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OPPORTUNITIES FOR APPLYING ONLINE TOOLS TO IMPROVE THE EFFICIENCY OF UNIVERSITY DISTANCE LEARNING

OPORTUNIDADES DE APLICACIÓN DE HERRAMIENTAS EN LÍNEA PARA MEJORAR LA EFICIENCIA DE LA ENSEÑANZA UNIVERSITARIA A DISTANCIA

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ABSTRACT

During the COVID-19 pandemic, distance learning has become one of the leading trends in education. This technology implements the principle of lifelong learning and is capable of meeting the ever-growing demand for knowledge in the information society. The purpose of this study is to determine the potential of online tools in the provision of distance learning. Given the development of distance education, modern methodological support should be developed based on a combination of promising methods, approaches, and appropriate digital tools so that higher education institutions could successfully achieve their goals in terms of fostering a certain level of student professionalism, even under quarantine restrictions. For this reason, the need for the predominance of modern learning tools over traditional ones and their complete dominance during distance learning is especially emphasized. Based on the results of surveys, the paper defines and characterizes contemporary online tools for holding lectures and seminars, testing and controlling knowledge, and holding online classes in real time through videoconferencing, as well as the potential of these instruments in distance learning. The article provides a list of the most popular and promising online services in the conditions of distance learning.

Keywords:

Distance learning, online tools, online platform, mobile application, virtual whiteboard.

RESUMEN

Durante la pandemia de COVID-19, el aprendizaje a distancia se ha convertido en una de las principales tendencias en educación. Esta tecnología implementa el principio del aprendizaje permanente y es capaz de satisfacer la creciente demanda de conocimiento en la sociedad de la información. El propósito de este estudio es determinar el potencial de las herramientas en línea en la provisión de educación a distancia. Dado el desarrollo de la educación a distancia, se debe desarrollar un soporte metodológico moderno basado en una combinación de métodos y enfoques prometedores y herramientas digitales apropiadas para que las instituciones de educación superior puedan alcanzar con éxito sus objetivos en términos de fomentar un cierto nivel de profesionalismo estudiantil, incluso bajo restricciones de cuarentena. Por esta razón, se enfatiza especialmente la necesidad del predominio de las herramientas modernas de aprendizaje sobre las tradicionales y su completo dominio durante la educación a distancia. Con base en los resultados de las encuestas, el documento define y caracteriza las herramientas en línea contemporáneas para realizar conferencias y seminarios, probar y controlar el conocimiento y realizar clases en línea en tiempo real a través de videoconferencias, así como el potencial de estos instrumentos en el aprendizaje a distancia. El artículo proporciona una lista de los servicios en línea más populares y prometedores en las condiciones del aprendizaje a distancia.

Palabras clave:

Educación a distancia, herramientas en línea, plataforma en línea, aplicación móvil, pizarra virtual.

INTRODUCTION

Under the quarantine restrictions, when millions of students across the country had to study at home because of the COVID-19 pandemic and university classrooms became virtual, the issue of the specifics of various aspects of modern distance learning remains one of the most pressing tasks.

At the beginning of quarantine, teachers were not adequately trained in the use of various digital tools and were only partially able to use them efficiently (Zenin et al., 2021; Malyuga & Petrosyan, 2022). Due to the spread of the novel coronavirus infection, educational institutions implemented distance learning primarily in an experimental mode (Borodina et al., 2022). During the quarantine restrictions, the vast majority of educators received experience in distance learning and blended learning (using Internet technologies and online platforms) (Gladilina et al., 2022).

In this connection, distance learning, which took root in the conveyance of knowledge and the shaping of students' skills during quarantine, may become a trend in higher education in the years to come. The active incorporation of distance learning in the educational process determines further research of its content, methods, and learning tools since the relatively short time of the quarantine was not enough to create well-developed scientific theories in the sphere of distance learning.

In our view, the priority for improving students' distance learning is to update the forms and methods of learning through the implementation of the most advanced tools and information technology, among which increasing popularity is gained by constantly operating Internet services, online platforms, and mobile applications. For the reasons described, research into the issues of using modern educational online tools in distance learning is topical and timely.

Researchers distinguish between the following variations of distance learning:

- Distance learning – a special form of institutionalization and embodiment of the educational process, in which the subjects of training (its participants) carry out educational interaction in principle and mostly extraterritorially (Satkeeva et al., 2022; Xie et al., 2022);
- Traditional distance learning – a type of distance learning, in which the interaction between participants and initiators of the learning process takes place at different times, with the active use of the delivery of training materials and other information objects by telephone or postal system (Kudashkina et al., 2022; Mantilla et al., 2022);

- E-distance learning – a type of distance learning, which involves primarily individualized interaction between the organizers and participants in the learning process, both synchronously and asynchronously in time, and mainly using electronic systems for the delivery of educational material and other information objects (computer networks, ICT) (Litvinova et al., 2022; Yakhyaeva & Muskhanova, 2022).

Scholars recognize the lack of a single universally accepted definition of distance learning, so they introduce and use their own, according to which distance learning can be defined as:

- as a pedagogical technology based on students' independent work (controlled, didactically supported, and monitored) with the use of modern computers, information technologies, telecommunication networks, and means of communication in training (Rakhinsky et al., 2021);
- as a form of organization and implementation of the educational process, through which its participants (objects and subjects of training) carry out educational interaction in a principally and predominantly extraterritorial way (Popov et al., 2021);
- as the newest form of education, in which students work independently at home, and their communication with peers and professors takes place primarily through videoconferencing, online forums, e-mail, and other means of online communication (Maqbool et al., 2022);
- as a collection of technologies that ensure the delivery of the main body of educational material to students, interactive communication between students and teachers in the learning process, providing students with the opportunity to work independently with teaching materials (Deng, 2022). In this case, a set of technologies refers to a combination of computer technologies as the basis for the operation of distance learning and multimedia technology as a tool to integrate multimedia content into the learning process (Medeshova et al., 2022).

Shakhazhanova et al. (2021), stress the importance of distance learning, which is characterized by non-linearity, novelty, associativity, flexibility, decentralization, distributivity, and openness.

Among the trends in distance learning, a wide use of technical devices has been observed, including computers, laptops, personal digital assistants (PDA), tablets, smartphones (Gasparian et al., 2022), iPads, iPhones, along with a variety of mobile applications and programs (Avdeeva et al., 2022), which provide fast and convenient access to the Internet, helping learning to be modern and more effective.

The wide variety and functionality of such tools reinforce the need to explore their potential application in teaching, especially when only virtual teacher-student collaboration remains possible, as in a pandemic (Topchiev et al., 2021). Today, thanks to innovation, the teaching community has the opportunity to effectively implement a variety of trending online platforms and services that will become promising aides to teachers, primarily for effective learning (Ferraro et al., 2021).

The goal of the present study is to define the potential of online tools in the provision of distance learning.

Research objectives:

- to characterize the major modern online tools and the potential of their use in distance learning;
- to establish a list of the most popular and promising online tools that have significant potential in the environment of distance learning.

MATERIALS AND METHODS

The study of the potential of online tools for implementing distance learning in higher education institutions was conducted between August 1, 2022 and October 1, 2022, through both desk and field research.

Desk research was realized through the analysis of information sources on the topic of the study. The source base of the study was represented by articles and collective monographs focused on the problems of organizing distance learning in higher education institutions, as well as articles aimed at analyzing various online tools that can be used in distance learning conditions. The analysis of the source base of the study was performed through the methods of theoretical generalization, comparative analysis, analysis, and synthesis.

Next in the course of the desk study, experts were interviewed via e-mail. In the e-mail, the experts were asked to specify the existing online tools that could be used in distance learning. The survey included experts in distance learning and pedagogical employees (40 people). The experts were selected based on their professional status as experts, so the pool of experts included specialists whose professional activities had been connected with the issues of implementing distance learning technologies for more than 5 years. All participants of the survey were informed about the purpose of the survey and the plans of its organizers to publish the results in a summarized form.

Based on the analysis of the source base and the expert survey, 23 online tools (online platforms, services, mobile applications, virtual boards, etc.) were selected.

The field study consisted of a survey of students who were studying remotely while under quarantine restrictions. The questionnaire contained 3 blocks of questions, which began with the basic three questions:

“Are you familiar with the following online tools? “

“Do you know their functionality and how to work with them?”

“Are you aware of how they can be used in distance learning?”

Each of these questions was the primary one in the block and was followed by the names of 23 specific online tools. For each tool under the corresponding question, the following answers were offered: “Yes”, “Moderately”, and “No”.

RESULTS AND DISCUSSION

The results of the survey show that, on average, almost 90% of students know 77% of the digital tools named in the questionnaire, 82% (“yes” and “moderately”) know how to use 70% of the digital tools named, 78% know how to use them specifically for distance learning in the subjects they study, using a total of 65% of the named technologies.

The survey of students finds that, in general, 23% of the technologies are completely unfamiliar to them, even by name, 30% of the proposed digital tools students do not know how to use, and 35% of the tools students do not know how to use it in distance learning.

The survey thus indicates that it is important to familiarize students with the existing modern educational technologies and their features, in particular for distance learning.

Based on the survey of students and desk research of trending online tools in learning, the main modern online tools were characterized and grouped according to certain aspects: online tools for holding lectures and seminars (Table 1), online tools for testing and controlling knowledge (Table 2), tools for holding online classes in real time via videoconferencing (Table 3), etc.

Table 1. Online tools for holding lectures and seminars.

Instrument	Potential for use in distance learning
Google Classroom	A platform providing for interaction between the teacher and the student or the teacher and the group. Among its advantages are the possibility of collecting all assignments and studying materials on one platform, reminding students of due dates and the submission of assignments, the opportunity for students to track their progress over the semester, constant feedback, the possibility of attaching completed assignments in different formats
Padlet	An online whiteboard that can be used to give students more autonomy and independence, such as checking their homework. Students and teachers can post notes, links, videos, audio, etc. on the board
EdPuzzle	A free service for creating video clips with text notes, questions, or tasks. Videos can be taken from sources such as YouTube, Vimeo, KhanAcademy, LearnZillo, and others. An interactive lesson with different tasks can be created from a single video
Canva	A service for creating tests, interactive exercises, and presentations. In its arsenal are auxiliary blocks and charts, templates, and built-in animation, which will diversify the theoretical material
Sakai	A platform for distance learning that allows creating presentations and saving them in a library. The platform consists of a framework and a set of instruments attached to it

Table 2. Online tools for knowledge testing and control.

Instrument	Potential for use in distance learning
GoFormative	An instrument suitable for testing and actualizing knowledge. It offers the teacher the opportunity to create tests and assess students' knowledge in real time
Kaltura	A service for surveys and interviews
Google Forms	The tool enables the teacher to independently create various assignments, even with attached YouTube videos. The results can be retrieved in the form of infographics or for each student separately
Socrative	An online service for creating and holding tests at the university. Students do not need to register, only to enter a code provided by the teacher. Using the survey, both teachers and students can visualize data in real-time to make decisions on future training
Kahoot!	A gaming platform that allows creating, playing, and sharing educational games. To enter the platform, students do not have to register, only to enter a code
Quizizz	A free online service for creating tests, quizzes, questionnaires, control or final assignments in the learning process for students to independently test their knowledge of a topic, course, etc. (interface in English)
Plickers	A free online service that enables quick mobile voting and face-to-face polls during the training session on the studied or current material in a test form. The results are displayed on the screen of a computer (projector) connected to the Internet (interface in English)

All these services do not require to be uploaded on the computer and are compatible with the platforms Skype, Zoom, and Microsoft Teams, which provide the opportunity to hold online classes in real time by videoconferencing (Table 3).

Table 3. Online tools for holding online classes in real time by videoconferencing.

Instrument	Potential for use in distance learning
Skype	Demonstration of material, presentations, videos – for learning; navigating to the necessary web page – for clarity; the chat – for exercises and tasks, brainstorming, polling (for simultaneity students can, having written an answer, send this comment only at the teacher's command – answers are quickly displayed on the screen in a second or two, the so-called "chat-rain"; downloading pictures, cards, images – a variety of games, games, and images – for a variety of purposes, etc.); demonstration of completed tasks or written text with subsequent analysis, etc.; uploading pictures, cards, images to the chat – for various games and exercises
Zoom	Approximately the same as Skype, yet the advantages are the function for the teacher to divide participants into separate groups ("session rooms") for group or pair work in the classroom (for creating projects during classes, competitions, contests, or games between teams) and visit each room, changing the participants' places (for control, etc.); the ability to mute any participant, the entire group, or part of it, making it impossible for students to give each other any tips, which can be useful during tests; the option of virtual background, where any pictures or photos can be set (for example, for conducting a virtual tour, quest, etc.); the opportunity to turn learning into an interesting game through a virtual change in the appearance of the participants (putting on" funny masks, filters, etc.); the pencil/eraser function of the virtual board can be used to draw by both the teacher and students separately, or both together, for example, to draw a certain scheme (to test knowledge)
Microsoft Teams	Approximately the same as the previous two online platforms, but the advantages are tools for collaborative viewing, audio/video recording, adding subtitles, translating audio and video content, creating video clips; collaborative work on a document; parallel access to other components of the Microsoft Office 365 platform (OneDrive, Microsoft Forms, Sharepoint, Outlook, etc.) to send and save files, to communicate with students, to conduct surveys, tests, etc.; the opportunity to turn off/on the microphone of a certain participant (-s) to conduct a survey, brainstorming, etc.

It is also specified that mobile applications such as Messenger, Telegram, Viber, and WhatsApp can be used for sending tasks and communicating.

A virtual whiteboard can be used during the lesson using Paint, Google Slides, and Bitpaper.io.

The works and materials of each student can be stored with Google Drive or a platform lesser known to students – Padlet, a convenient online service for information storage and organization and collaborative work online. These two tools can also be utilized at the stage of summarization and systematization of knowledge as a platform to post educational information, for team or individual homework assignments, or as a place to gather and discuss ideas for projects.

Analysis of the theory and practice of students' distance learning enabled us to identify a list of the four most popular and promising online tools that have significant potential in distance learning conditions, namely: Google Classroom, Google Forms, Kahoot!, and Microsoft Teams.

Studies (Topchiev et al., 2021; Gladilina et al., 2022) confirm that the use of these resources for practical and lecture classes will allow the teacher to make classes interactive, interesting, and most importantly – to actively interact with student groups, even remotely.

Our findings align with the results of Borodina et al. (2022), which indicate that students and teachers note the efficiency of using such platforms as Moodle, Canva, and Google Classroom during seminars and lectures. As demonstrated by Topchiev et al. (2021), many online platforms are regrettably not always effective in practical and laboratory classes, as some subjects require personal presence at the laboratory to reproduce certain types of work. A solution to this problem the authors see in writing software and creating simulators and virtual reality programs designed specifically for particular disciplines. In addition, online platforms provide students in distance learning with 24-hour access to teaching materials containing lectures by teachers and assignments for individual work (Shakhazhanova et al., 2021).

A survey of teachers conducted by Avdeeva et al. (2022), demonstrates that testing students' academic performance is most efficiently performed with Google Forms, which also aligns with the results of our study. Nevertheless, as noted by Zenin et al. (2021), the issues of academic malpractice (plagiarism, cheating) remain standing, which drives teachers to develop individual tasks and tests or hold tests in real time to avoid this, because one of the key problems in distance learning is the authentication of student's knowledge in the course of training.

The use of active and interactive forms of holding classes in the educational process through online tools

realizes the competence-based approach to education in the form of computer simulations, business and roleplaying games, examination of specific practical cases, and psychological and other training sessions in combination with extracurricular work to form and develop students' professional skills (Gasparian et al., 2022). In this connection, new requirements for the results of the development of educational programs (educational results) lead to the improvement of the content and development: 1) of new methods and technologies of educational activity (teaching, training); 2) forms of monitoring its results (monitoring the quality of education).

CONCLUSIONS

The utilization of innovative technology in professional training is becoming a powerful tool to improve the quality of higher education because of the opportunity to create a technological environment of education and upbringing in higher educational institutions, i.e. an environment that is predictable, manageable, and approximated to the pre-defined and planned tasks as much as possible.

At present, ICT can provide educational activities with diverse, compact, and operational instruments conducive to the active intellectual and creative solution of significant contradictions in theory and practice by students. This creates an opportunity to ensure the individualization of learning with a substantial enhancement of the role of self-education and self-learning in it through the use of the most advanced information and communication tools and open access to educational resources. The necessary conditions for successful interaction of the parties to the educational process in the distance learning mode are the presence of a clear organization of the educational process, cooperation, autonomy of students and teachers, and responsibility.

The conducted survey reveals that one-third of the online tools mentioned in the questionnaire are unfamiliar to students, which raises the need to teach them about the existing modern educational technologies and their capabilities, particularly in distance learning. Thus, our study defines and characterizes contemporary online tools (online platforms, services, mobile applications, etc.) and their potential for distance learning.

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