



## MODERN INFORMATION TECHNOLOGIES IN MEDICAL EDUCATION: VIRTUAL TEXTBOOKS, WEBINARS AND ELECTRONIC LIBRARIES

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### Abstract:

The article discusses modern information technologies that radically change the approach to teaching in medicine. The main focus is on such key aspects as virtual textbooks and online courses, video lectures and webinars, as well as electronic libraries. Virtual textbooks and courses provide students with access to relevant educational materials from anywhere in the world, and video lectures and webinars provide the opportunity to study with the world's leading experts remotely. Electronic libraries serve as an essential resource for clinical practice and scientific research, offering specialized and updated materials. Information and communication technologies open up new opportunities for flexible, affordable and high-quality medical education.

**Keywords:** Information and communication technologies, virtual textbooks, online courses, video lectures, webinars, distance learning, electronic libraries, clinical practice, medical research, multimedia resources, evidence-based medicine

### Introduction

The process of transition from an industrial society to an information one, which we are witnessing now, is accompanied by changes in priorities — information is becoming one of the key resources and engines of development.

The rapid growth of the volume of information leads to the fact that working with it becomes impossible without the use of information and communication technologies (ICT).

Information and communication technologies (ICT) are a set of methods, mechanisms and tools used to collect, process, store and transmit information. Since the late 70s, ICT has been associated with computers and related devices, and today it is impossible to imagine our civilization without it.

An important feature of ICT is the ability to represent various types of information, such as numbers, texts, sounds, images and videos, in a digital format. This form



provides the convenience of storing information, processing it, transmitting and exchanging it using computers and networks.

ICT is becoming an integral part of the education of the future, providing unique opportunities for individualization of learning, deep immersion in subject areas and the development of digital skills. The pedagogical role is also being rethought: the emphasis is shifting from passive knowledge transfer to promoting students' independent learning and inspiring them to constantly strive to learn new things.

The use of ICT in education makes it possible to increase the availability of knowledge, make learning more interactive and convenient, and also take into account the needs and characteristics of each student. Information and communication technologies also contribute to improving the quality of education, expanding opportunities for self-education and knowledge sharing.

Information and communication technologies (ICTs) also play an important role in medical education, providing new opportunities for training and professional development. We will consider the following key aspects of their use in medicine.

## **1. Electronic Educational Resources (EOR):**

**Virtual textbooks and courses:** They help students access extensive medical materials from anywhere.

Virtual textbooks and courses are key elements of modern educational programs, allowing students and medical professionals to access important information at a convenient time and from anywhere in the world. Here are a few aspects of their significance and functionality:

### **Advantages of virtual textbooks and courses:**

#### **1.Global accessibility:**

- Virtual textbooks and courses can be used by students regardless of geographical location. This is especially important for remote regions where access to high-quality educational resources may be limited.

- They allow students to maintain continuous learning, regardless of external circumstances such as pandemics or travel restrictions.

#### **2. A wide range of educational materials:**

- The virtual textbooks feature updated and extensive materials, including videos, infographics, interactive models and simulations, which helps to better assimilate complex topics.



- The courses include a wide range of disciplines — from basic anatomy to advanced medical technologies and treatment techniques.

### **3. Interactivity and multimedia:**

- Unlike traditional paper textbooks, virtual versions often include multimedia elements such as animations, three-dimensional models of organs and tissues, interactive tests and simulations, which significantly increases the level of student engagement.

- Interactive exercises and tests can provide instant feedback, which helps students quickly correct their mistakes and understand the material more deeply.

### **4. Updatability and relevance:**

- Virtual textbooks and courses are easily updated, which is especially important in the rapidly developing field of medicine. This allows students and faculty to access the most up-to-date information, research, and recommendations.

- Regular updates ensure that the material always meets modern standards of treatment and diagnosis.

### **5. Personalization of the learning process:**

- Virtual courses often include adaptive technologies that adapt to the pace of student learning, helping to identify weaknesses in knowledge and offering additional materials to strengthen them.

- They allow students to choose an individual pace and style of study, which is especially useful when combining study with practice or work.

### **6. Access to teachers and experts:**

- In the framework of virtual courses, students can interact with teachers and experts through forums, chats and video conferences, ask questions and receive clarifications on complex topics.

- Discussions with colleagues and teachers help to form critical thinking and contribute to a deeper understanding of the material.

### **7. Economic efficiency:**

- Virtual textbooks and courses are often cheaper compared to printed publications. Students can save on the purchase of expensive textbooks by having access to electronic versions on a long-term basis.



## **Usage examples:**

- Coursera, edX, Moodle and other platforms offer specialized courses for healthcare professionals. For example, courses in radiology, surgery, or pharmacology can be completed online with interactive elements.
- E-textbooks from publishers such as Elsevier or Springer allow students to access the latest editions of key medical reference books and textbooks.

## **Video lectures and webinars: provide distance learning, allowing you to gain knowledge from experts.**

Video lectures and webinars play a key role in distance learning, especially in medical education, where obtaining knowledge directly from experts is critically important. They provide students and professionals with the opportunity to study with leading experts from the comfort of home, and integrate various forms of learning for a deep understanding of the subject.

### **1. Advantages of video lectures and webinars in medical education:**

#### **Access to international experts:**

Video lectures allow students and doctors to study with the world's leading specialists in various fields of medicine, such as surgery, oncology, cardiology and others.

Geographical barriers are being erased, and students can listen to lectures by experts from renowned universities and medical centers without leaving their country.

Webinars are often organized with the participation of world opinion leaders, which allows listeners to get first-hand information about the latest research, diagnostic methods and therapy.

#### **Flexibility in learning:**

Students can watch video lectures at their convenience, which is especially important for those who combine study with practical work.

Video lectures can be reviewed several times to better understand complex topics or update knowledge before exams or practical classes.

Webinars are usually recorded, and participants can return to them later to review key points or materials.



## **Interactivity and participation:**

Webinars provide an opportunity for active interaction with teachers and colleagues. Participants can ask questions in real time, receive clarifications and participate in discussions.

Chats, voice and video conferences allow students to contribute their comments, participate in group discussions and share their knowledge and experience.

The ability to conduct surveys, quizzes and interactive voting during webinars allows teachers to instantly assess the level of knowledge of students and adjust the course of the lecture depending on the audience.

## **Updatability and relevance of materials:**

Video lectures and webinars are easily updated to include new research and treatment methods, which is especially important in rapidly changing fields of medicine.

Lecturers can demonstrate the results of new clinical trials, discuss the latest publications in leading medical journals and apply modern diagnostic and therapeutic technologies.

## **Demonstration of clinical cases and procedures:**

Video lectures allow us to consider real clinical cases in detail. Teachers can demonstrate the process of diagnosis, patient management and decision-making in real time.

For practicing physicians, webinars often include demonstrations of complex surgical procedures or diagnostic techniques that are broadcast in high quality, which helps to improve practical skills.

The use of video materials allows students to observe rare cases or high-tech procedures that are difficult to see under normal conditions.

## **Multidisciplinary approach:**

Webinars are often organized at the intersection of various medical disciplines. For example, a webinar may include the participation of surgeons, therapists, radiologists and other specialists, which allows students to see the problem from different angles.

Such events help to better understand the interaction between different disciplines and to see an integrated approach to patient treatment.



## **Supervision and support:**

Video lectures and webinars allow students and doctors not only to gain knowledge, but also to receive support in further education. For example, teachers can supervise students after completing a lecture, answer additional questions via email or forums.

Progress tracking systems on educational platforms allow teachers to evaluate student performance and adjust the content of lectures.

## **Saving resources and time:**

Video lectures and webinars reduce the cost of organizing training, especially in terms of travel, accommodation and other logistical costs.

Medical institutions can invite experts to give lectures online, which is much cheaper than their arrival for a personal presentation.

## **Usage examples:**

Massive open online courses (MOOCs) such as Coursera and edX provide video lectures on topics ranging from basic anatomy to specific medical disciplines such as genetics and pharmacology.

Medical webinars organized by professional associations such as the American Medical Association (AMA) or the European Association for the Study of Diabetes (EASD) allow doctors and students to learn about the latest developments and clinical recommendations.

## **Electronic libraries**

Electronic libraries : contain specialized materials on clinical practice, research, and the basics of medical sciences.

Electronic libraries play an important role in medical education, providing access to a huge amount of specialized materials that students and professionals need for teaching, research and clinical practice. These resources greatly facilitate the process of searching for relevant information and ensure constant updating of data, which is especially important in the context of the rapid development of medicine.

## **Advantages and role of electronic libraries in medical education: Access to specialized literature:**

Electronic libraries contain many textbooks, manuals, articles and research on all aspects of medicine, including clinical practice, medical technology, pharmacology and many other fields.



In such libraries, you can find materials on both basic medical sciences (anatomy, physiology) and more specialized areas (surgery, oncology, cardiology).

Many electronic libraries provide access to highly specialized sources that are difficult to find in standard book collections.

### **Relevance and updating of information:**

1. In medicine, information quickly becomes outdated, so timely access to updated data is extremely important. Electronic libraries allow you to get information from the latest scientific research and clinical guidelines.

Some resources, such as PubMed, regularly update the database, giving users access to the latest scientific publications.

### **Access from anywhere in the world:**

Electronic libraries are available online, which allows students and doctors to access the necessary materials at any time and from anywhere in the world. This is especially important for remote regions where access to physical libraries is limited.

Thanks to modern technologies, libraries are available both on computers and on mobile devices, which makes their use convenient and mobile.

### **Integration with educational programs:**

Many digital libraries integrate with educational platforms and curricula, offering students resources that complement lectures and practical classes.

Teachers can create recommendation lists of literature using materials from electronic libraries and direct students to relevant articles and research.

Integration with Learning Management Systems (LMS) allows you to create interactive courses that include links to specific sections of e-books and articles.

### **Search and access to scientific articles and clinical studies:**

Electronic libraries provide access to peer-reviewed scientific articles that play an important role in clinical and scientific research. Students and doctors can use such resources to get information about the latest advances and treatment methods.

For example, platforms such as PubMed, MEDLINE, and Scopus allow you to quickly find publications on various topics and research, thanks to convenient search tools.



It also simplifies the process of writing scientific papers and dissertations, since all the necessary materials are collected in one place.

### **Multilingual and interdisciplinary resources:**

Many digital libraries support multilingual versions of materials, which is especially important for international students and doctors working in multilingual environments.

Libraries often offer resources not only in medicine, but also in related sciences such as biology, biochemistry, chemistry and engineering, which helps students develop an interdisciplinary approach to learning and research.

### **Interactive features and multimedia:**

Modern electronic libraries often include not only texts, but also multimedia resources — video tutorials, interactive models, simulations and virtual laboratories that help students better understand complex topics.

Some electronic textbooks allow users to take notes, bookmarks, comments and highlights, which improves the learning process and repetition of the material.

### **Economic efficiency:**

Access to electronic libraries is often more cost-effective than purchasing physical books or subscribing to print magazines. Universities and medical institutions often provide free access to such resources for their students and staff.

Libraries such as JSTOR, ScienceDirect, and Elsevier offer flexible subscription models that allow you to access important information at an affordable price.

### **Cross-references and in-depth study:**

Electronic libraries provide the ability to use cross-links, which allows users to easily navigate from one article or book to another, deepening knowledge on a specific topic.

The recommendation functions help you find related materials, expanding the horizons of students and professionals.

### **Examples of popular electronic medical libraries:**

#### **Advantages of using ICT in medical education:**

- **Accessibility of knowledge:** Students can study anytime and anywhere.





- **Interactivity:** learning becomes more interesting due to interactive elements, which improves the assimilation of the material.

**Adaptability:** Personalized learning programs help students focus on their weaknesses.

### **Advantages of using ICT in medical education:**

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- **Interactivity:** learning becomes more interesting due to interactive elements, which improves the assimilation of the material.

**Adaptability:** Personalized learning programs help students focus on their weaknesses.

### **Problems and challenges:**

- **Insufficient technical equipment:** not all educational institutions can afford the necessary technologies.

- **Technical skills of teachers:** not all teachers are ready or able to use ICT effectively.

- **Internet access:** Internet access may be limited in some regions.

### **Conclusion:**

Thanks to their numerous advantages, virtual textbooks and courses are becoming an integral part of the educational process, offering students flexible, modern and adapted approaches to acquiring knowledge in medicine.

Video lectures and webinars are becoming an integral part of modern medical education, offering students and doctors the opportunity for flexible, affordable and highly effective training. They promote active interaction between participants, provide access to best practices and knowledge, and help prepare for the challenges faced by modern medicine.

Electronic libraries are an indispensable tool in modern medical education. They provide quick and convenient access to relevant, specialized and interdisciplinary information that plays an important role for both students and practitioners. With their help, medical professionals can keep abreast of the latest developments in their field, which helps to improve the quality of clinical practice and contribute to successful scientific activities.

ICT has significantly changed medical education, making it more flexible, accessible and of high quality. They help prepare students for the modern challenges of medicine, providing them with the necessary skills to work with the latest technologies



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