

**MINISTRY OF HEALTH, LABOUR AND SOCIAL PROTECTION  
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## **ACTUAL ISSUES OF MORPHOLOGY**

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## **PROBLEME ACTUALE ALE MORFOLOGIEI**

**Materialele Conferinței științifice internaționale  
dedicată aniversării a 75 de ani de la fondarea  
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## **АКТУАЛЬНЫЕ ВОПРОСЫ МОРФОЛОГИИ**

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# SMART HYSTOLOGY

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## Abstract

The review presents the experience of teaching histology in practical classes at a medical university, which involves the use of new pedagogical approaches in problem-oriented self-education, the formation of professional practical skills in future medical workers, their acquisition of the ability to interpret in detail the diagnostic criteria of histological structures in normal conditions, as well as their changes in the process of adaptation, compensation and possible pathological changes. The article discloses and substantiates innovative technologies that contribute to improving the efficiency and quality of education, as well as ensuring the creation of pedagogical conditions for students to adapt to the education system and improve the formation of tools for the development of their clinical thinking., Expanding communication opportunities. Histology and embryology were integrated with other basic scientific disciplines during the first two years of study at the university. Due to Smart technology the Nikon E200 Microscope application with a WiFi camera for tandem microscopy, each student has the opportunity to be coordinated and self-oriented, to be able to fully demonstrate initiative, independence, creative research research and to be more interactive while differentiating histological preparations in discussing and solving problematic scientific issues of medical importance.

**Key words:** problem-oriented teaching of histology, Nikon E200 Microscope with WIFI Camera for Tandem Microscope.

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**Background.** The main task of higher education in Ukraine remains its modernization, ensuring high quality training of specialists at the level of international standards [1].

This problem can be solved if the necessary conditions are created for students to realize their intellectual potential on the basis of the widespread introduction of innovative pedagogical technologies in the educational process, a significant increase in the effectiveness of the educational process, individualization of learning, and continuous interactive activity. It should be noted that in comparison with other types of human activity and the corresponding systems, knowledge in the field of medicine is associated with a large variety of assimilation and application information in the diagnostic and therapeutic process. It should be understood that this amount of information is constantly updated and revised, which requires continuous improvement of the learning process. Therefore, concern is expressed that traditional approaches to academic training, using the example of medical science, cannot provide high-quality training for doctors capable of independent work, continuous self-education if we do not take into account the didactic principles and problems of organizing independent work of students already in the first courses of their study. the need to determine effective methods of its organization using information technology, which is dictated by the data of literary sources and own pedagogical experience [2-7].

Creating the necessary information base for the formation of a doctor is impossible without fundamental biomedical knowledge. Diagnosis and treatment of pathology is based on a deep understanding of the functioning mechanisms and molecular foundations of structural organization and regulation in the norm. This is facilitated by the development of molecular biology and genetics, which are now used as examples of gene and cell therapy. Practical studies in histology, cytology and embryology in medical universities of Ukraine play an important role not only in illustrating theoretical knowledge, but also in providing them with understanding and deep learning [6].

An analysis of the literature on trends in medical education points to the problem of reducing the time devoted to teaching fundamental disciplines in new programs of higher medical education. This contradicts the basic model of medical education in the USA, known as the Flexner report [3, 4, 6].

To increase the effectiveness of teaching basic disciplines, including human physiology and morphology, it is proposed to use the experience of the College of Medicine in Chicago, USA, to identify existing problems in different categories of students using questionnaires for teachers and students

at the beginning and end of the course; also described at the University of New South Wales (Australia) for training in the form of simultaneous study of microscopic anatomy (histology) and pathology, jointly developed by histologists and pathologists in workshops using a virtual collection of histological and histopathological images [8-10].

The goal of the course in histology is not to study pathological changes in organs, but first of all to understand the functional characteristics of normal structures that allow the student to diagnose their possible changes. At the present stage, it is important to justify the role of the traditional educational method for the diagnosis of histological preparations in the formation of practical skills and the development of students' clinical thinking primary courses and it is imperative to introduce innovative methods to optimize vocational training [6-10].

Our scientific pedagogical research uses the experience of the American educator and philosopher John Dewey (1859-1952), who proposed a learning paradigm with simple memorization of information in the process of acquiring knowledge in accordance with their cognitive activity and interests. This is due to different teaching methods in many countries. It should be noted that it is especially relevant today in medical education [11].

Many studies, including ours, are devoted to the role of interactive teaching methods, since the educational process takes place in conditions of constant active interaction of students and teachers [6-9].

This is coeducation, where the student and teacher complement each other. The teacher is the organizer of the training. Organization of training includes modeling of real situations, the use of game elements and discussions, joint problem solving based on an analysis of circumstances and the corresponding situation. During group training, students learn to think constructively, make informed decisions, develop the ability to persuade and discuss.

**The aim of the work** was to generalize the experience of introducing innovative technologies and interactive methods of teaching students in practical classes in histology at a medical university.

## Materials and Methods

The traditional method of teaching in histology is using a light microscope and histological preparations. Innovative technologies such as virtual microscopy, computer, audio-visual means for demonstrating slides, SMART Bord microscope Nikon E200 with a WiFi camera for tandem microscopy for demonstrating histological slides.

The maximum number of device connections to the camera, the resolution and maximum magnification is 640 \* 480. Students' personal mobile phones are equipped with color micrographs and their morphological characteristics. The basic collection consists of training slides, histological preparations, as well as slides and histological preparations of our own scientific research with their normal and abnormal characteristics.

The innovative method of problem teaching (PBL) is used in teaching first-second year students of English-speaking students of cytology, embryology, general and special histology. Weekly 3 practical hours in class for 2 semesters, total 40 topics - 120 hours and 185 hours - individual work. The curriculum contains 11.5 credits (345 hours, which include lectures (2 hours / week, total 40 hours / academic year).

## Results

At the practical classes of the Department of Histology and Embryology of the A.A. National Medical University Bogomolets is diagnosed with a specific object according to the procedure in the following sequence:

- 1) initial independent study of histological preparations;
- 2) then each student shows teacher the structures studied in this preparation, and the teacher gives the necessary explanations and controls the student's skills;
- 3) a further detailed discussion of this drug is conducted with the participation of all students;

4) if the organ is being studied, it is first necessary to determine its place in the functional system of the body and give a general description (origin, determine the general plan of its structure, show details or membranes, identify diagnostic signs;

5) provide a detailed histological analysis of the structures and their functional properties.

Each histological preparation is studied in two stages. At the first stage, the student learns to „read“ the histological object and form its „visual image“ in the norm and acquires the ability to diagnose possible changes in the normal structure. At the second stage, tables, diagrams, electron diffraction patterns, multimedia presentations are used to ensure consolidation and control of practical skills. Our method of active discussion of each histological preparation demonstrated the growing success of the student's personal development as well as increased activity in group communication, which largely depends on how an individual can join a group, adapt to new learning conditions in university classes and navigate under conditions of increasing speed and volume of information. To determine the existing problem in different categories of students, we should use questionnaires for teachers and students at the beginning, for their coordinating activities, and at the end of the course to assess the quality of teaching and the effectiveness of teaching by introducing innovative technologies and problem-oriented learning (RBL) in students' independent independent work. The PBL method is based on the joint work of a group of students who, under the guidance of a teacher, solve the problem in 7 stages – from refinement and coordination of goals through“ brainstorming ”to obtain a common result. During the Diane Wood study (2003), students improve their knowledge, discuss solutions, learn to work in a team and reach consensus under the supervision of a teacher-teacher. In this case, the contribution of each student to the overall result is assessed. The most important result of such training is the ability to act effectively in complex clinical situations, acquire clinical and communicative skills [12].

Our experience and our research on optimizing students' practical skills in training are aimed at a detailed interpretation of the diagnostic criteria for normal and abnormal characteristics using a virtual collection of histological and histopathological images. It takes into account the role of teachers in making the teaching method more accessible, understandable and interesting for junior students with different levels of knowledge of their basic training and creating comfortable, psychological, pedagogical conditions for their active work in the classroom.

Using the SMART Bord, Nikon E200 Microscope with WIIFI Cameara for Tandem Microscop in close contact with student smartphones allowed the demonstration of histological preparations and slides, their detailed study at various magnifications, their comparative evaluation in various combinations. Therefore, it must be emphasized that this is an effective way to revive the class room, helping students experience a deeper level of engagement and understanding in the conditions of interactive and visual research. This method improves the quality of training and the assimilation of fundamental knowledge of histology.

The role of a teacher as an organizer of interactive training, which involves modeling real situations, using interactive elements and discussions, joint problem solving based on an analysis of circumstances, is great. In the process, students improve their knowledge, discuss solutions, learn to work in a team and reach consensus under the supervision of a student teacher. It should be noted that the problem-based learning method (PBL) provides for collective participation in the discussion of assessment, based on the contribution of each student to the overall result.

The most important result of such training is the ability to act effectively in complex clinical situations, to think constructively, to acquire professional communication skills, and organizational competence.

## **Conclusions**

In our opinion, a differentiated approach to the use of information and communication technologies allows us to expand the availability of training and improve the psychological and pedagogical conditions for the formation of students' personal qualities. We have a high level of awareness about

their responsibility for the quality and effectiveness of training, as well as their willingness to learn and improve. The advantages of PBL and the features of some methods for the possible introduction of this innovative technology in the medical education of Ukraine are revealed.

During the student's independent work the implementation of the student research method will increase the effectiveness of the development of communicative abilities of students at all levels of basic knowledge, and will help to achieve psychological comfort and self-esteem.

Through the use of Nikon E200 Microscope with a WiFi camera for tandem microscopy, each student has the opportunity to navigate and self-orientate and be more interactive during the differentiation of histological preparations while discussing the solution of problematic scientific issues of medical importance. Students have the opportunity to fully demonstrate the initiative, independence, creative search in research activities.

It is advisable to create in Ukraine a digital collection of virtual slides on histology, cytology and embryology, in which you can use the best histological preparations accumulated at universities in Ukraine.

## References

1. Чайковський ЮБ, Хламанова ЛІ. Додипломна вища медична освіта в Україні: що можна змінити вже сьогодні? Медична освіта. 2015(1):125-8.
2. Чайковський ЮБ, Хламанова ЛІ. Деякі шляхи впровадження проблемно-орієнтованого навчання у вищу медичну освіту. Журнал НАМН України. 2017; 23(1-2):116-21.
3. Flexner A. Medical education in the United States and Canada: A report to the Carnegie Foundation for the Advancement of Teaching. — New York City, 1910. — Bulletin № 4. — P. 346 <http://www.carnegiefoundation.org/publications/medical-education-united-states-and-canadabulletin-numberfour-flexner-report-0>
4. Cooke M, Irby DM, Sullivan W, Ludmerer KM. American medical education 100 years after the Flexner report. N Engl J Med. 2006 Sep 28;355(13):1339-44.
5. Чайковський ЮБ, Хламанова ЛІ. Сучасні аспекти педагогічного впливу на креативне та профільне виховання студентів молодших курсів у вищому медичному закладі. Матеріали XIV всеукраїнської конференції «Сучасні підходи до вищої медичної освіти в Україні». Тернопіль «Укрмедкнига». 2017:186-188.
6. Чайковський ЮБ, Хламанова ЛІ. Проблема викладання базових медико-біологічних дисциплін: дискусія протягом століття. Журнал Національної академії медичних наук України. 2015(21,№ 1):95-102.
7. Kimbarovskaia EM, Evseeva LI, Khlamanova LI. Active methods of teaching histology to students. Arkhiv anatomii, gistologii i embriologii. 1988 Oct;95(10):97-9.
8. Kumar RK, Freeman B, Velan GM, De Permentier PJ. Integrating histology and histopathology teaching in practical classes using virtual slides. // Anat Rec B New Anat. 2006 Jul;289(4):128-33.
9. Krasne S, Hillman JD, Kellman PJ, Drake TA. Applying perceptual and adaptive learning techniques for teaching introductory histopathology. J Pathol Inform. 2013 Dec 31;4:34.
10. Isaacs M, Lennerz JK, Yates S, Clermont W, Rossi J, Pfeifer JD. Implementation of whole slide imaging in surgical pathology: A value added approach. J Pathol Inform. 2011;2:39.
11. Dewey J. Experience and education. In The Educational Forum 1986 Sep 30 (Vol. 50, No. 3, pp. 241-252).
12. Wood DF. Problem based learning. Bmj. 2003 Feb 8;326(7384):328-30.

