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FEATURES OF THE APPLICATION OF MULTIMEDIA PRODUCTS IN THE EDUCATIONAL PROCESS IN A HIGHER EDUCATIONAL INSTITUTION

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The demonstration of didactic material should promote the advance of critical and analytical thinking in medical students, assist long-term memory preservation, as well as form the development of a complete understanding of a pathological process or specific nosology. The usage of diverse modern instructional methods in educational process is conductive to the continuous professional development of the educator. Pathological anatomy, by tradition, is considered to be the link between theoretical and clinical disciplines, as it offers an initial basis for both all-inclusive understanding of illness and detailed information of its morphological indicators.
When teaching the Pathomorphology subject, tables, group and individual work with gross specimens, presence at autopsies, and the projection of microscopic images onto a large screen as well as mental maps, interactive whiteboards, visual presentation techniques such as inscribing are widely used. The implementation of visual aids enables students' acquaintance with the macroscopic appearance of wide-ranging pathological processes and numerous nosological entities. In this way strengthening of theoretical knowledge with the practical parts of medicine occurs the best way.
***The purpose** – to broaden the knowledge about the use of visuals in the educational process, to present the principles of creating a multimedia presentation for a better efficiency of information perception by students.*
***Conclusions.** The use of various visual aids, as well as multimedia presentations, is important in the educational process. A multimedia presentation is not a set of slides, graphs, but a way to convey effectively educational information, present the issuesunder study (thought, idea) to the audience. During the educational sessions (lecture or practical), the pedagogical skill of the teacher still remains central, and a successful combination with the use of various visual aids will be a bright visualizing tool of addition.*

***Key words:** visualization, multimedia production, educational process, pathological anatomy.*

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ОСОБЛИВОСТІ ЗАСТОСУВАННЯ МУЛЬТИМЕДІЙНИХ ПРОДУКТІВ У НАВЧАЛЬНОМУ ПРОЦЕСІ В ЗАКЛАДІ ВИЩОЇ ОСВІТИ

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Демонстрація навчального матеріалу повинна сприяти розвитку критичного та аналітичного мислення студентів-медиків, формуванню довготривалої пам'яті та цілісного розуміння патологічного процесу чи нозології. Використання різноманітних сучасних методів представлення наочностей у процесі навчання сприятиме вдосконаленню майстерності й самого педагога. Патологічна анатомія вважається містком між теоретичними та клінічними дисциплінами, адже є базисом як для уявлення про хворобу, так і знання про її морфологію. При викладанні предмета «Патоморфологія» використовуються таблиці, групова та індивідуальна робота з макропрепаратами, відвідування розтину померлих, демонстрація мікроскопічних зображень на великому екрані, а також широко застосовуються ментальні карти, інтерактивні дошки, техніка подання навчальної інформації – скрайбінг. Використання наочностей сприяє ознайомленню студентів із виглядом загальнопатологічних процесів, різних нозологій на рівні макроскопічної картини. У такий спосіб якнайкраще відбувається підкріплення теоретичних знань із практичною стороною медицини.
***Мета дослідження –** розширити знання про застосування наочностей у навчальному процесі, представити принципи створення мультимедійної презентації задля підвищення ефективності сприйняття інформації слухачами.*
***Висновки.** Застосування різноманітних наочностей, а також мультимедійної презентації є важливими у навчальному процесі. Мультимедійна презентація - це не набір слайдів, графіків, а спосіб донести навчальну інформацію,*

***Ключові слова**: мультимедійна продукція, наочності, навчальний процес, патологічна анатомія.*

Клінічна та експериментальна патологія. 2026; Т.25, № 2 (96). С. 168-174.

представити проблематику досліджуваного питання (думку, ідею) аудиторії. Під час проведення навчальних занять (лекційних чи практичних) визначальним все ж залишається педагогічна майстерність викладача, а вдале поєднання із застосуванням наочностей чи мультимедійної презентації буде яскравим візуалізаційним інструментом доповнення.

Introduction

Digitalization of the educational process embodies a persistent problem in current higher education. This is determined both by the crucial need to exploit the potentials of distance learning and by the requirement to improve the visual quality of methodological resources in the teaching of medical disciplines at higher education institutions. Contemporary methodologies for the performance of instructive content are envisioned to substitute the growth of critical and analytical thinking in medical students, their improve cognitive engagement, learning sustain adapted paths, long-term indorse memory preservation, enable the development of integrated conceptual understanding.

Similarly, the usage of varied modern methods for presenting visual didactic materials pays to the incessant enhancement of pedagogical mastery. Using numerous forms of info illustration rises the overall efficiency of the educational process. This paper focuses on enhancing capabilities connected to the utilisation of multimedia products in pedagogical practice, drawing on the teaching involvement of the staff of the Department of Pathological Anatomy at Bukovinian State Medical University in teaching the educational component Pathomorphology.

Objective

To raise the consciousness of the usage of modern visual teaching techniques by utilising multimedia products in the instructive process at a medical higher education institution.

Main part

The didactic tactic of visualization is one of the central values in pedagogy, grounded on the idea that more than 90% of data is perceived by humans over visual and auditory channels. It is a fixed statistic that the main volume of acquaintance is developed through the most influential and effectual channels of information transmission and reception. There are visual and auditory analysers. Drawing on this consideration, the education staff of the Department of Pathological Anatomy follows to the opinion that the more varied and clinically oriented the information performance (means knowledge) is, the more operative and long-lasting the courses of learning and retention will be.

The visualization principle is guaranteed by the engagement of numerous sensory modalities in the learning process. This is mainly applicable to the subject Pathomorphology, which is trained to second- and third-year students of the Dentistry and Medicine programs. Pathological anatomy is legally viewed as a bond amid theoretical and clinical disciplines, as it makes the foundation for clinical thinking expansion in future physicians as well as offers not only an over-all consideration of disease but likewise thorough knowledge of its morphological features.

The faculty memberships sustain that an actual teaching is attained when visualization is viewed as the incorporation of visual and auditory perception together with motor and tactile sensory engagement. Habitually, visualization serves as a means of illustration and demonstration. Therefore, in teaching Pathomorphology, instructional methods comprise the usage of tables, group and individual work with gross specimens, presence during dissections, and the projection of microscopic images onto a large screen. The usage of visual assistances eases students' acquaintance with general pathological methods and various nosological entities at both macroscopic and microscopic levels (tabl. 1).

New technologies allow modern teachers to safeguard the principle of visualization, predominantly through the implementation of tools for visualizing instructive materials. Moreover, to frequently used methods of giving instructional satisfied, such apparatuses progressively comprise mind maps, interactive whiteboards (like Padlet), and visual performance techniques such as scribing.

Multimedia tools are shaped through multimedia technologies and presently include electronic textbooks, educational and methodological manuals, digital books, archives, catalogues, reference materials, encyclopaedias, testing and modelling software, training programs, and simulators.

The furthermost widely utilised multimedia instrument leftovers the multimedia presentation (MP), derived from the English term presentation, meaning illustration or demonstration. Distributing lecture content or conference presentations through multimedia presentations has become an average and suitable practice. A multimedia performance involves a sequence of slides covering visual essentials and concise textual information, as well as thematic charts and graphs. To decrease file size, performances are often renewed into suitable presentations. Each slide may include text, graphics, video content, animation, audio, diagrams, graphs, tables, and other instructional materials.

This scientific investigation summaries numerous important values followed by the teaching staff of the Department of Pathological Anatomy when preparing lecture materials. Founded on pedagogical experience, higher education instructors should distinguish that a multimedia presentation is not just a gathering of slides, charts, or templates, but rather a real means of interactive notions, ideas, and material to an audience. When formulating a multimedia demonstration, teachers must report to numerous serious considerations, counting visual style, contextual design, colour arrangements, moving picture effects, font selection, information plan and importance, and the suitable volume of content per slide.

Table 1

Rules for using visuals

Visuals usage rules	
Visualization properties	"Everything that is possible should be presented for perception by the senses, namely: visible - for perception by sight, heard - for hearing, smells - for smell, that which can be tasted - for taste, accessible to feeling - by touch". (J.A. Comenius). The presented visuals should correspond to the level of knowledge and the students' perception capabilities; if possible, the visuals should not have anything superfluous that could cause additional associations and distract".
Using visuals	Visuals are used at all stages of the educational process, the demonstration is consistent, synchronized with the presentation of educational material; is based on scientific justification.
A reasonable amount of attention	A feature of use is a reasonable amount of attention paid to visuality. Overestimating the role of visuality in learning can inhibit the development of abstract thinking. The use of demonstration tools should foster interest in learning and reinforce theoretical material.
Visibility performs the following functions:	Promotes the intellectual development of students; Helps to establish connections between theory and practice; Facilitates the student's educational and cognitive activity, contributes to the formation of interest in professional knowledge; Helps the comprehensive perception of the subject being studied; Contributes to the formation of motivation for cognition.

Source: authors' own development

To attain real learning results, presenters should methodically reproduce on these thoughts. A combined design style is viewed as the most suitable method, as the association between visual style and content should sustain, rather than distract from, the essential communication. Additionally, data must not outweigh or unclear the main instructional content.

The context of a slide should function as a subordinate element, serving to highlight, shade, or emphasize information without obstructing it. The use of psychologically contented colour characters and a reliable mode of info attendance is optional. Slide names should seizure the audience's attention, while the content itself should persist simple, organised, and brief. Overfilling a single slide with unnecessary information should be evaded, as students are typically able to recall no more than three important facts, assumptions, or meanings at a time.

Arrangements or tables resulting from big dimensions of data have proven predominantly effective. Altering widespread textual material into graphs, tables, diagrams, mind maps, or scribing-based visuals is both pedagogically suitable and favourable to profounder understanding of the lecture topic (fig.):

5 rules of presentation	
1.	To focus
2.	To interest
3.	To like
4.	To become remarkable
5.	To arouse

Figure. The main rules for presentation

Source: authors' own development

The key duty of the lecture class is to offer a theoretical basis for learning, advance awareness in educational doings and a specific discipline, and form rules for autonomous work in students. A traditional lecture has irrefutable recompenses not only as a way of transmission information, but as well as a method of demonstrative effect of the teacher on students, which surges their motivational activity. In the circumstances of distance learning or in current realities of wartime, a video lecture is extensively used. A video lecture is an activity by a teacher documented on videotape or means of application on an electronic medium and accompanied with multimedia essentials. The absolute benefit of this method of giving the material is the aptitude to listen to the lecture at any time, recurrently raising to the most problematic places. It is significant to safeguard unrestricted admittance to the offered material, which will nearly remove the time and space limits of both students and teachers in mastering the educational material. Only as a result of the coordinated interaction of the teacher's words and demonstration material will clarity acquire meaning. The word itself is a specific means of visualization that determines the teacher's description of a pathological process or nosology; it enlivens the pedagogical process, and no technical means are able to influence the minds of listeners compared to the living word of a lecturer or teacher (Table2):

A practical class embodies a form of instructive organization led under the direction of a teacher and intended to consolidate theoretical acquaintance through the discussion of chief sources and the achievement of precise tasks. The incorporation of information technologies requires variations in the organization of practical classes and the improvement of their methodological sustenance. Multimedia tools make it conceivable to establishthe work with training devices (simulators) that duplicate real-life situations, research objects, and experimental settings.

In the background of teaching Pathomorphology to the third-year students of the Medicine and Dentistry programs, such simulators comprise gross specimens representing various pathological processes and nosological entities. Throughout the distance learning, teachers demonstrated images and video fragments of

Table 2

The effectiveness of using multimedia products

The contribution of the use of various types of multimedia products	
1.	Involving a variety of databases (texts, tables, micro- and macro-images, macro-preparations, diagrams, video and audio fragments, visits to autopsies of the deceased);
2.	Motivation to increase attention and educational and cognitive activity;
3.	It is problematic to build a lecture using different text variations, to focus attention on the main components of the lesson;
4.	Quick and effective assimilation of information on the topic through the use of visuals;
5.	Optimal emotional learning environment, creating comfortable conditions for memorizing new material;
6.	Increasing the productivity of the lecture class and building interdisciplinary connections;
7.	Involving young students in the department's scientific circles, participation in scientific and practical conferences, congresses, etc..

Source: authors' own development.

authentic gross specimens from the museum of the Department of Pathological Anatomy. Due to the extensive assortment of exhibits kept in the museum of the Department of Pathological Anatomy at Bukovinian State Medical University, the faculty memberships have the possibility to present the macroscopic structures of diseases through both physical specimens and video materials, so enhancing the effectiveness of student learning.

At the same time, the number of students' autonomous work with educational and methodological materials meaningfully rises. Students can work with gross specimens not only throughout scheduled practical classes but also during sessions and meetings. Additionally, the practical class schedule comprises a devoted session previous to final modular valuations, concentrating on student consultation concerning the work with gross specimens and the algorithm for their morphological description.

The utilisation of novel information technologies as well increases the potentials of controlling the educational process, brands the learning process more stimulating due to the usage of a larger number of high-quality presentations of educational material. So, one of the important areas in the field of informatization of education is the development and implementation of multimedia technologies, the use of which in practical teaching work allows educators both transform and augment the content of pedagogical education and to stimulate the instructive and cognitive activity of students in classes (Table. 3):

Table 3

Advantages of using a multimedia presentation

Information capacity	The ability to place a large amount of graphic, textual, and audio information in one media allows you to fully demonstrate educational material.
Compactness	Various types of electronic media can be used as media for MP
Emotional appeal	MPs make it possible to present information not only in a sequence that is easy to perceive, but also to effectively combine sound and visual images, and select dominant colors.
Clearness	We use the rule "it is better to see once than hear a hundred times"
Mobility	All you need for the demonstration is a computer (laptop, tablet or smartphone), a projector. When giving a lecture remotely, an available internet connection is required.
Interactivity	The ability to directly influence the course of the presentation is one of the important advantages of multimedia.
Economic benefit	Reproducing multimedia presentations on electronic media is much cheaper than printing an average booklet in terms of volume and quality. It is also necessary to take into account the possibility of multiple use of one presentation, its addition with new text and graphic materials.
Persuasiveness and energy	It is necessary to attract the attention of the listeners. You do not need to use slang, try to minimize the use of special terminology. If you cannot do without using a number of terms, you need to give them a brief explanation at the beginning
Report time	The time allotted for the MP is up to 90 minutes. From this time, it is necessary to calculate the time for: greetings (introductory part), directly on the content of the lesson topic, answers to questions from the students, summing up (final part)
The main task of using multimedia for lectures is to provide not the maximum, but the minimum amount of the most important information and to motivate students to study the subject in depth.	

Source: authors' own development

Interactive whiteboards, which are considered convenient for collaborative work, including online work, allow users to add a variety of content (text, images, files, links, videos), organize it, comment on it and share it, which makes it an ideal tool for learning, project work and creative exchange of ideas. Such a virtual online whiteboard is Padlet (Table 4):

It is suitable to organize it with an academic group not only for one applied lesson, but for the complete academic year. This is a place where the teacher and students place and exchange various necessary files, which can be suitably and quickly found in one place. The availability of its use fascinates as it works on computers and smartphones; mobile applications are available.

Table 4

Recommendations for creating a MP

When designing your presentation, consider the following tips:	
1.	Stick to a consistent presentation style
2.	Use no more than three colours on a slide, preferably contrasting colour combinations
3.	Choose psychologically comfortable tones for the background
4.	Choose no more than two font types and sizes for titles and body text on a slide
5.	Don't use fonts that are difficult to read from a distance
6.	Use short phrases and sentences; minimize the number of definitions on the slide (3 definitions or theses)
7.	Information placement - horizontal, more important information should be placed in the centre
8.	Do not use images for decoration. Any demonstration material must be meaningful
9.	Use graphic material (diagrams, tables, graphs) as an alternative to text. However, avoid very large tables
10.	Use animation only when necessary

Source: authors' own development

Conclusions

Based on the above, it is worth emphasizing that the use of visuals, as well as multimedia products, is significant in the educational process. A multimedia presentation is not a set of slides, graphs, templates, it is an effective way to convey educational material, present the issues of the investigated issue (thought, idea) to the audience. Throughout the classes (lecture or practical), the pedagogical skill of the teacher still remains central, and a successful combination with the use of visuals or multimedia presentation will be a bright visualizing tool of addition.

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