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APPLICATION OF MOBILE TECHNOLOGIES IN THE PROCESS OF TEACHING FUTURE PHYSICIANS AT THE UNIVERSITIES OF THE USA

Abstract. The development as well as the global and local spread of mobile devices, mainly smart phones and tablets, have led to the emergence of a new direction of electronic learning in the field of higher medical education, namely mobile learning. This phenomenon causes continuous research, study and application of mobile technologies for learning purposes by medical students and academics. In order to make mobile learning effective, higher medical institutions have to take proper measures. The academic staff should create required learning tools and methodological support, provide proper material and technical conditions for the efficient and safe usage of mobile technologies. The researchers should study the experience of developed countries in this direction. A profound analysis of foreign scientific evidence has shown that the USA ranks a leading position in this branch of innovation. This country has a long history of implementing mobile technologies into the undergraduate university training aimed at improving clinical thinking and communication skills of future physicians. Thus, our paper highlights: the conditions of implementation of electronic mobile technologies in the US higher medical education; current state of their application at medical schools and colleges of the USA; the requirements and risks of new technologies application in university training of future physicians; potentials of social media and gaming technologies as the professional training tools at US higher medical institutions. Priceless experience of the USA should be taken into account while designing new curricula and modernizing an academic process at undergraduate level in Ukraine. The preliminary conditions for this process primarily include the use of mobile applications, social media tools and "smart games" for learning. The electronic mobile technologies involving the tactics of a serious learning game are promising and can aid evolution of m-learning in the Ukrainian higher medical education institutions. However, electronic mobile technologies, including the above listed tools applied in the academic process could be beneficial only in case of their gradual, methodologically correct, grounded and controlled implementation and usage involving proper on-line behavior – digital professionalism.

Keywords: electronic mobile technologies; future physician; higher medical education in the USA.

1. INTRODUCTION

The problem statement. The age of digital technologies has had a significant influence on academic preferences of students. They prefer a technology-based, self-regulated, active and dynamic academic process which involves considerable amount of social interaction. Both practical experience and scientific evidence prove that described academic process could be considerably enhanced by means of electronic mobile technologies (EMT) as they promote the possibilities for the self-study, self-direction and self-regulation. The USA ranks a leading position in this branch of innovation. The country is implementing mobile technologies into the undergraduate university training aimed at improving clinical thinking and

communication skills of future physicians. The US medical schools and colleges have managed to apply EMT consistently, correctly and rationally involving the individual's potential for self-regulated learning, modeling personal educational process, its organization, direction and evaluation, drawing on the students' ability to consider their own learning results and analyze them critically in a highly motivated manner. Such processes as informational monitoring, personal feedback, testing, questioning and self-evaluation in self-regulated learning promoted in US medical students the development of learning skills directed at acquiring, applying and managing knowledge. These skills are indubitably of paramount importance nowadays since the world is overloaded with information and the level of professionalism primarily depends upon the ability to study and direct the learning process without extra supervision.

Analysis of recent studies and publications. A thorough scientific search indicates an intensive implementation of EMT and mobile devices in US medical education. However, this scope of research is characterized by the lack of sufficient viable data concerning the professional training possibilities of EMT in the process of undergraduate medical education in our country. Various aspects of EMT application were researched by the Ukrainian and foreign scientists. Thus, the problem of effective implementation of information and communication technologies (ICT) was studied by V. Bykov. [1], K. Buhaichuk [2], A. Hurzhiy and V. Lapinskyi [3], H. Lavrentieva [4], S. Lytvynova, O. Melnyc et al. The issues of mobile learning were researched by T. Kaluha [5], O. Semerikov [6] et al. Theoretical and methodological basis of EMT implementation in professional medical training were analyzed and discussed by R. Battat [7], M. Gidda [8], V. Joynes [9], P. George [10], I. Doherty [11], R. Ellaway [12], R. Kassamali [13], Comstock J. [14], K. Masters [15], M. O'Connell [16], C. Pimmer [17] et al.; peculiarities of Web 2.0 and social media application for professional learning purposes of medical students were described by G. Eysenbach [18], P. Cartledge [19], C. Loughlin [20], A. Osman [21], A. Raikos [22], B. Hughes [23] et al. The gamification processes were researched by M. Ahmed [24], B. Cugelman [25], I. Nicolaidou [26] et al.

In order to improve the quality of academic process at higher medical institutions in our country it would be rational to consider the best progressive ideas of US experience, namely the social and pedagogical factors influencing the application of EMT throughout preclinical and clinical training as well as practical peculiarities and associated restrictions of EMT implementation. The abovementioned statements constitute the topicality of the conducted research.

The article's goal. The paper aims at researching electronic mobile technologies in the undergraduate medical training in the USA and stating the preliminary conditions for further implementation of EMT in higher medical education of Ukraine.

In order to systemize the scientific search, we focused on the following tasks: *to investigate* the historical background of EMT implementation in US higher medical education; *to evaluate* the current state and academic purposes of EMT application at US medical schools and colleges; *to define* the learning requirements of medical students as well as potential risks of EMT implementation in the US education; *to determine* the academic and learning potential of social media tools and gaming technologies in the academic process; *to suggest* possible ways of EMT implementation at Ukrainian higher medical education institutions with the aim of academic modernization and improvement of the quality of the existing learning methods and strategies.

2. RESEARCH METHODS

The study involved the application of a number of theoretical research methods, namely: scientific search; literature analysis; data generalization; structuring and

systematization of the researched information; identification and comparison of relevant data in Ukrainian and foreign scientific evidence concerning the problem of EMT application in the process of professional undergraduate training in the branch of health care in the USA. The conducted research complements previously found and discussed data related to the mentioned above problem.

3. THE RESULTS AND DISCUSSION

3.1. The background of EMT implementation in higher medical education of the USA

Electronic mobile technology is a complex concept that includes several components, namely the software (Apps), the hardware and host system, infrastructure and technical facilities. All of the listed elements serve to support the use of electronic mobile devices (EMD). The spread of mobile technologies in education has been influenced by a number of factors including primarily the appearance and development of such powerful mobile devices as Apple iPhone®, iPad® and processors IOS® and Android™. The extension of tablets as well as smart phones triggered an emergence of a new direction of electronic learning – mobile learning (m-learning) which is characterized by the application of mobile devices with long-lasting charge possibilities, large displays, expanded memory cards, high-speed processors and Internet [11]. Despite the limitations of such devices concerning reading and writing activities compared to traditional desktops or laptops, EMD still benefit by such criteria as portability and price. They have complemented personal computers, almost substituted flash drives, cameras and scanners.

Ideally, technologies possess all necessary means to satisfy the requirements of the academic process, however, under real conditions the effectiveness of EMD implementation depends upon the educational, methodological, material and technological background. The EMT provide student-centered learning by both promoting study autonomy for students and disvaluing the traditional role of a teacher [27, p. 130]. However, the presence of EMT and their availability for students cannot guarantee their application for academic purposes solely. Even if the medical education establishments provide future physicians with EMD it seems impossible to control their usage for recommended online learning sources.

The US medical students apply their mobile devices for various types of academic activities. For instance, they control their daily schedule by the use of a calendar and notifications, apply the apps to take notes or communicate with their fellow students, professors, physicians, patients. They also use search engines to find learning-related information and apply apps for specific academic purposes (libraries, encyclopedias, dictionaries, etc.) [28]. The approaches of students related to the use of EMD for learning are rather heterogeneous. The autonomy of the learning content and tools has been defined as the most significant criterion concerning the choice of numerous EMD, but the level of their implementation in the academic process depends on both the educational culture of medical students and the purposes of the academic process [27].

Personal digital devices had been applied in medical education of the USA long before the emergence of smartphones. These devices were used to make more correct clinical decisions including diagnosis, administration of medicines and medical prescriptions. Nowadays the efficacy of mobile technologies has been proved in the following aspects: improvement of teaching quality, optimization of the academic process due to the availability of massive scientific and academic database, upgrading of test and examination control [14], as well as the increase of time-management and communication possibilities with the help of general functions of a mobile device.

The research in the scope of mobile learning in the US undergraduate medical education was launched more than a decade ago. The "Guide on e-Learning in medical education" [12] includes a chapter dedicated to mobile learning. The authors predicted the extension of this learning approach among the students. Thus, the implementation possibilities of mobile technologies in medical education have been contentiously increasing over their developmental period. In fact, they develop faster than could be implemented and adjusted to higher medical education, particularly in developing countries. Moreover, the scientists and medical educators cannot manage to provide timely description of EMD application options in academic process, which also hinders implementation of new technologies.

3.2. The state of EMT implementation in the US medical schools

The emergence of smart devices triggered the revolution in the access to information at any time with the help of numerous applications (APPs). The number of Apple APPs has reached 2500. Such free and open access APPs for iOS and Android include the APPs designed to practice in diagnosis statement (*Dr Companion app*, *Prognosis: Your Diagnosis app*), procedure of medical encounter and examination (*iHandy Level app*), interpretation of clinical tests (*MedLab Tutor app*). The general number of medical APPS for mobile devices Apple and Android count over 165 thousand and this number is continuously growing due to the possibilities of their independent designing and relatively low cost. The US medical schools have applied these advantages of free and open APPs. Undergraduate students in the Warren Alpert Medical School of Brown University of the USA are provided with EMD equipped with basic software and applications which are required in the academic process [10, p. 226]. However, some medical schools and colleges are biased against the implementation of EMD in academic process and prefer to use more traditional learning tools.

The empirical studies conducted in US educational institutions which encourage the use of new technologies state that the most effective apps include the supplementary information for the academic courses, anatomy schemes, media-recordings with subject information – "podcasts" (iPod+broadcast), online quizzes, training examination tests. It has been proved that the application of smartphones for academic purposes positively influences students' motivation. Accordingly, the use of available applications as well as the development of specific new ones should be stated as a primary direction of medical education development, modernization and quality improvement [13, p. 425].

The research of P. George, carried out to evaluate the effectiveness of iPad application in academic process, has detected the ambiguities among the points of view of first-year medical students who were provided with these digital tools. A total of 79 per cent of surveyed individuals proved the general learning usefulness of iPads. However, only a half of questionnaire participants indicated their usefulness in the role of the obligatory components of the academic process. Most students considered these technical tools as effective interaction means that promote communication and interaction within the academic subdivisions, but they also supposed that EMD cannot fully supplement the printed learning materials [10, p. 226].

The EMD-assisted undergraduate medical training has been traditionally directed at improving self-study skills, abilities of professional information use and readiness to continuous education. Nowadays, the development of basic programming skills including development of applications for their further use in US health care tends to be applied during the study of bioinformatics. In such case the role of students will evolve from users to developers, which can enable the autonomy and independence in the use of EMD required for the individual situations, specific patients and countries. The study of K. Masters proves the existence of a large number of English mobile applications and a low quality of mobile

applications designed in other languages [29]. Since they are mostly developed by non-medical IT specialists, the product quality is restricted and they do not meet expected requirements. The undergraduate medical training that involves the development of basic IT skills could enhance the quality of professional activity in the "World of Internet" and "Internet of Things". The researchers highlight the possibility and efficacy of including IT development fundamentals into the curricula of higher medical education institutions [15, p. 883].

3.3. The requirements and risks of EMT implementation in US higher medical education

Currently the mobile technologies and optimal means of their implementation in the system of formal and informal education have been stated as primary subjects in the scope of pedagogical research worldwide. While the solution of this medical and pedagogical problem lacks a unified mechanism the sufficient amount of scientific evidence [8] [10] [14] indicates an active interest in EMT implementation and application methods in higher medical education. The US scientists provide negative evaluation for their advance in this direction. They state that the application of information and communication technologies in medical education should be strictly controlled. Since mobile devices belong to students it would be sound to predict their uncontrolled usage that can have a negative impact on the effectiveness of a learning process.

The application of mobile devices for learning requires a specific methodology. Undoubtedly the provision of students and professors with the devices does not guarantee its correct usage even if they are experienced IT users for personal daily purposes. The study of R. Ellaway lists the main regulatory factors concerning the application of digital technologies, in particular mobile ones: 1) both implementation and application of mobile technologies depend on the regional peculiarities; 2) the bias of new technologies application does not depend on social factors; 3) virtual technologies supplement rather than substitute real time types of academic activities; 5) global extension of mobile technologies positively influences their local application [30, p. 1038].

The key task of proper implementation of mobile technologies in the USA included the statement of the set of application requirements. The study of K. Masters describes the five main groups of such requirements [29], namely:

1) functional – learning environment should be suitable and convenient for the application of mobile technologies. This requirement involves provision of medical schools with charging points for mobile devices, high-speed Internet and WiFi, technical support service, convenient mobile access to learning virtual services of higher education institutions (e-libraries, virtual learning environment, virtual patients etc.);

2) safety – the use of mobile technologies has to be safe for the users and the environment. Important issue of the safety requirement is provision of the protection from thefts of the devices themselves as well as personal private (photos, bank accounts, social media profiles, etc.) and professional information (patients, diagnoses, etc.) which is saved in them unless the devices are protected by the password. As the debate about the mobile availability of patient data bases continues, the access to the mobile device for other users should be strictly forbidden. Moreover, the device should be protected from the viruses that can eradicate saved professional and private data. The use of a single devise for professional and personal purposes increases the risk of professional misbehavior. Thus, *digital professionalism* involves the protection of private information from the professional environment, following the profession-associated ethical issues, restriction of professional and private information, which includes avoiding private patient information in the device

[31, p. 844] [33]. In addition, ethical correctness of patient information use during practical classes and clinical clerkships should be another educational issue at higher medical education institutions. It is important to protect patients (avoiding photos in social media, etc.), medical students (analyzing the present risks and future professional influence of potential publication), medical schools and colleagues (considering the authority and privacy);

3) availability and accessibility – the legality and encouragement of the students to utilize EMD that is accompanied by the development of safe applications for the campus virtual environment (function of unsaved password and repeated authorization after the exit), additional explanations and recommendations on the use of mobile services for the learning purposes (the course of bioinformatics during the preclinical study period), provision of medical students with EMD (medical schools either provide the students with EMD or announce the requirement of possessing such device), the development of applications for EMD and preparing teachers to operate them in frames of the academic process, applying the devices for learning purposes. The use of EMD during the classes requires precise teaching control as the students could use the device for the non-learning purposes. The students' attention can be distracted from studies due to their on-the-spot decision to check the correctness of delivered material on the Internet [8]. In addition, students with specific needs require particular attention as the use of some of the applications can be complicated for them. Thus the universities should provide alternative learning tools and ensure equal learning conditions and final quality of the academic process;

4) continuous research, design and methodological improvement of mobile devices usage in the academic process – unfortunately, the huge number of mobile applications hinders the ability of teachers to control their appropriateness. However, the organizations and auditing groups can correct this situation and provide students with proper learning information;

5) self-realization – the need to benefit from the possibilities of mobile technologies by students, use the applications; communicate; exchange information; consult with teachers, tutors and fellow students.

It is worth mentioning that in the US medical education the mobile technologies are not used as the main learning tools. Their application can be interrupted by the restricted access or other technical conditions. Educators always have the alternative means for these unpredicted situations, thus the EMD are considered as the tools of non-formal or informal learning.

The application of the m-learning technologies based on the digital professionalism and linguistic communication triggers the realization of the theory of active learning by interpersonal communication, interaction and mature learning characteristic for the adults [9] who are able to manage their learning process. The mobile technologies provide non-formal and informal practical communication learning [17] as well as unconscious learning by means of social media tools (electronic social media – ESM), which is based on the "knowledge pushing" technologies.

The use of ESM for learning directs the academic process according to the needs of learners. Personalized student-oriented learning environment is a promising learning tool that unites new information and communication and pedagogical technologies aiding the accumulation of new knowledge. In its turn this process can encourage the development of necessary practical skills and professional strategies. The educators faced the important task to create necessary structured methodological and pedagogical conditions for the development of personalized and autonomous learning. This can provide the formation of required knowledge and suggest the options for effective study methods [22, p. 12;].

The concept of "personalized learning environment" has been currently considered as the application of a number of tools and possibilities of Web 2.0. This technology serves for the solution of the abovementioned pedagogical problem. The term *Web 2.0* was introduced

by T. O'Raily. Nowadays, it is used to indicate permanently developing and changing software and the content of social media, the quality of which is influenced by users and service information load. Thus, the technologies are improving with the increase of a number of users controlling, checking, correcting, modifying and changing the content [16].

The *Web 2.0* technology in the health care, medical education, science and practice caused the development of the notion *Medicine 2.0*. The applications, services and tools of *Medicine 2.0* are based on the technologies of *Web 2.0*. They also include virtual reality tools which can simplify social interaction, prolonged activity and participation, cooperation, direct approach and the availability of information in restricted groups of users [18]. Thus, these technologies can be applied for different purposes, namely: teaching and learning at medical school, intraprofessional interaction of physicians, interprofessional interaction of physicians and communication between patients. Patient-patient communication model could be encouraged by the formation of the groups of patients with the similar health problems or diagnoses. In addition to the notion *Medicine 2.0* there is another one, namely *Health Care 2.0.* However, this concept is much broader in content and includes administrative and legal health care issues [23]. *Health Care 2.0* and *Medicine 2.0* substantiated the primary intention of *e-Health care* creators and extended these notions [18].

3.4. Social media in higher medical education

The application of Web 2.0 services and social media in professional undergraduate training of future physicians in the USA as well as their communication skills development helps to solve many pedagogical tasks, including the development of oral comprehension and communication skills, team work abilities, self-study and self-realization skills due to the availability of learners' information, creation of students' personal learning environment, providing individual teaching and learning approach towards each student, elimination of formal barriers between teachers/professors and students, which can hinder the effectiveness of academic process, the transformation of teachers' role and functions, formation of electronic content of subjects, namely e-books, e-tests etc, possibilities of international academic cooperation and student mobility [32, p. 537]. Our paper [28] gives a more detailed and profound description of social media learning abilities and peculiarities in undergraduate professional clinical and communication training of medical students.

Professional qualities of a physician have been associated with proper clinical behavior and manners, mutual respect, understanding and empathy. Professionalism could appear at risk in case of inappropriate social media use and on-line behavior. Possible incorrect use, operation, management and generation of information as well as the absence of appropriate ethical knowledge could contribute to such negative conduct. This statement is proved in a number of studies worldwide which are dedicated to the analysis of social media profiles of medical students, practicing physicians and medical educators. Unfortunately, the research results showed that many of them were accessible openly and contained private information [21]. This situation initiated the publication of a guide consisting of recommendations on proper on-line behavior of medical students and other health care practitioners [7].

In addition, the US medical schools and colleges developed a local list of recommendations concerning the adequate social media usage. They continuously tutor future physicians according to the following criteria:

1) *protection of patients* – on-line behavior is considered as non-ethical and non-professional if it contains information exposing the personal patient data (name, age, ethnic features, date/month/location of a medical encounter, photos). Moreover, publication of such information is considered incorrect even if it is approved by patients. It is recommended to

avoid offensive, dry and cynical utterances addressed to the patients. In contrast, recommendations suggest expressing respect, sympathy and empathy;

2) *protection of health care institution* (medical schools/colleges, hospitals/clinics and other health care institutions) – the commentaries in social media groups should be followed by the links proving the authenticity of published information. The user should avoid subjective opinions and thoughtless commentaries as well as sharing this information. In contrast, recommendations suggest using serious, polite and clear language;

3) *protection of students* – medical students should remember that all information published on the Internet permanently remains there and can be easily monitored and searched. Moreover, all information published on the Internet should be considered as the social property, since it can be shared by everybody. It explains the requirement to future doctors concerning courteous publishing of clinical and academic information, with the proper consideration of all commentaries, stories, blogs, evaluation of the information from the perspective of their future colleagues, chiefs, patients and remembering that even one unconsidered post can negatively influence their future carrier and professional growth [34].

American scientists state that compared to other social environments the application of social media for learning purposes is more effective [19 , p. 847]. However, with the aim of professional application of social media tools it is recommended to cross a so-called "five-step" way from an inexperienced user towards the social media content creator whose information could be safely shared. By the recommendations of American Medical Association each student should preferably undergo this process during the undergraduate and post-graduate years at medical school. A. Stupple [35] has defined these five social media user stages, namely:

1) *Anonymous private information user*. This type of behavior is ideal for getting familiar with the structure, audience and peculiarities of social media. It involves monitoring and consumption of information being an anonymous unidentified user with restricted number of friends or followers;

2). *Anonymous private information sharer*. This stage involves the development of reflection skills, which happens due to the ability to share and spread previously created information (posts, photos) involving the choice of interesting and current information and monitoring the reaction of the audience (number of likes/dislikes);

3) *Anonymous public information sharer*. This stage involves the availability of shared information for the extended audience as well as the possibilities of commenting and audience grouping according to the similar interest;

4) *Identified public information sharer*. This is primarily recommended level of a medical student at the late undergraduate level. Personal identification information can be exposed at this stage. It involves using, commenting, and spreading of information. However, it is still forbidden to create it;

5) *Identified public creator of information*. In addition to the possibilities characteristic of the previous stages, the social media users at this level can suggest and encourage discussions, state their opinions in personal blogs and commentaries, which means the presence of fundamental knowledge and experience of social media use [33].

3.5. Game technologies in higher medical education

One of the advantages of social media tools application is the possibility of implementing gaming approach towards learning, since popularization of gaming technologies in the academic process has left its impact on higher medical education as well. In order to describe a mentioned above academic technology scientists prefer to use the term *gamification* which is still a promising direction in the USA. Its core meaning involves the

process of applying games during a serious non-gaming environment which is characterized by the application of gaming strategies to motivate and encourage students to reach the final academic goals by gaining points or completing a certain mission. In other words, gamification occurs by application of a "serious" computer game. In the system of higher medical education it is provided by using electronic or online leaning software – virtual patients [24].

The paper of I. Nicolaidou et al. describes one of such games – Virtual Emergency TeleMedicine. The game involves electrocardiogram data that enable medical students to practice professional behavior in a close to reality medical environment with the help of telemedicine equipment and virtual patients. The game is based on the principles of active evidence-based learning, namely self-realization, contextualization and orientation of the academic process according to the requirements of students. By the scenarios the student gains the knowledge and is accordingly granted points. The results of the game are open, which allows controlling, providing feedback and consulting the learners. Such games improve clinical knowledge, academic quality and prepare for the future professional activities and could be designed for mobile use [26].

Technologies applying the gaming tactics are extremely exciting and gripping. However, making the game an effective learning instrument requires taking into account a number of particular features during the process of the game development. This particular process is rather complicated and based on the correct and gradual goal statement, authenticity of information and data, provision of interesting, funny and pleasant activity, self-control and self-reflection, social interaction [25]. Moreover, the research proves the gender difference in the common gaming interest. A male share dominates over female, which should be taken into account while developing and introducing this learning technology [26]. On the other side, gamification is a key technology of many medical mobile applications, which is a promising direction of the US and Ukrainian m-Health Care.

5. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

As a result of profound analysis, we defined the stages of EMT implementation in the US higher medical education, which include: creation, development and expansion of new powerful mobile devices; the spread of mobile devices among medical students and their application for the academic purposes; development of proper learning, teaching, material and technological conditions for the effective use of mobile technologies in medical schools and colleges; providing research with further confirmation of the usefulness and efficacy of electronic mobile technologies as the means of academic process quality enhancement.

The main problematic aspects of EMT implementation in the US medical schools include the detection and verification of appropriate means of their optimal usage in formal academic process; provision of suitable technical conditions for their safe use; conducting the research and trials; improving methodology of EMT use for learning; solution of pedagogical tasks associated with personalization of learning environment; determination of teacher's status and functions in the process of mobile technology-assisted study; provision of the learning tools and methodological support for m-learning with the aim of professional clinical training and communication practice of medical students.

US experience as well as identified preliminary conditions should be taken into account while designing new curricula and modernizing an academic process in undergraduate medical education. The USA is undoubtedly at the vanguard in the direction of innovation and mobile technologies application. This fact indicates the requirement for further implementation of EMT and EMD into the academic process at Ukrainian higher medical education institutions. Thus, the preliminary conditions for this process in Ukraine include but

are not limited to the use of mobile applications, social media tools and "smart games" for learning. However, the conducted research also proves that electronic mobile technologies, including the above listed tools applied in the academic process could enhance the latter only in case of their gradual, methodologically correct, grounded and controlled usage. It also involves teaching students how to apply mobile technologies in the academic process correctly considering the issues of proper on-line behavior – digital professionalism. Moreover, the EMT which use the tactics of a serious learning game are promising and can evolve m-learning in health care.

To sum up, the emergence of numerous electronic learning tools launched the shift from real learning environment to the virtual one, from real-life patients to virtual ones, from lectures to podcasts, from the textbooks to e-books and on-line courses, from encyclopedias and dictionaries to mobile applications, etc. In addition, American studies state that students prefer digital online learning material and authentic sources to the printed ones. All of the listed above information causes an urgent necessity to analyze these data, consider determined results and benefits in the process of curricula, syllabi and course development with the aim to improve the academic process and implement EMT in Ukrainian higher medical education, which is a prospect of our further research.

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ДОСВІД ВИКОРИСТАННЯ МОБІЛЬНИХ ТЕХНОЛОГІЙ У ПРОЦЕСІ ПІДГОТОВКИ ЛІКАРІВ В УНІВЕРСИТЕТАХ США

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Анотація. Мобільне навчання – новий простір електронного навчання, який утворився в результаті розвитку й розповсюдження у вищій медичній освіті потужних електронних мобільних пристроїв. Це зумовлює дослідження й вивчення способів застосування електронних мобільних технологій (ЕМТ) освітянами галузі охорони здоров'я, а також їх застосування студентами-медиками з навчальною метою. З метою забезпечення ефективності навчального процесу науково-педагогічному складу закладів вищої освіти галузі охорони здоров'я (ЗВО) слід вжити належних заходів щодо розвитку навчально-методичних, матеріальних та технологічних умов використання ЕМТ, зосередити наукові дослідження на вивченні досвіду розвинутих країн у цьому напрямі. Ґрунтовний аналіз зарубіжних праць засвідчив, що США знаходиться в авангарді даного напрямку інновацій. У цій країні ЕМТ упродовж тривалого часу активно залучаються в освітній процес ЗВО з метою практики професійних клінічних і комунікативних навичок майбутніх лікарів.
У цій праці виявлено передумови впровадження ЕМТ у вищій медичній освіті США; сучасний стан їх використання в медичних школах і коледжах цієї країни; потреби й ризики застосування ЕМТ для навчання студентів-медиків; навчальний потенціал електронних соціальних сервісів та ігрових технологій у ЗВО галузі охорони здоров'я України. Безцінний досвід США слід врахувати під час розроблення нових навчальних програм і модернізації додипломного періоду навчання у вітчизняних медичних вишах. До перспективних напрямів цього процесу передусім належить використання мобільних додатків, електронних освітніх ресурсів електронних соціальних мереж та ігрових технологій. ЕМТ, що застосовують тактику навчальної «розумної» гри, є перспективними у ЗВО галузі охорони здоров'я і можуть сприяти подальшій еволюції мобільного навчання. Проте ЕМТ у формі перелічених вище електронних освітніх ресурсів можуть бути ефективними лише за умови їх поступового, методично обґрунтованого й контрольованого впровадження і використання з дотриманням принципів належної поведінки в Інтернеті – цифрового професіоналізму.

Ключові слова: електронні мобільні технології; майбутній лікар; вища медична освіта США.

ОПЫТ ИСПОЛЬЗОВАНИЯ МОБИЛЬНЫХ ТЕХНОЛОГИЙ В ПРОЦЕССЕ ПОДГОТОВКИ ВРАЧЕЙ В УНИВЕРСИТЕТАХ США

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Аннотация. Мобильное обучение – новое пространство электронного обучения, которое образовалось в результате развития и распространения в высшем медицинском образовании мощных электронных мобильных устройств. Это провоцирует исследования, а также изучение способов применения электронных мобильных технологий (ЭМТ) педагогами области здравоохранения, а также их применение студентами-медиками в учебных целях. С целью обеспечения эффективности учебного процесса научно-педагогическому составу учреждений высшего образования (УВО) области здравоохранения следует принять надлежащие меры для развития учебно-методических, материальных и технологических условий использования ЭМТ, сосредоточить научные исследования на изучении опыта развитых стран в этом направлении. Обстоятельный анализ зарубежных работ показал, что США находится в авангарде данного направления инноваций. В этой стране ЭМТ в течение длительного времени активно привлекаются в образовательный процесс УВО с целью практики профессиональных клинических и коммуникативных навыков будущих врачей.
В этой работе выявлены предпосылки внедрения ЭМТ в высшем медицинском образовании США; современное состояние их использования в медицинских школах и колледжах этой страны; потребности и риски применения ЭМТ для обучения студентов-медиков; учебный потенциал электронных социальных сервисов и игровых технологий в УВО области здравоохранения Украины. Бесценный опыт США следует учесть при разработке новых учебных программ и модернизации додипломного периода обучения в отечественных медицинских вузах. К перспективным направлениям этого процесса, прежде всего относятся использование мобильных приложений, электронных образовательных ресурсов электронных социальных сетей и игровых технологий. ЭМТ, что применяют тактику учебной «умной» игры, являются перспективными в УВО области здравоохранения и могут способствовать дальнейшей эволюции мобильного обучения. Однако ЭМТ в форме вышеперечисленных электронных образовательных ресурсов могут быть эффективными только при условии их постепенного, методично обоснованного и контролируемого внедрения и использования, придерживаясь принципов надлежащего поведения в Интернете - цифрового профессионализма.

Ключевые слова: электронные мобильные технологии; будущий врач; высшее медицинское образование США.