МІЖНАРОДНІ МУЛЬТИДИСЦИПЛІНАРНІ
НАУКОВІ ІНТЕРНЕТ-КОНФЕРЕНЦІЇ

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Світ наукових досліджень

Збірник наукових
публікацій міжнародної
мультидисциплінарної наукової
інтернет-конференції

Випуск 27

22-23 лютого 2024 р.

ISSN 2786-6823 (print)

Google Scholar

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W OPOLU

Тернопіль, Україна – Ополе, Польща
2024

УДК 001 (063)

Світ наукових досліджень. Випуск 27: матеріали Міжнародної мультидисциплінарної наукової інтернет-конференції (м. Тернопіль, Україна, м. Ополе, Польща, 22-23 лютого 2024 р.) / за ред. : О. Патряк та ін. ГО "Наукова спільнота", WSZIA w Opolu. Тернопіль: ФО- П Шпак В.Б. 2024. 265 с.

Збірник наукових публікацій укладено за матеріалами доповідей наукової мультидисциплінарної інтернет-конференції «Світ наукових досліджень. Випуск 27», які оприлюднені на інтернет-сторінці www.economy-confer.com.ua

Оргкомітет

Адреса оргкомітету:
46005, Україна, м. Тернопіль, а/с 797
тел. +380977547363 e-mail: economy-confer@ukr.net

ISSN 2786-6823 (print)

POSSIBILITIES OF APPLICATION OF IMMERSIVE TECHNOLOGIES IN THE EDUCATIONAL PROCESS OF MEDICAL STUDENTS AT CLINICAL DEPARTMENTS

Igor Gladchuk
MD, professor, Head of the
Department of Obstetrics and Gynecology,
Odesa National Medical University
ORCID: 0000-0003-2926-4125

Oksana Pavlovska
Ph.D., Associate Professor,
Department of Obstetrics and Gynecology,
Odesa National medical university
ORCID: 0000-0001-9549-9032

Olga Savelyeva
Ph.D., Associate Professor,
Department of Internal Medicine No1,
Odesa National Medical University
ORCID: 0000-0002-6478-2158

Kateryna Pavlovska
Ph.D., Associate Professor,
Department of Internal Medicine No1,
Odesa National Medical University
ORCID: 0000-0002-4869-8212

Internet address of the article on web-site:
https://www.economy-confer.com.ua/full-article/5326/

Currently, the use of immersive technologies has become a powerful driving force for changes in learning and teaching methods in many leading educational institutions of the world [1, p. 1]. From a modern point of view, it is the incessant computerization, the involvement of the latest information and communication technologies as well as the active application of innovations in the educational process that definitely become the fundamental factors of the competitive advantages of an educational institution, therefore, a kind of integral indicators of its competitiveness in the world educational space [2, p. 2].

It should be noted that immersive technologies are modern technologies of visual, audio and partially tactile immersion of the participant in an alternative space, which is created using 3D graphics [3, p. 4]. Today, virtual educational simulators, augmented reality software applications can be very successfully and effectively used in the educational process of medical university students during practical/seminar

classes when mastering practical skills and to prepare for the objective structured clinical exam (OSCE) as well as 360-degree video (immersive video).

Thus, with the help of virtual reality, with the use of 360° images, the program creates, for example, a clinical case in the intensive care ward where the participant can bring to automatism the algorithm of actions of a medical worker in accordance with professional competencies [4, p. 5]. Augmented reality technologies demonstrate 3D objects in real time, combining the virtual environment with the real one [5, p. 2]. It is possible to learn with the involvement of augmented reality using only a smartphone but a special helmet or glasses are required to immerse you in the virtual space.

360-degree video or immersive video is a panoramic image with varying degrees of interactivity, while the reproduction of visual and audiovisual material allows the viewer to move and feel present in this reality [6, p. 2]. Viewing can be done using a personal computer, a mobile device or a special display on a virtual reality helmet.

According to many experts, the main advantages of immersive learning are first of all visualization, as well as concentration, involvement and high productivity [7, p. 24].

Visualization is the most important advantage of immersive technologies, which allow you to present any subject, phenomenon/process, sequence of actions in maximum detail, which is especially important when studying anatomy, general physiology and pathological physiology, and clinical disciplines in medical universities.

Concentration is the next very important component of the learning success. One cannot help but agree with researchers who claim that misunderstanding of educational material most often occurs not due to the lack of certain abilities, weak intelligence or forgetfulness, but rather due to insufficient attention. In addition, the learning process is not always exciting and relaxed. The use of immersive methods involves the sequential, step-by-step performance of certain tasks, which, firstly, makes it impossible for the student to be distracted by other activities of minor importance during the class, and, secondly, forms the necessary level of concentration in him and, what is extremely important, feeling of conscious achievement of the goal set.

Involvement. The syllabus using virtual reality gives a chance to involve all students in the group simultaneously in the process of analyzing and solving a task of any complexity and direction, which is also a certain motivating factor for the formation of the appropriate level of communicative competence in future doctors, the development of clinical thinking and research skills.

Therefore, such a modernization of the educational process will certainly lead to an increase in motivation to study, productivity and can become a platform for further professional formation and growth of both medical education students and university teachers.

Possibilities of using immersive technologies in the educational process of students of medical universities at clinical departments are presented in the Table 1.

Table 1

Possibilities of using immersive technologies in clinical departments of medical universities

Type of immersive technology	Topics of practical classes
Virtual reality	1. Assessment of the severity of the patient/victim condition under conditions of a health care facility, emergency situation, combat operations, in the field, under the condition of lack of information and limited time. 2. Determination of tactics and development of the algorithm for the provision of emergency medical care in case of emergency in limited time. 3. Organization of providing medical care and medical evacuation measures to the population and military personnel in emergency situations and hostilities. 4. Determination of the principles of treatment of patients (conservative, operative), under the conditions of a health care institution and outside, at the stages of medical evacuation, in field conditions. 5. Drawing up medical routes of patients. 6. Performing medical manipulations under the conditions of a health care institution 7. Determination of delivery tactics and the postpartum period. 8. Working out the algorithm of actions in the complicated course of pregnancy, childbirth and the postpartum period. 9. Working out the algorithm of actions during resuscitation of a newborn.
Augmented reality	1. The structure of human internal organs, blood supply, innervation, topographic anatomy. 2. General and pathological physiology of body organs and systems. 3. Assessment of psychomotor and physical development of a patient. 4. Assessment of the general condition of a newborn child. 5. Analysis of the results of laboratory, functional, instrumental examination methods.
Immersive video	1. The structure, origin and development of tissues, organs and systems of the human body, their topographical and anatomical interrelations. 2. Patterns of prenatal and postnatal development, variants of organ variability, formation of congenital and acquired malformations. 3. Age, sex and individual characteristics of the structure of the human body. 4. The influence of the environment and harmful factors on human health. Provision of primary, secondary, tertiary, emergency, palliative medical care to a patient, surgical interventions. 5. Medical rehabilitation (physiotherapy treatment, hydrotherapy, hydrokinesiotherapy, kinesiotherapy, massage, aromatherapy)

It should be noted that today one of the world leaders in the development of virtual educational simulators, virtual laboratories and interactive science is the “Labster” platform, thanks to which more than 5 million students are already successfully studying [8, p. 2]. The Ministry of Education and Science of Ukraine and Labster have been actively cooperating since 2022. At present, several Ukrainian higher education institutions have already signed up to the Labster offer and are successfully implementing Labster within their educational courses.

Therefore, for the formation of professional competencies of future doctors, it is advisable to widely involve such modern teaching methods as immersive technologies, which have many promising advantages. In our opinion, changes in the pedagogical paradigm, approaches to teaching educational material will allow to raise the level of students by maximum disclosure of their individual abilities, talents and intelligence.

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