

Abstract

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ANALYSIS OF MICROBIOLOGY ONLINE TEACHING
IN QUARANTINE CONDITIONS

Introduction and purpose. Teaching microbiology, virology, and immunology subject in a medical school has traditionally been conducted without the use of online technologies. Consequently, the changes in the way stakeholders interact need to be analyzed. The purpose of the article is an analysis of the experience that was performed on how the course of microbiology, virology, and immunology was taught online in coronavirus quarantine conditions of 2020.

Authors have determined the main problems in achieving by higher education seekers the proper level of theoretical knowledge, some of the practical skills and abilities that have arisen because of the change in the form of practical classes and lectures. The positive aspects of this unpredictable experiment were noted in the way of teaching the discipline. This subject involves higher education seekers gaining a significant amount of sensory and motor skills. Moreover, the subject has a large fragment of theoretical knowledge, which consists of empirical data of the infectious diseases pathogens properties, methods of their study for microbiological diagnosis; the structure of pathogens, which is necessary for understanding the directions of etiotropic therapy of infectious diseases; biological and antigenic properties to assess the possibilities of specific prevention and treatment of diseases; the resistance of pathogens to external factors in order to understand the peculiarities of the epidemiology of each disease and the possibilities of its specific prevention. Higher education seekers must also learn the structure of the human immune system, to study the mechanisms of its functioning. Finally, a complex of theoretical knowledge, practical skills, and abilities should be built. These achievements were analyzed in this article to assess the prospects for modernization of the educational process in the subject.

Discussion. The situation was problematic with the teaching of this subject online in quarantine. But the benefits are that it was at the same time a discovery in the use of new digital technologies accumulated by civilization in the educational process in such traditionally classical areas of education as teaching microbiology, virology, and immunology course in medical higher educational institutions.

Keywords: Knowledge, skills, abilities, distance learning, higher education seekers.

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Резюме

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АНАЛІЗ ДОСВІДУ ВИКЛАДАННЯ МІКРОБІОЛОГІЇ ONLINE У ПЕРІОД КАРАНТИНУ

Актуальність та мета. Викладання мікробіології, вірусології та імунології у медичному навчальному закладі традиційно проводилось без застосування online технологій. Саме тому зміни у способах взаємодії стейкхолдерів мають бути проаналізовані. Проведено аналіз досвіду викладання курсу мікробіології, вірусології та імунології on line за умов коронавірусного карантину 2020 року.

Відзначено основні проблеми у досягненні належного рівня теоретичних знань студентів, деякої частини практичних вмінь та навиків, які виникли у зв'язку зі зміною форми проведення практичних занять та лекцій. Відзначено позитивні сторони цього непередбачуваного експерименту у способі викладання дисципліни. Цей предмет передбачає здобуття студентами значної кількості сенсорних і рухових навичок. У той же час, сутність предмету містить великий фрагмент теоретичних знань, які складаються з емпіричних даних про властивості збудників інфекційних захворювань, способи їх дослідження з метою мікробіологічної діагностики; структури збудників, що необхідно для розуміння напрямків етіотропної терапії інфекційних захворювань; біологічних та антигенних властивостей для оцінки можливостей специфічної профілактики та лікування захворювань; стійкості збудників до зовнішніх чинників з метою усвідомлення особливостей епідеміології кожного окремого захворювання та можливостей його специфічної профілактики. Також студенти мають засвоїти інформацію про структуру імунної системи людини, вивчити механізми її функціонування. Насамкінець, має бути побудований комплекс теоретичних знань, практичних вмінь та навиків.

Висновки та практична значимість роботи. Не зважаючи на проблемність ситуації з викладанням даного предмету on line в умовах карантину, слід відзначити, що у той же час відбувся певний прорив у застосуванні новітніх цифрових технологій, накопичених людством, у навчальному процесі у таких традиційно класичних сферах освіти, як, наприклад, викладання курсу мікробіології, вірусології та імунології у медичних вищих навчальних закладах. Ці здобутки проаналізовані у даній статті з метою оцінки перспектив осучаснення навчального процесу з предмету.

Ключові слова: Знання, вміння, навички, дистанційне навчання, пошукувачі вищої освіти.

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Introduction

We have an extraordinary experience of transformations today in the educational process at different levels of education – compulsory school attendance for all children, vocation, and higher education, "gifted" to the planet by the challenges of the coronavirus pandemic. It is well-known from the history of human development that, whatever the challenges, they ultimately carry with them a powerful potential of the energy of society, which

causes certain social phenomena transition and processes to new levels. These are revolutionary changes compared to evolutionary periods when the potential for change is only accumulating. Authors have focused on the analytical assessment of the experience gained and the prospects opened by the coronavirus for the field of education.

The aim the article is to analyze the teaching experience of the of microbiology, virology, and immunology course on-line under the conditions of

coronavirus quarantine in 2020 and consider the prospects of using elements of distance learning in the post-quarantine period to improve the efficiency of the educational process.

Theoretical framework. In order to structure the analytical process, it is productive way to use such categories as knowledge, skills, and abilities. These categories are tools for assessing any discipline being studied. They are also indicators of the necessary areas of control over the results of the educational process, closely related to the category: competitions.

The academic staff of the Department of Microbiology, Virology, and Immunology of the Ukrainian Medical Dental Academy constantly pays attention to the quality of the content structure of the subject [1, 2]. The staff makes regular contributions to improve the educational, methodological, and organizational support of the educational process [3, 4, 5, 6, 7, 8]. Authors also pay attention to the student's knowledge assessment in the subject [9, 10]. The category: "competencies" is necessary for the assessment of the success level in studying the subject [1, 12, 13, 14, 15].

Therefore, we will evaluate and analyze each of these categories (knowledge, skills, abilities, competitions) according to the following plan:

1. How much the technologies of the learning process have changed.
2. Have changes in the technology of the learning process led to an improvement or deterioration of the results of the process.
3. Should it be the possible prospect of consolidating certain elements of distance learning be considered appropriate in the post-quarantine future?

Category: "Knowledge"

One of the difficulties in studying the subject "Microbiology, Virology, and Immunology" is an extremely large amount of descriptive information. This knowledge opens new horizons to a greater extent. A striking example of the "inexhaustibility" of microbiological science, information, in fact, was a new strain of Coronavirus, which "closed" the planet for quarantine. To some extent, we can say that microbiology, virology, and immunology is a discipline that has certain signs of encyclopedic. It is impossible to remember all the accumulated amount of knowledge. It is proper in many cases to use reference materials, such as Bergey's Manual of Systematic Bacteriology, created to classify microorganisms based on many properties: morphological, tinctorial, cultural, and others. We

can say the same about the study of the section: "Immunology". In fact, higher education seekers can study only the basics of immunology within the subject of Microbiology, Virology, and Immunology.

"Classical" methods of studying include both control of the accumulated facts knowledge and discussion of the material; it's structuring, consideration of problematic issues. It allows shifting the emphasis from the knowledge of facts to understanding the material. The role of a teacher is extremely important as a guide for higher education seekers in the complex mazes of microbiological science. With his help, higher education seekers have to create in their minds a logical map of the subject, which should contain separate "sectors". Primary information about the properties of each individual pathogen (morphological, structural, tinctorial, cultural, enzymatic, antigenic, biological, phagolizable) should be primarily not an object of memory, but a basis for analysis. The results of the analysis should provide the keys to understanding such phenomena and processes as the epidemiology and pathogenesis of a particular infectious disease, features of the immune response to the pathogen. A deep understanding of the mechanisms of interaction of these two systems (on the one hand – pathogens, on the other – the human body) is the basis for successful management of interaction processes. This applies to such practical tasks of medicine as specific and non-specific areas of prevention and treatment of infectious diseases. Also logically mediated is the choice of direction of microbiological diagnosis that is effective for a particular infectious disease.

The teachers of our department use the platforms Zoom [16] and Google classroom [17] most often in the distance learning condition. The first of them involves direct communication between participants in the learning process. The second one provides sending information from the teacher to higher education seekers and vice versa. Skype also provides the ability to set up video communication [18] and Moodle is a platform that provides the ability to exchange data [19]. These platforms are widely used in the world too. This is a non-exhaustive list of platforms that exist in the world for distance learning. There are also a number of other, lesser-known resources that can take a more significant role in the development and formation of distance learning throughout the world.

According to the results of the student's survey, Zoom is the undisputed leader in the Academy. More than half of the higher education seekers named it. Other options shared what was left about equally. Even such as sending information by e-mail, Viber, WhatsApp, and telephone communication were given among the options. It turns out that the other options cannot compete with the Zoom.

The authors of this article believe it does not mean that this platform meets all the requirements for adequate support of the educational process in higher medical education. This only means that the educational process was necessary for direct communication between teacher and student. It argued that higher education seekers deliberately rejected the possibility of an easier way to get a better grade but chose a higher level of knowledge, integrity in the learning process.

Category: "Skills and abilities"

The authors consider these categories together because abilities are, in fact, skills brought to automatism [17].

Therefore, we analyze changes in the conditions of distance learning in the process of acquiring motor, sensory and intellectual skills.

Examples of motor skills are slide preparation, staining by a simple or complex method, serological reaction, and so on. Distance learning reduces this process to the level of theoretical knowledge. This is the place where the learning quality of the subject is lost the most. So, we should not carry out this part of the educational process on the online platform in the post-quarantine period. We should keep the classical approach to mastering them instead.

To a large extent, this also applies to sensory skills, such as taking into account the serological reaction, or assessing the nature of bacterial staining, or the enzymatic properties of bacteria. This group of skills higher education seekers can partially acquire in the form of distance learning using drawings, photos, or videos. But, the real lesson will be better to master these skills in full.

Intellectual skills, such as making a conclusion about the diagnosis of infectious disease on the basis of laboratory results are compensated in distance learning better than the previous two, because they are essentially the result of generalization, synthesis of new knowledge.

But, since these are parts of the activity, based on theoretical knowledge, and realized first in motor and sensory actions, they must also, return to their usual place in the classroom or laboratory.

Category: "Competency building approach"

The study of the subject: "Microbiology, virology and immunology" involves the formation of various competencies of the future specialist. These include such groups of competencies as integral, general and special (professional, subject). Most of these competencies are directly related to the acquisition, improvement and practical application of knowledge, skills and abilities in the subject. These aspects are discussed in the previous provisions of this article.

At the same time, other competencies are aimed at such issues as, for example, maintaining a healthy lifestyle (the ability to self-regulation, follow up a healthy lifestyle, the ability to adapt and act in a new situation); social and psychological competencies (ability to choose communication strategies; ability to work in a team; interpersonal skills; ability to act socially responsibly and with public consciousness; the desire to preserve the environment; ability to apply science-based psychological techniques of effective work with colleagues, medical staff, patients and their relatives, willingness to interact with other people; individual awareness of the culture of other peoples), as well as skills in the use of information and communication technologies.

Issues of a healthful lifestyle and self-regulation have undergone significant distortions in quarantine conditions due to the forced restriction of the stay and movement of people outside their homes. Hypodynamia has significant negative consequences for the functioning of the musculoskeletal system, cardiovascular system. Indirectly, it affects the work of the whole organism. It is also important the increasing of the hypoxia level, which occurs against the background of these phenomena, as well as long periods of being in a state of wearing a protective mask. Lack of oxygen also has a negative effect on the systems and organs of the human body. In the context of issues of self-regulation under quarantine is important not only self-regulation at the physical level, but also the need to optimize own psychological state. All these questions do not directly relate to the goals and objectives of the subject: "Microbiology, Visusology and Immunology". However, they are more related to the process of formation, education of a conscious personality, doctor, conductor of these values among future patients. At the stage of training, as well as at the stage of professional activity, the determining factor is and will be a personal example, the expression of attitude to the issues.

In fact, in this section of educational achievements, the teacher's task is to sow the

seeds of a rational attitude to these issues. And the student's task is to perceive and nurture these grains and to express the attitude to the issues.

The competences in the use of information and communication technologies have come to the forefront in terms of the results of their effective

Conclusions

1. The online form of interaction between teacher and student is productive to assess student's knowledge at the stages of initial and final control.

2. We can use the tests of different levels of complexity and situational tasks in the process of the interaction.

3. The interaction can take place even during

mastery in quarantine. Others need further separate analysis. But in general, we can say that the issues of healthy lifestyle, self-regulation, social and psychological competencies have certainly been transformed in quarantine and acquired a new sounding.

a real lesson and can save a lot of time and deepen the control of the level of knowledge of each individual student.

4. This approach does not need computer classroom equipment, as every student today uses a smartphone and can set up an Internet connection with any Internet resource.

Prospects for future research

It is possible that, over time, the medical community will raise the issue of delimitation of such a control part of the educational process and live communication of higher education seekers with the teacher. This could save a lot of time for higher education seekers who spend it moving from one learning base to another, which are often

distant from each other. Then the real lessons could be devoted exclusively to the consideration of more complex, problematic issues and the acquisition of practical skills and abilities.

This approach can also be productive for freeing up some of the teachers' time from the learning process, to devote it to scientific research.

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