with the main findings of the survey of students enrolled in four full-time courses at two state universities in Taiwan: "The positive experience of teaching students using social networks was very much related to students' positive learning experiences with the use of social network were highly related to the information-sharing feature and the interactional function of technology" (Hung & Yuen, 2010).

Table 3: Channels of operational communication in the system "Student — Teacher"

You communicate for educational purposes or to solve organizational and personal issues (the number of answers is not limited)				
course	on the platform for online classes	in the social network messenger	via e-mail	by phone
1.	52.17 %	56.52 %	52.17 %	39.13 %
2.	36.36 %	68.18 %	22.72 %	22.72 %
3.	28.57 %	85.71 %	42.85 %	42.85 %
4.	38.09 %	69.04 %	30.95 %	38.09 %
5.	66.67 %	66.67 %	33.33 %	66.67 %

It is a good practice that 81,89% of the surveyed higher education institutions created their own group to exchange information about the educational process (schedule, distribution of tasks or other materials, etc.) (question 6), and only 14,24% did not create such a narrow group. communication environment. That is, social networks have become an effective tool for interaction between higher education students and teachers, convenient support for collaborative and cooperative learning.

According to the results of the analysis of the answers to question 7, it was found that students use only Telegram (81,97%) and Viber (21,87%) messengers to exchange information about the educational process (Table 4).

Table 4: The most convenient social network messenger for the rapid exchange of information about the learning process

In which social network messenger did you create your own group to share information about the learning process?				
course	Instagram	Viber	Twitter	Telegram
1.	—	13.04 %	—	82.6%
2.	—	27.27%	—	77.27%
3.	—	7.14%	—	92.85%
4.	—	45.23%	—	73.8%
5.	—	16.67%	—	83.33%

It is expected that students gave the following answers to question 8 "What social networks should be involved to improve communication with students (consultations, project discussions, etc.)?": Telegram (81,18%), Viber (26,86%) and Facebook (2,38%) (Table 5).

Table 5: To improve communication (consultations, project discussions, etc.) it is advisable to involve messengers of such social networks

Messengers of which social networks should be involved to improve communication (consultations, project discussions, etc.)?				
course	Twitter	Facebook	Viber	Telegram
1.	—	—	34.78 %	73.91 %
2.	—	—	22.72 %	77.27 %
3.	—	—	28.57 %	92.86 %
4.	—	2.38 %	21.41 %	78.57 %
5.	—	—	—	83.33 %

According to the results of the survey to improve the effectiveness of communication in the system "Student — Teacher" during online classes using interactive teaching methods, it is advisable to use Google Meet (79%), Zoom (13,78%) and Google Classroom (11,62%). In this way, the study fully confirmed the relevance of the mentioned topic, namely, the optimal tools for optimizing digital education were found.

DISCUSSIONS

The study showed that most teachers were able to quickly adapt to modern realities, learn new tools and actively share new experiences with colleagues. This confirms the results of Zhezhnych et al. (2019) on a prompt adaptation of teachers to the use of digital education tools. But there were other serious problems at the same time. It became clear that even the most modern gadgets and the Internet will not replace "a living person — a caring mentor and supervisor who could use new formats aimed at communication and involving interaction between students and teachers instead of the old formats of exercises." At the same time, the advantage of full-time education contradicts research by Al-Rahmi et al. (2015), which demonstrates high efficiency of distance education. It became clear that the entire existing curriculum could not be covered by digital teaching methods, it was found that our approach to teaching became outdated. In this sense, the pandemic can be compared to a magnifying glass, which clearly revealed all our problems. The pandemic has demonstrated the willingness of adults to invest not only money but also time in the education of their children. This confirms the data of Prasolov (2021), which demonstrates a high readiness of both teachers and students for the transition to distance education.

It is worth noting that the pandemic forced people to work together and help each other, as a result, higher education has reached a new level of cooperation. The impact of the pandemic on the transformation of the educational process is considered in Selwyn (2020a, b); Selwyn et al. (2020a; 2020b) and Vasilchenko and Shatska (2021). The authors of these works also draw attention to the need to use messengers in the educational process. The authors have high hopes for introducing such an element as messengers into the distance education system. The authors note that the organization of the synchronous component of education improves with the help of interactive communication tools. However, St. Amour (2020) and Subramanian (2020) note the emergence of several problems of social adaptation and socialization, which were caused by quarantine. Given all the problems we faced, the university teachers were forced to urgently increase their digital literacy, thus getting rid of the psychological problems of conducting classes remotely. This solution to the issue of organizing the educational process during quarantine is reflected in Suoranta (2020). The author notes that teachers face the need not only to organize a continuous educational process, but also the process of socialization of students. We must pay tribute to the many educational platforms and publishers that have provided access to various courses, schools and webinars for free during the pandemic, which we have taken advantage of. This can also be traced in a study by Vasilchenko and Shatska (2021), which notes the need to improve the information and communication competencies of the teachers of higher educational institutions.

Practical training for teachers was held as part of the organization and provision of electronic information and educational environment in Kyiv National University of Culture and Arts, which addressed the issue of using messengers in the educational process. It is worth noting that since September 2020, distance education has become official in many higher educational institutions of the country.

At the beginning of the pandemic, teachers and students communicated mainly through Skype, personal e-mail and social networks (Instagram, Facebook, Twitter, Telegram), while mastering various educational platforms for online learning. Widespread use of Instagram and Facebook is described by UNESCO (2020). The author notes the high efficiency of the organization of the educational process with the help of these social networks. Experience, even negative, is necessary in any activity, as it shows our mistakes and allows us to learn from them, which leads to success and achievement of goals in the future. The study confirms this fact. The work on mistakes at Kyiv National University of Culture and Arts has led to the improvement of teachers' skills, to the greater interest of students in learning, to the understanding that the joint work of teachers and students will allow overcoming all difficulties and problems.

The theoretical significance of the research results is that they expand and deepen knowledge about the essence of the use of digital tools and their theoretical and methodological foundations of the organization. The practical significance of the study lies in the focus of its results on improving the professional training of students in the conditions of distance education.

The study's main limitations are the difficulty of identifying the results due to the limited sample of students. The difficulty also lies in the development and use of modern digital tools and the adequacy of the used methods for the research task, taking into account the needs of the modern education system. In connection with the quarantine due to the COVID-19 pandemic, it was difficult to test the research materials in the actual educational process.

CONCLUSION

The results of a survey of teachers and applicants for higher education allowed to scientifically substantiate the need for deeper mastery of such tools. educational process like Google Meet (79%), Zoom (13,78%) and Google Classroom (11,62%), which are preferred by applicants. The optimal use of the capabilities of all these tools of distance educational communication is optimal. It should be borne in mind that almost a third of applicants (34,26%) noted the lack of scientific and methodological support for mastering subjects in the major 029: Information, Library and Archival Affairs, in connection with which research and teaching staff of graduate departments of information technology , document science and information-analytical activities should equip Google classes of their disciplines with syllabuses, work programs, guidelines for seminars, practical classes and independent work of students, tests for current and final control of knowledge, video materials (lecture recordings or their presentations). To improve the formation of a system of general and professional competencies of applicants, the development of their cognitive interests and creative thinking should introduce innovative forms of seminars through problem solving, organization of business games and discussion brain-rings in remote video formats. In the process of organizing operational current communication in the student - teacher system, it is necessary to take into account the priority for students of messenger such as Telegram, on the basis of which it is necessary to introduce a chatbot for convenient and effective exchange of information on educational process, schedule, urgent information students on current issues of university life, monitoring the degree of satisfaction of applicants with the quality of educational products and services. The work has broad theoretical and practical significance and can be used as material for improving the system of student training. Future research should be aimed at researching various digital means of organizing the educational process.

REFERENCES

1. Aldahdouh, T. Z., Nokelainen, P., & Korhonen, V. (2020). Technology and social media usage in higher education: the influence of individual innovativeness. *SageOpen* (Ahead of print). <https://doi.org/10.1177/2158244019899441>
2. Al-Rahmi, W. M., Othman, M. S., Yusof, L. M., & Musa, M. A. (2015). Using social media as a tool for improving academic performance through collaborative learning in Malaysian higher education. *Review of European Studies*, 7(3), 265–275. <https://doi.org/10.5539/res.v7n3p265>
3. Anderson, T. (2019). Challenges and opportunities for use of social media in higher education. *Journal of Learning for Development*, 6(1), 6–19. Retrieved from <https://jl4d.org/index.php/ejl4d/article/view/327>
4. Anisimova, O., Kovalska, L., & Peleshchyshyn, O. (2019). Opportunities of social networks in educational activities. In S. Fedushko & T. O. Edoh (Eds.), *Proceedings of the 2nd international workshop on control, optimisation and analytical processing of social networks (COAPSN-2019), Lviv, Ukraine, May 16-17*. (pp. 137–151). CEUR-WS (Online). Retrieved from <http://ceur-ws.org/Vol-2616/paper12.pdf>
5. Antonyuk, T., & Kos, N. (2020) *Distance learning through the eyes of students of the faculty of animal husbandry and water resources*. Retrieved from <https://nubip.edu.ua/node/75541>
6. Artyushina, M. V., Kotykova, O. M, & Romanova, G. M. (Eds.). (2007). *Psychological and pedagogical aspects of implementation of modern teaching methods in higher education: textbook-manual*. Kyiv: KNEU.
7. Bila Tserkva National Agrarian University. (2020). *Questionnaire "Students about the quality of the educational process"*. Retrieved from https://btsau.edu.ua/sites/default/files/Faculties/osvita/quality/result_anketa_opp_agro_2020.pdf
8. Bogaychuk, O. S. (2018). Optimization of the process of teaching foreign language students by means of information and communication technologies. *Scientific Bulletin of the International Humanities University. Series: Philology*, 23, 210–212.
9. Burdeyna, N. B. (2019). Optimization and intensification as the main factors of increasing the efficiency of the educational process in higher education. *Scientific Journal of the National Pedagogical University named after MP Drahomanov. Series 3: Physics and Mathematics in High and Secondary School*, 7, 20–24. Retrieved from <http://enpuir.npu.edu.ua/bitstream/123456789/15409/1/Burdeyna.pdf>
10. Chugh, R., & Ruhi, U. (2018). Social media in higher education: a literature review of Facebook. *Education and Information Technologies*, 23(2), 605–616. <https://doi.org/10.1007/s10639-017-9621-2>

11. Dumpit, D. Z., & Fernandez, C. J. (2017). Analysis of the use of social media in higher education institutions (HEIs) using the technology acceptance model. *International Journal of Educational Technology in Higher Education*, 14(1), 5. <https://doi.org/10.1186/s41239-017-0045-2>
12. Hung, H.-T., & Yuen, S. C.-Y. (2010). Educational use of social networking technology in higher education. *Teaching in Higher Education*, 15(6), 703-714. <https://doi.org/10.1080/13562517.2010.507307>
13. Kovalchuk, T. (2020). *Distance learning through the eyes of students studying pedagogy*. Retrieved from <https://nubip.edu.ua/node/76013>
14. Kovalchuk, Z. Y. (2013). Criteria for optimizing education in higher education. *Scientific Notes of the National University "Ostroh Academy". Series: Psychology and Pedagogy*, 23, 112-121. Retrieved from http://nbuv.gov.ua/UJRN/Nznuoapp_2013_23_15
15. Ortynskyi, V. (2017). *Pedagogy of high school: textbook*. Lviv: Lviv Polytechnic Publishing House.
16. Pidlasyi, I. P. (2004). *Practical pedagogy or three technologies. An interactive textbook for teachers of the market education system*. Kyiv: Slovo.
17. Pometun, O., & Pirozhenko, L. (Eds.), (2002). *Interactive learning technologies: theory, practice, experience: Methodological manual*. Kyiv: A.P.N.
18. Prasolov, E. Y. (2021). *Modernization of educational activity with the use of internet technologies in distance education in the conditions of digitalization*. Poltava: Poltava State Agrarian University.
19. Selwyn, N. (2020a). What's the problem with learning analytics? *Journal of Learning Analytics*, 6(3), 11-19. <https://doi.org/10.18608/jla.2019.63.3>
20. Selwyn, N. (2020b). *After COVID-19: The longer-term impacts of the coronavirus crisis on education*. Melbourne: Monash University.
21. Selwyn, N., Hillman, T., Eynon, R., Ferreira, G., Knox, J., Macgilchrist, F., & Sancho-Gil, J. M. (2020a). What's next for ed-tech? Critical hopes and concerns for the 2020s. *Learning, Media and Technology*, 45(1), 1-6. <https://doi.org/10.1080/17439884.2020.1694945>
22. Selwyn, N., Pangrazio, L., Nemorin, S., & Perrotta, C. (2020b). What might the school of 2030 be like? An exercise in social science fiction. *Learning, Media and Technology*, 45(1), 90-106. <https://doi.org/10.1080/17439884.2020.1694944>
23. Slepkan, Z. I. (2005). *Scientific principles of pedagogical process in high school: textbook*. Kyiv: Vyscha Shkola.
24. St. Amour, M. (2020). *Privacy and the online pivot*. Retrieved from <https://www.insidehighered.com/news/2020/03/25/pivot-online-raises-concerns-ferpa-surveillance>
25. Subramanian, S. (2020). *How the face mask became the world's most coveted commodity*. Retrieved from <https://www.theguardian.com/world/2020/apr/28/face-masks-coveted-commodity-coronavirus-pandemic>
26. Suoranta, J. (2020). Critical pedagogy and wikilearning. In S. Steinberg, & B. Down (Eds.), *The SAGE handbook of critical pedagogies* (pp. 1126-1138). London: Sage.
27. UNESCO. (2020). *COVID-19 educational disruption and response*. Retrieved from <https://en.unesco.org/covid19/educationresponse>
28. Vasilchenko, L., & Shatska, N. (2021). Implementation experience of distance learning under the circumstances of the pandemic. *Electronic Scientific Professional Journal "Open Educational Environment of Modern University"*, 10, 43-55. <https://doi.org/10.28925/2414-0325.2021.105>
29. World Economic Forum. (2020). *Annual report 2019-2020*. Retrieved from https://www3.weforum.org/docs/WEF_Annual_Report_2019_2020.pdf
30. Zhezhnych, P., Berezko, O., Zub, K., & Demydov, I. (2019, May 16-17). Analysis of features and abilities of online systems and tools meeting information needs of HEIs' entrants. In S. Fedushko & T. O. Edoh (Eds.), *Proceedings of the 2nd international workshop on control, optimisation and analytical processing of social networks (COAPSN-2019), Lviv, Ukraine, May 16-17* (pp. 76-85). CEUR-WS. Retrieved from ceur-ws.org/vol-2392/paper10.pdf