

MODERN TEACHING METHODS FOR MORPHOLOGICAL DISCIPLINES IN HIGHER EDUCATION INSTITUTIONS OF UKRAINE UNDER MARTIAL LAW

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Morphological disciplines, in particular cytology and histology, are fundamental sciences of critical importance to the professional training of future biologists, as well as specialists in the fields of veterinary and human medicine. These sciences remain foundational to medical and biological education, providing essential insight into the microscopic structure, function, and pathology of cells, tissues, and organs in both animals and humans. However, despite their importance, student interest in morphological disciplines has been declining, often due to the complexity of understanding, the significant amount of information, and outdated teaching methods and technologies.

This has been noted by international researchers, who emphasise the importance of moving towards lessons that utilise multimedia presentations with animated effects; virtual laboratories with high-resolution digital slides; the use of interactive learning technologies; and the close integration of theory and the practical application of knowledge [6; 7].

The situation is further exacerbated in Ukrainian universities under conditions of martial law, in connection with Russia's

full-scale invasion, the temporary occupation of territories, and the forced relocation of higher education institutions. Today, the educational process must be organized with due regard to the security situation, combining synchronous and asynchronous distance learning with in-person laboratory sessions; stimulating students' cognitive interest through interactive creative assignments, small-group collaborative work, innovative instructional technologies, the development of critical thinking skills, and other approaches.

Drawing on experience of teaching cytology, histology, embryology and developmental biology at universities – both my own and that described in the literature [1–5] – it is possible to identify certain trends in the application of effective, modern teaching methods and technologies under martial law.

Firstly, security, flexibility, and the transition to blended learning formats. Online sessions are conducted in both synchronous and asynchronous modes, making use of a variety of platforms (predominantly Zoom, Google Meet within the Google Workspace suite, and Microsoft Teams). The use of screen casting – digital video recording of what is happening on a computer screen, supplemented by voice commentary and real-time explanations – enables video lectures to be delivered and materials to be saved for those who are unable to attend online due to air raid alerts or power cuts. Students gain access to lecture and practical session materials, as well as instructor demonstrations, for repeated viewing at a time that is convenient and safe. Particularly effective is the “flipped classroom” methodology. A successful example of such a methodological product is the educational histology YouTube channel established by Kharkiv National Medical University [1].

Secondly, combining traditional light microscopy with digital microscopy, as well as setting up virtual histology laboratories, is an effective approach. The latter utilize high-resolution digital scans (microphotographs) of histological preparations, enabling the study

of histological sections on a smartphone or computer screen. It is important to create online atlases, educational databases of microphotographs, where drugs are accompanied by marking of structures, signatures and explanations and can be used, if desired, both for studying new material and for knowledge control.

Thirdly, under conditions of martial law, particular attention must be devoted to methodological support for the educational process and individualized academic guidance for students throughout their studies. Accordingly, there is pressing need for online atlases and methodological guidelines for laboratory sessions and students' independent coursework, which already incorporate photomicrographs of histological preparations, case-based tasks, problem-oriented questions, and self-assessment tests. The use of platforms for non-formal education has proven beneficial in this regard. Successful completion, in students' own time, of training courses on platforms such as OpenLearn, Coursera, Cursa, Udemy, and others, allows each student to build a personal portfolio of academic achievements.

Moreover, the system of student academic achievement assessment requires reform. Under present conditions, this is increasingly taking place via Learning Management Systems (LMS) – specialised digital platforms designed for the creation and distribution of educational materials, the automated assessment of student academic progress, and the administration of the educational process. Such systems enable the hosting of all instructional materials for students (lecture and practical course materials, syllabi, disciplinary study programs and working curricula, etc.); the assessment of homework assignments; the implementation of access restrictions and time limits during testing; and the monitoring of each student's individual progress. Among the leading LMS platforms employed in Ukrainian educational institutions are Moodle and Google Classroom; in recent years, Canvas LMS has also come into use (as in the majority of European universities), alongside bespoke institutional

platforms. For example, Zhytomyr Ivan Franko State University employs its own systems: “E-Portfolio” and “ZDU PROJECT”.

Thus, the contemporary methodological framework for the study of cytology and histology in Ukrainian educational institutions is oriented toward ensuring student safety, the individualization of instruction, the digitalization of educational process organization and its methodological provision, the introduction of blended learning formats, and the broad adoption of Learning Management Systems.

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