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Use of Digital Information Technologies in Teaching Veterinary Operative Surgery

Використання цифрових інформаційних технологій при викладанні ветеринарної оперативної хірургії

Розглянуто особливості інтеграції цифрових інформаційних технологій у систему вищої освіти та проаналізовано їх застосування під час викладання оперативної хірургії студентам факультету ветеринарної медицини і технологій у тваринництві.

З'ясовано, що всі використовувані цифрові інструменти умовно можна поділити на дві групи: засоби підготовки до занять та засоби комунікації й обміну інформацією.

У процесі підготовки використовуються інтернет-ресурси, спеціалізовані хірургічні сайти, мультимедійні презентації, навчальні відеофільми, а також чат-боти штучного інтелекту. Встановлено, що відеоматеріали є пріоритетними для більшості студентів і сприяють глибшому засвоєнню практичних аспектів дисципліни.

Для організації освітньої взаємодії застосовуються платформа Moodle, онлайн-конференції, комп'ютерні тестові системи, соціальні мережі та месенджери. Доведено, що студенти активно користуються електронними курсами, інтерактивними матеріалами, тестами та відеоконтентом.

Ключові слова: *ветеринарна хірургія; цифрові інформаційні технології; навчальне відео; платформа Moodle; соціальні мережі; месенджери.*

This study examines the features of integrating digital technologies into higher education and analyzes their application in teaching operative surgery to students at the Faculty of Veterinary Medicine and Technology in Livestock. It is substantiated that the digitalization of the educational process is a key component of contemporary reforms aimed at improving the quality, accessibility, inclusiveness, and effectiveness of education. The study emphasizes that the use of information and communication technologies contributes to the personalization of educational trajectories, the development of professional competencies, the enhancement of critical thinking, and increased student motivation.

The aim of the study was to identify which digital technologies are used at the Department of Veterinary Obstetrics, Internal Pathology, and Surgery in teaching operative surgery. The research was conducted over a five-year period and included the analysis of scientific sources, pedagogical observations, surveys, and questionnaires administered to students.

It was found that all digital tools can be conventionally divided into two groups: tools for class preparation and tools for communication and information exchange. During preparation, students use Internet resources, specialized surgical websites, multimedia presentations, educational videos, and AI-based chatbots. Video materials are prioritized by most students and contribute to a deeper understanding of the practical aspects of the discipline. The Moodle platform, online conferences, computer-based testing systems, social networks, and messaging applications are used to organize educational interaction. It was determined that students actively use e-courses, interactive materials, tests, and video content, which enhances the effectiveness of independent learning.

The obtained results confirm the feasibility and effectiveness of the comprehensive implementation of digital technologies in training of future veterinary medicine professionals and indicate prospects for further research on their impact on the quality of professional education.

Key words: *veterinary surgery, digital information technologies, educational videos, Moodle platform, social networks; messengers.*

Introduction / Вступ. Among the priority areas of state policy for the development of higher education in the context of Ukraine's European integration is the issue of continuously improving the quality of education, modernizing its content and the organization of the educational process, as well as implementing educational innovations and information technologies (Pliushch V., & Sorokun S., 2022).

Digital information technologies are becoming an integral component of modern education, contributing to the improvement of its quality and effectiveness. By ensuring interactivity, engagement, and individualization of learning through personalized educational programs and adaptive platforms, students are able to develop their competencies at an optimal pace and deepen their understanding of the learning material (Dashko Y., & Miroshnichenko V., 2023).

Competent use of innovative technologies in the educational process contributes to the formation of positive motivation of students, makes it possible to maximize its effectiveness in accordance with modern realities (Shalgimbekova K., et al., 2024).

The integration of digital technologies into education represents a significant evolution in the pedagogical landscape, with the potential to enhance accessibility, engagement, and personalization of learning. Successful initiatives demonstrate the potential of digital learning to improve educational outcomes and expand opportunities for both students and instructors (Zou Y., et al., 2025).

Digital technologies have significantly transformed the educational landscape by expanding access to education worldwide. With the rapid development of the Internet, mobile devices, and online platforms, education is no longer confined to traditional classrooms. It can become more inclusive, flexible, and equitable, providing individuals from diverse backgrounds with opportunities to learn and develop (Hushin H., 2025).

Digital technologies are eliminating the scarcity on which higher education has traditionally been based. By implementing digital platforms for learning, teaching, and accreditation, universities can expand access and reduce costs, thereby creating a more inclusive and resource-rich educational system that serves far more learners than traditional models (Smith M., 2023).

Aim and Tasks / Мета та завдання. The purpose of the conducted research was to determine which information technologies are used at the Department of Veterinary Obstetrics, Internal Pathology and Surgery of the Higher Education Institution «Podillia State University» in teaching operative surgery. Objectives: To become familiar with the features of the integration of digital technologies into the system of higher education and analyze their application during the teaching of operative surgery to students at the Faculty of Veterinary Medicine and Technology in Livestock; to determine which elements of information technologies are used by students in order to improve surgical competence.

Methods / Методи. During the research, an analysis of information sources concerning the application of digital information technologies in higher education was carried out. The study was conducted over the past five years among groups of students at the Faculty of Veterinary Medicine and Technology in Livestock who were studying operative surgery. In order to obtain data regarding students' use of information technologies, such methods as surveys, observation, and questionnaires were applied.

Results / Результати. According to this research at the Department of Veterinary Obstetrics, Internal Pathology and Surgery, the following tools were used in teaching operative surgery: educational videos of surgical interventions on animals, multimedia presentations, materials from specialized surgical websites, and AI-based chatbots (Fig. 1).

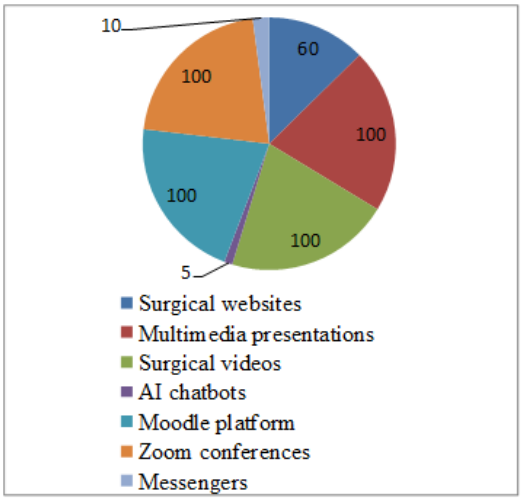

Fig. 1 Use of information technologies in teaching operative surgery

At the same time, educational videos and multimedia presentations are used in every class, materials from surgical websites are used in most classes, while AI assistants are used only for preparation for approximately every tenth class.

As also shown by our studies (Fig. 1), the department has created conditions to ensure the exchange of necessary information between participants of the educational process; for this purpose, such digital information technologies as the Moodle platform, Zoom conferences, and messengers are used.

According to our research (Fig. 2), all students studying surgery for educational purposes use educational videos, in many cases they refer to materials available on surgical websites, in every second case they use multimedia presentations, and in every tenth they refer to artificial intelligence chatbots.

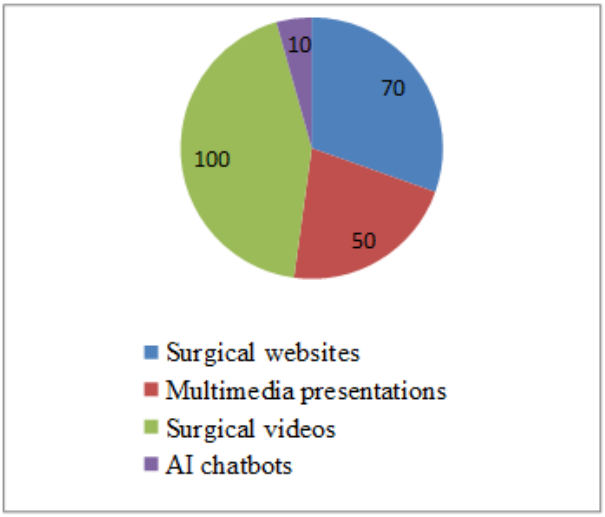

Fig. 2 Use of information technologies by students to prepare for classes

To receive and exchange educational information on surgery, all students use the university Moodle platform, and in the case of distance learning – Zoom conferences. In addition, students also use social networks and messengers to find and exchange educational materials (Fig. 3).

Discussion / Обговорення. The results of our research indicate that the situation with innovations at the Department of Veterinary Obstetrics, Internal Pathology and Surgery makes a positive impression. The teaching staff is open to new trends and is ready to introduce Internet technologies into the educational process (Fig. 1).

In general, all the elements of information technologies used during the teaching of operative surgery can be divided into those designed to ensure the preparation of teachers and students for classes (Fig. 2), and those that create the opportunity to transfer the necessary information from teachers to students, as well as between students and discuss it in the form of a dialogue (Fig. 3).

During lectures and laboratory-practical classes on operative surgery, multimedia presentations and educational videos are used to improve understanding and increase student activity (Fig. 1).

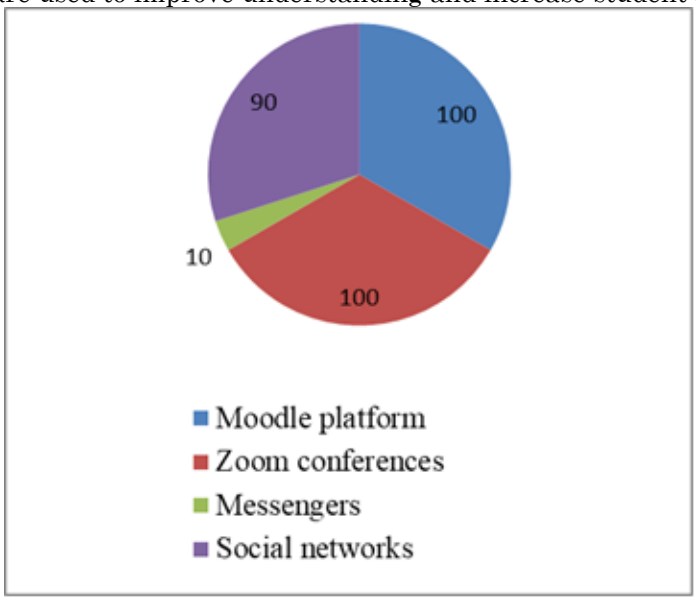

Fig. 3 Use of information technologies by students to obtain and exchange educational information

As reported by M. Abdulrahaman, multimedia combines text, images, audio, video and animation in one digital resource, offering visualization, interactivity, ease of updating and portability between computers, as well as greater emotional appeal and multifunctional use in teaching and learning (Abdulrahaman M., et al., 2020).

According to E. Staneviciene & G. Žekienė, the multifaceted use of multimedia potential makes it possible to further improve the educational process. Combining classic approaches with new technologies – mixing animation, 3D models and traditional hand-drawn sketches – can turn a presentation into a work of art with high educational potential, contributing to more effective learning of the subject (Staneviciene E., & Žekienė G., 2025).

As our research has shown, preference is given to educational video materials (Fig. 1). This is explained by the higher informativeness of such manuals, as well as the peculiarities of teaching the academic discipline. Conducting classes on operative surgery requires the teacher to demonstrate various surgical techniques and surgical interventions on animals. Very often, this is difficult to do due to the lack of the necessary animal and conditions for the operation. In addition, even in the case of an operation, due to the crowding of students at the operating table, the vast majority cannot see all the intricacies of operative actions, especially those techniques that are performed in the body cavity. In such cases, the teacher uses educational videos. The main source of such videos is the YouTube channel of the teacher of operative surgery, which contains more than one hundred educational videos on surgery (Stepanov O., 2010).

According to the data we received, all students studying operative surgery are registered on YouTube. This hosting is the main source of surgical video. Previous studies have confirmed the importance of surgical video for the training of veterinary surgeons (Stepanov O., 2021).

When studying operative surgery in order to prepare for classes, students use Internet resources and specialized surgical websites. These sources also help students in writing term papers and essays on surgical interventions and treatment of surgical diseases of animals. Traditional textbooks and manuals are used as an alternative.

Given the variety of surgical interventions and treatment methods, student essays are discussed with interest during classes. Authors are invited to give oral presentations on a given topic, searching for relevant materials on the Internet.

Importantly, data obtained from the Internet is updated and replenished much faster than traditional literary sources (Lazer D. et al., 2020).

Another advantage of using Internet resources for learning is the possibility of interconnection and complementation of materials from different disciplines through hyperlinks and specially organized search engines (Gerjets P. et al., 2016).

Recently, chat bots with artificial intelligence have been used by teachers and students in the pedagogical process (Fig. 1).

Artificial intelligence technologies have penetrated into various spheres of life, including education (Garzón J., et al., 2025).

AI apps are configured to avoid displaying images of surgical procedures, as they may not be acceptable to certain audiences. However, they help to systematize the necessary materials, create tables, slides, formulate situational tasks and develop clinical cases. At the same time, these tools are very useful when searching for scholarly sources on a certain topic. However, in most cases, students are looking for specific recommended sources without the involvement of AI.

The university uses the Moodle platform. Its main task is to enable teachers to create online courses, including on operative surgery (Fig. 1).

This is a system of learning and content management, which, according to L. Vargas-Montoya, is no longer just an auxiliary tool, but becomes an important and sometimes leading component of the educational process, in particular in distance learning practices (Vargas-Montoya L. et al., 2023).

All students, regardless of their place of residence, have the opportunity to obtain the necessary educational materials from various disciplines through the specialized information environment of the university.

The university educational and methodological online complex for operative surgery includes: the course programme of the discipline, an electronic course of lectures and laboratory classes with a hypermedia guide and glossary; tests for ongoing and final knowledge assessment, multimedia and video files and additional digital informational educational Internet-resources for each topic of the curriculum.

As of today, Moodle provides a full suite of interactive tools designed to facilitate collaboration, including discussion forums, chat functions, blogs, wikis, and various assessment options such as quizzes, assignments, and reviews. The platform also supports multimedia elements, allowing instructors to add videos, podcasts, and other interactive resources to their courses. Moodle's

collaborative tools and adaptability enable educators to create a flexible learning environment that supports student interaction, communication, content sharing, and interaction with peers and faculty (Zahra O. et al., 2025).

The use of computer testing and control systems on the Moodle platform optimizes the work of teachers, allows one to quickly assess students' knowledge with minimal time spent, develops thinking speed and attention, promotes more regular and diligent study.

The Department of Veterinary Obstetrics, Internal Pathology, and Surgery has developed interactive platforms for operative surgery for students of all courses studying this discipline: the third, as well as students of the second and third courses with a shortened period of study.

According to the earlier studies of O. Stepanov, students studying operative surgery mostly positively evaluate the educational platform Moodle, precisely as a useful educational tool that helps in learning the discipline (Stepanov O., 2023).

An important component of the study of operative surgery is the independent work of students, the importance of which increases in the conditions of reducing classroom hours. The use of information technologies in the organization of independent work significantly intensifies and activates this process (Rasheed R. et al., 2016).

Students mainly use Internet sources. The advantage of the World Wide Web is that it allows you not only to read the necessary texts, but also to view slides and video materials.

In recent years, the number of students of the Faculty of Veterinary Medicine, who are active on Instagram, Facebook, Twitter and other social networks, as well as on messengers Viber, Telegram, WhatsApp, has increased significantly. These platforms provide information retrieval as well as communication between users to share this data.

According to the results of the study by E. Lema-Moreira, the use of social networks is associated with the involvement of students in the flow of information and the exchange of resources. Although social media platforms are primarily used for social interaction, many students report using them to share materials, ideas, and academic content, highlighting their potential to integrate into the educational environment and support formal learning activities and knowledge sharing practices (Lema-Moreira E. et al., 2024).

Students not only communicate with each other in their free time, but also acquire relevant knowledge, including operative surgery, and share it with each other.

As noted by O. Stepanov, for educational purposes, students studying surgery mainly use Instagram and Facebook social networks (Stepanov O., 2024).

Social networks contribute to the development of e-learning and education in general, offering new technical and methodological tools. Students from all over the world can sign up for online classes for free and take courses at their own pace (Veletsianos G., & Navarrete C., 2015).

In recent years, online lectures conducted via Zoom or Google Meet have become an important component of distance learning in operative surgery (Fig. 2). If classroom learning is not possible, these platforms allow teachers to provide the necessary learning materials to each participant through presentations and videos. Students can gain a full range of knowledge by making eye contact with the instructor and having the opportunity to ask questions and get answers.

Such data agree with A. Mousa's report that Zoom and Microsoft Teams play an important role in all kinds of interaction between teachers and students, as well as between students themselves. These programs provide live interaction in a virtual classroom, allowing participants to exchange ideas synchronously (Mousa A., 2022).

Conclusions / Висновки. Summarizing the above, it can be stated that significant changes are taking place in education, primarily related to the introduction of modern information technologies into the educational process. Their application in education is the responsibility of every teacher.

At the Faculty of Veterinary Medicine and Technology in Livestock, modern educational innovations based on informational computer and Internet technologies are used during the training of veterinary medicine doctors.

All elements of information technologies used in the teaching of operative surgery can be divided into those designed to prepare teachers and students for classes, and those aimed at exchanging information between participants of the educational process.

When preparing for operative surgery classes, surgical videos, materials from surgical websites, multimedia presentations and, much less often, AI chatbots are mostly used.

The Moodle platform, Zoom conferences, social networks and messengers are used to exchange information on operative surgery.

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