Additional Module for Teaching in Orthopedics and Traumatology Through Mobile Devices

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Abstract— In recent years, e-learning is increasingly being considered as a real alternative to traditional in many surgical specialties. In the present study, the concept of introducing an additional module for training in orthopedics and traumatology through mobile devices is presented and the need for the development and application of this and similar technologies to improve the results of the practical and theoretical training of medical students is motivated.

Ключови думи— teaching, medicine, orthopedics and traumatology, mobile devices

1 Introducion

The goal of teaching medical students is to create a solid foundation of enduring knowledge and prepare them for the challenges of their residency and encounter with patients in a real environment setting. Acquiring diagnostic and therapeutic skills in clinical specialties requires both in-depth knowledge and rapid and adequate response in case of emergency.

Teaching programs in orthopedics and traumatology are conservative and include a lecture course and practical clinical exercises. They are validated by experience and decades, but at the same time undergo constant development and improvement of both content and teaching methods. An analysis by Lindeman et al.[3,4] shows that nearly 80% of surgical training programs lack sufficient practical training.

Incorporating e-learning using Internet-based resources could partially solve this problem[4]. In surgical specialties, virtual patients, digital modeling, online manuals, as well as standardized recordings of surgical conservative and operative procedures can be used[2]. This is a process of constant inclusion of new modern educational strategies in the standard established programs.

Learning through an additional module, accessible on electronic devices, in the form of small volumes of information, is a way to facilitate and improve the work of orthopaedic surgeons with medical students. The creation of a microlearning concept and its implementation, combined with its accessibility in terms of place and time, are the basis of a new medical educational concept that complements and expands the volume of established medical education.

2. Material and methods

The study was carried out during the winter semester of the academic year 2022/2023 at the Department of Orthopedics and Traumatology of Medical University of Plovdiv. All students from both streams who studied at the Department of Orthopedics and Traumatology during this period were included - one with teaching in Bulgarian and one in English.The students conducted a full course of study, including 14 lectures and 28 practical exercises for the semester, respectively in Bulgarian and English.

An additional mobile training module was created. The materials in it were selected by the project participants in Bulgarian and English. They consisted of a small volume of concentrated important information on the topics of the orthopedics and traumatology program.

The Moodle LMS with its mobile application (Moodle mobile application) was used to deliver the micro-lectures to the students, and for this purpose the system was installed on a specialized server. The micro-learning course can be found at the following address: https://orthopaedics.edu-learn.eu/ .

Students from each of the two streams (English and Bulgarian) were divided into two groups with an equal number of members. Everyone received an invitation and instructions to register on the platform. The members of two of the four groups (one in Bulgarian and one in English) started receiving weekly materials corresponding to the topics of the training program in the form of messages on their mobile phones.

Figure 1 shows the user interface of the Moodle mobile application, which is freely downloadable for both major mobile operating systems Android through Google Play and IOS through+ Apple Store.

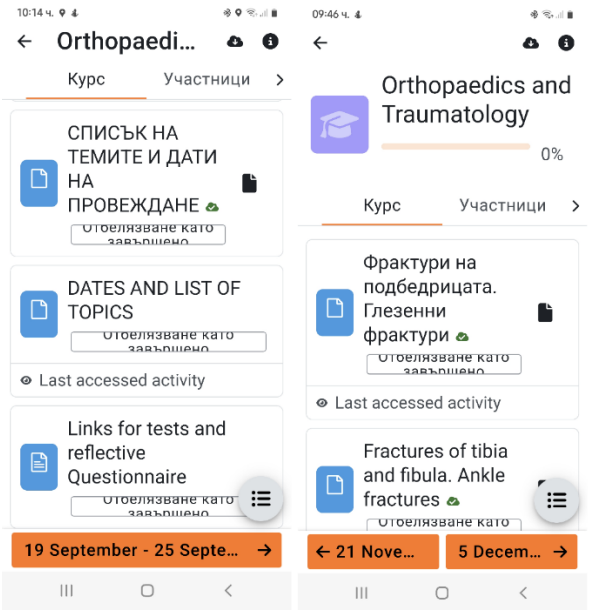


Fig.1 User interface of a mobile training application Moodle app with 2 screens presenting the topics in the additional training module in Orthopedics and Traumatology

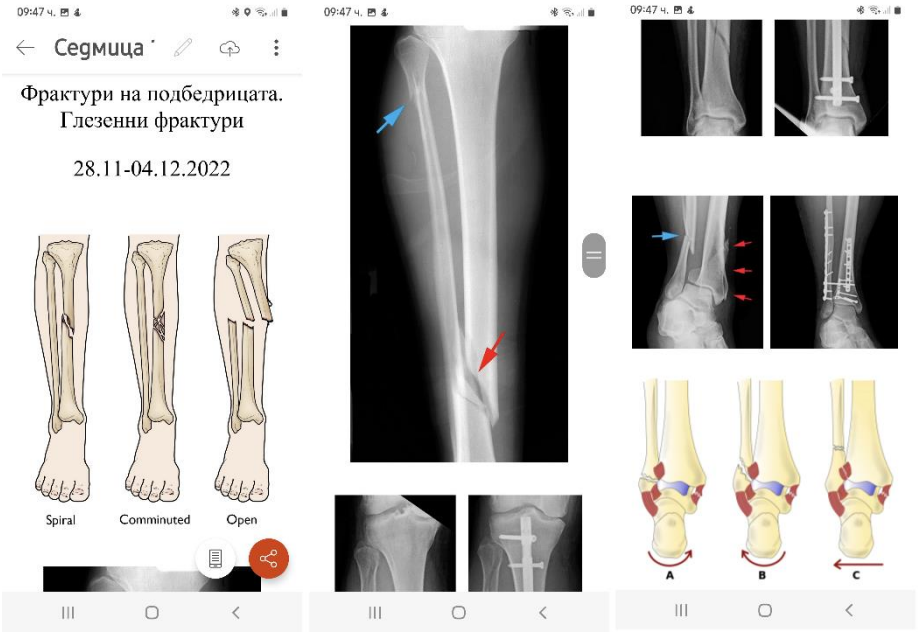


Fig. 2 Presentation of learning content on the topic: "Fractures of the lower leg. Ankle fractures" on a mobile phone through the Moodle app.

At the end of week 7, the remaining two groups of students also received invitations to join the platform. All participants were given a test on the material taught with or without the additional module, after which the training continued in both modes for the entire course. All students received a final test on the second half of the material.

The results of the midterm and final test served to compare the pedagogical effectiveness of the mobile microlearning additional module.

3. Results

The results of the mid-term test, conducted 7 weeks after the start of the training, showed better performance and higher scores for students trained with a combination of conventional and additional mobile methods. At the end of the semester, there was an equalization of the results of the two groups, and a slight advantage was still found in the group trained with the combination of the two methods for the whole term.

At the end of the semester, participants were asked to complete a learning evaluation test. The majority rated the microlearning method highly as more accessible, less time- and venue-intensive, and highly effective.

4. Conclusion

The generally conservative education in medicine, and in orthopedics and traumatology, is being adapted to the new working conditions in healthcare institutions, the advancement of technology and the demands of the "digital" generations of the 21st century.

Additional training on digital devices is a cost-effective, innovative, and reliable method that is well accepted by students and can be incorporated into the orthopedics and traumatology curriculum. The new "blended" method of teaching[1] is part of the new educational strategies. Careful analysis of post-implementation data is needed to assess the relationship between improved learning and improved performance and to investigate the pedagogical effectiveness of the platform in medical students and in orthopedics and traumatology.

5. Literature

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