APPLICATION OF AUDIOVISUAL MEDIA AND E-LEARNING TECHNOLOGIES IN MEDICAL EDUCATION IN THE CONTEXT OF THE E-EDUMED PROJECT*

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This article presents some results and outcomes developed in the framework of the project "**e**-Learning **Edu**cational Center in **Med**icine" LLP/LdV/TOI/RO/2010/006 /E-EDUMED/. The main aim of the project is to develop a web portal and a complex virtual health educational center that will provide on-line education and training materials in healthcare and medicine (especially Ultrasonography) by ensuring modern instruments and methodologies based on the achievements advanced information and communication technologies' in regard to the interactive lifelong learning platforms and digital content. The article presents briefly the project as a whole. The next sections describe the products developed in the project framework. The last section presents some information and data about the project experimentation phase.

Introduction. What is E-EDUMED? e-Learning Educational Center in Medicine, E-EDUMED [1] for short, is a two year Transfer of Innovation (`www.meditopeu.com`) European funded project aiming to answer the needs of medical staff in improvement, updating, accessibility, and equal chances to medical knowledge and harmonization in training of specialists in ultrasonography. The project finished in January 2013. In the project framework partners from Bulgaria, Hungary, Italy and Romania were involved. The project aims at the development of a complex virtual health education center providing on-line education and training materials, by an interactive lifelong learning platform (see the project website). The e-learning health education center for innovative education includes:
 − an e-learning platform;
 − two interactive training packages in ultrasound and nurse education,
 − guidance material;
 − a glossary of medical terms and atlas, which helps in understanding specific issues;
 − a patient training package, which is freely accessible informative structured content addressed to the broad audience.

The specific aims of the project could be summarized as follows:

– To offer up-to-date and accessible training methods (including further training). The implementation of e-learning methods in medical education for nurses and doctors (ultrasound) enhances the attractiveness of the training, providing the target group with new ways of gaining knowledge (interactive multimedia presentations, online video transmission and simulations, access to the up-to-date medical achievements). It allows the creation an interactive model of learning, facilitating flexible and distributed learning by multidisciplinary, multinational and multicultural innovative learning methods to increase the level of medical professionals and attain EU dimension.

– To unify the teaching styles by using multimedia material with participation of specialists in different countries, ensuring cooperation, sharing of experience, common European dimension, harmonization in medical education, flexibility in time and location; improvement in the quality of training by effective, efficient formative and summative assessment.

– To support participants in the acquisition and the use of knowledge, skills and qualifications by ensuring validation and recognition of qualifications. The training modules are included into the post-university courses or resident training; the possibility of according credits, is taken into consideration, as well as contacting national responsible structures.

– To support improvements and innovation, ensuring learning accessible to all whatever their individual circumstances; encouraging self-directed learning and peer support; lowering the costs of training (travel/accommodation in university centers); improvement of language skills.

Target groups. The target group addressed by the project is formed by medical doctors in different types of vocational training (residents, in course of gaining competence in echography, in continuous medical training), nurses (MCH nurses, pediatric nurses, school nurses), patients; end users add to this group employees and managers in medical institutions, educational staff in medical training institutions, stakeholders, designers of medical training courses and as institutions: universities, professional organizations, medical institutions, EU structures in the field of education and health.

Innovation of the project. During the final evaluation of the project by the representatives of the EC the following were identified as innovative contributions:

– Virtual Training and Communication Center, offering a Managed Learning Environment for medicine education, with a varied range of e-tools and applications; a Virtual Learning Environment (curriculum, training materials, assessment, tutor support, communication, feedback, quality management) as well as access to related references, organisations, scientific events and research area.

– Multimedia content and new on-line courses in general ultrasound with interactive section for diagnostic, clinical signs and echographic images.

– An informative package raising the health culture of potential patients.

– A glossary with medical terms (with multilingual support) and a diagnostic ultrasound e-book.

– New methodologies that allow: the users to perform most clinical decision-making procedures in a simulated environment; student-activated learning methods and collaborative learning; monitoring progress of the activities and measuring the effectiveness of the training.

Fig. 1. E-EDUMED web portal

The E-EDUMED web portal. E-EDUMED environment consists of a web site and a web portal (see Fig. 1), a virtual training and communication center. The project website plays a major role in the achievement of project objectives, as it is the central dissemination tool, central marketing instrument, communication tool; offering information and downloads; assuring access to LMS. Also it offers a gateway for information on European e-learning medical training programs and evaluated feedback from users and the wide public by online questionnaires. We kept in mind that only websites which provide new information are re-visited, so the project website was regularly updated. The news column is easy to find and enables a quick update of the most recent activities. The web site provides also interactive elements addressed to the users such as a forum, blog and subscription mechanism. On the E-EDUMED web site are published up to date curricula of the ultrasound and nurse training courses. The patient educational package is not included in the platform. It is available on the project web site with no registration required. This is not an e-learning module, but its main aim is to promote the improvement of the health culture of the potential patients (in fact the wide public) by provision of informative digital content, broadly accessible and easy understandable for the broad audience of all patients, in close relation with the content provided by the medical modules developed in the project.

E-learning health education center for innovative education. This is the main result of the project ensuring a common European dimension. It helps in the implementation of e-learning methods in medical education for nurses and doctors (in ultrasound) enhancing the attractiveness of training, providing the target group with new ways of gaining knowledge (interactive multimedia presentations, virtual classes, access to the up-to-date medical achievements). The e-learning Center offers flexibility in time and location, assuring cooperation, sharing of experience, encouraging self-directed learning, improvement of language skills and peer support and at the same time lowering the costs of training (travel, accommodation and so on). E-learning health education center for innovative education includes:

– the e-learning platform E-EDUMED – we decided to use the open source e-learning platform Claroline. Some customizations and additions to the basic functionality of

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the platform were done in order for the Problem Based Learning (PBL) and Virtual Classroom methodologies to be supported.

– interactive training packages in ultrasound and nurse education,
– guidance material,
– a glossary for medical terms, atlas and e-book,
– a patient package.

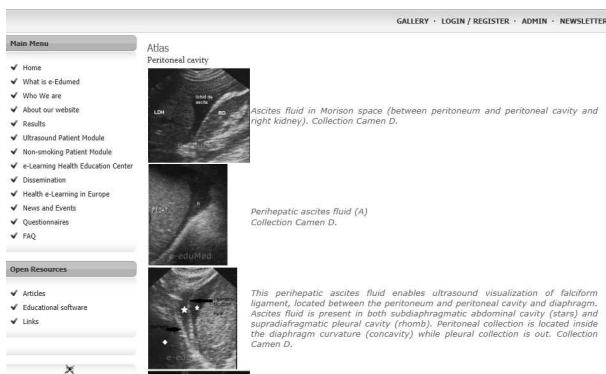Fig. 2. E-EDUMED Glossary of Medical Terms

Fig. 3. E-EDUMED Medical Atlas

e-Learning modules and contents. In order to achieve wide European usability, the project developed a Glossary of Medical Terms with ensured multilingual support (see Fig. 2) and Atlas [2] (see Fig. 3) covering the whole field of Medical Images Technology. A Course Guide for using the e-platform has been developed too.

The learning content available on the platform is developed in the form of SCORM compliant learning objects. The following learning objects are available in the e-platform: The Multimedia Lesson; Slides and Lecture notes. The Multimedia Lesson (see Fig. 4) is a learning object delivered through the e-learning platform built up by an audio explanation synchronised with a slide presentation using the Adobe Presenter plugin. The interface of each Multimedia Lesson is provided with a hypertextual index allowing the user to navigate the lesson, to interrupt and start again the listening without returning to the beginning of the explanation. The Slides implemented by the didactic experts for their audio lessons have been converted to .pdf. Slides are printable documents allowing the users to take notes while listening to the explanation. Thanks to the Slides the user will write didactic expert's comments or a memo and reminders. They will be useful to brush up the lesson in off-line mode. The Lecture Notes represent in depth studies to better detail some of the contents dealt with during the audio lesson or to provide students with a different perspective on the contents already explained.

An e-publication of all e-EDUMED materials is available online. Materials can be printed but not downloaded. Please note that this Web site is password protected and
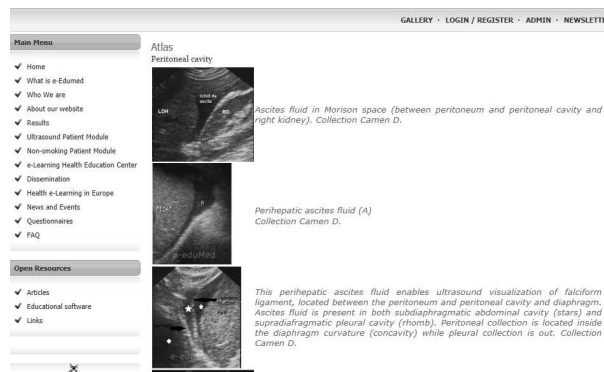
Fig. 4. E-EDUMED Multimedia lesson – an example

registration is needed. Registration is free of charge and gives access to all materials.

The e-EDUMED project fully developed (in terms of curricula, timetables and multimedia training materials) the following educational training packages:

A) Education e-courses for health care practitioners.

– Ultrasound (US) training package, which consists of the following 3 modules: a theoretical module, general abdominal US, special US. Some quantitative indicators for the package are the numbers about the PPT presentations – 606 slides, Lecture notes in anatomy and US (PDF – 632 pg), 6 multimedia lessons, 10 Virtual classes, 150 quizzes.

– Nurse training package, which consists of the following 3 modules – basic training, US module and non-smoking module. Some quantitative indicators for the package are the numbers of PPT presentations – 335 slides; Lecture notes (PDF – 126 pages), multimedia lessons – 4, Virtual classes – 10, quizzes – 80.

– The virtual Classrooms or Problem Based Learning (PBL) sessions have been hosted in Adobe Connect. This system of videoconferencing is particularly suitable to perform virtual classrooms thanks to the following important facilities: Discussion Area; Collaboration Area; Sharing Area and the possibility to record the virtual classes.

B) Education e-courses for improvement of the health culture of the citizens.

– Ultrasound Patient Module – more and more medical doctors believe strongly in the importance of patient education and health culture. Health culture is a combination of knowledge, attitudes, beliefs and behavior in relation to rehabilitation, strengthening and society in matters of personal health [3]. Take into account that e-learning Patient Module mentioned above has to be considered as integral part of overall e-learning content developed under the e-EDUMED Project framework, aiming to answer to the following questions: What is ultrasound (sonography)? Why is ultrasound used? How does ultrasound work? What does an ultrasound scan involve? What can I expect? What types of ultrasound equipment exist? Is it safe? Are there any side-effects, complications, advantages and disadvantages from ultrasound? What are the major fields of application of ultrasound?

– Non-smoking Patient Module – Most people know that smoking can cause lung cancer, but they do not know that it can also cause many other cancers and illnesses. So,

stopping smoking can be a main factor of morbidity decrease. The non-smoking Patient Module aims to implement health promotion and prevention strategies for individuals, families, and communities, as a different way to promote the improvement of the health culture of the partner countries population.

Experimentation and piloting. The experimentation phase had 2 stages. The first one took place in March–May 2012 (duration 3 months) and the second one in October-December 2012. By intensive dissemination medical doctors with several years of work experience, young medical doctors, university students in medicine, nurses, Academics responsible for Continuous Medical Education and expert in learning methodologies were encouraged to enroll on the training platform by completing a registration form. For Bulgaria a group of 20 participants was planned – 10 doctors and 10 nurses. Actually we had registered 13 medical doctors and 10 nurses for participation in the training. By registered trainees all had an active involvement on the e-learning platform. All participants finished successfully the course. As a total we had a testing group of 42 doctors and 44 nurses. The testing took place in all partner-countries. Pilot testing of platform and training packages was carried out in order to check the prototype fitness for the purpose, the suitability of the knowledge provided, user interface, language level, graphic approach and interaction level. Pilot testing was done both for the e-learning platform (facilities) and for the content of the training modules. Both trainers and trainees were involved. In order to evaluate the users' satisfaction level there were used:

– For the US package: platform testing questionnaire and Instructor and Peer Interaction evaluation questionnaire, both placed within the e-learning platform.

– For the nurse package: platform testing questionnaire and virtual testing questionnaires, both placed within the e-learning platform.

– For the patient training package: a questionnaire available on the project web site.

Concerning the Ultrasound package more than 80% of the respondents rated the module as very good or excellent. In regard to the Nurse package, more than 75% of the respondents rated the module as excellent, while around 22% rated it as a good one.

Patient modules are not a training modules, but informational modules, aiming to promote the improvement of the health culture of the partner countries' population by provision of informative digital content, broadly accessible and easy understandable for broad audience of all patients, in close relation with the content provided by the ultrasound and non-smoking learning modules developed in the project. The modules are not uploaded on the e-learning platform and are available on the project web site. The evaluation of the modules was done by the doctors who participated in the experiment and more than 80% of the respondents rated the modules as very good and excellent. Concerning the platform more than 60% of the respondents rated the platform as excellent or very good.

Apart from these evaluations the project products were evaluated by external experts from all partner countries. All reports on the evaluation are published on the project web-site[*].

Conclusions. The main foreseen impact of the project is on learning and learning outcomes. The E-EDUMED project proposes a solution aiming at the improvement of the

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[*] `http://www.e-edumed.ro/index.php?option=com_content&view=article&id=68&Itemid=75&lang=en` (issue #20)

level of medicine education and specialization. At the time the project ended (January 2013) there were about 170 000 web site visitors, now they are more than 400 000. Many Medical Universities in all partner countries already declared their interest in the project products. Taking all this into account we consider that multimedia learning content and e-learning methodology, which provide additional opportunities for learning and access to medical knowledge for personal development and updating of competencies, are of consistent and significant value.

REFERENCES

[1] E-EDUMED Project website http://www.e-edumed.ro/
[2] Ultrasound atlas http://www.e-edumed.ro/index.php?option=com_content&view=article&id=220%3Aperitoneal-cavity&catid=47%3Aresults&Itemid=75&lang=en
[3] E-EDUMED Ultrasound Patient Module http://www.e-edumed.ro/index.php?option=com_content&view=article&id=227&Itemid=124&lang=en
[4] E-EDUMED Non-smoking Patient Module http://www.e-edumed.ro/index.php?option=com_content&view=article&id=231&Itemid=125&lang=en

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ИНОВАТИВНИ МЕТОДИ И ПОДХОДИ ЗА РАЗРАБОТВАНЕ НА СИСТЕМА ЗА Е-ОБУЧЕНИЕ В ОБЛАСТТА НА МЕДИЦИНАТА

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В настоящото научно съобщение са представени резултати и продукти, разработени по международен проект „e-Learning Educational Center in Medicine" LLP/LdV/TOI/RO/2010/006/E-EDUMED/. Основна цел на проекта е разработването на уеб портал и комплексна виртуална образователна среда в областта на здравеопазването, която да осигури онлайн обучение и учебно съдържание в областта на медицината (по-специалноултразвуковата диагностика) и здравната култура чрез обезпечаването на модерни инструменти и методологии, базирани на съвременните ИКТ в областта на интерактивните платформи за учене през целия живот и дигитално учебно съдържание. Изложението представя накратко самия проект. В следващите раздели са представени разработените в рамките на проекта продукти. Представени са данни и информация за проведения в рамките на проекта експеримент.