

CARE MANAGEMENT: ON LINE-BASED APPROACHES TO NURSE EDUCATION IN ULTRASOUND IMAGING

Elena Taina Avramescu¹, Mitrache Marius¹ and Adrian Camen²

¹University of Craiova , A.I. Cuza, nr.13, Craiova, Romania

²University of Medicine and Pharmacy Craiova, Str. Petru Rareş nr. 2, Craiova, Romania

ABSTRACT

Over the last two decades nurses have to face the need to be high qualified professionals with always updated competencies and practical skills. Learning on the Internet by the "e learning" method, fundamentally changed the way by which nurses can get information and be involved in educational activities designed to ensure their continuous medical education. The goal of our work was to provide e-education for ultrasound nurses by the use of a Learning Management Systems delivered through the Internet, within the framework e-EDUMED project. The project developed a virtual health educational center providing on-line education and training materials by 2 interactive training modules in ultrasound adressed to medical doctors and nurses and one module for patient education.

The e-learning platform hosts asynchronous online courses - educational materials in a traditional style of presentation, PPT and course notes (text and images), questions and quizzes associated with each section, multimedia lessons. Synchronous online courses are implemented in the virtual class e- EDUMED allowing a tutor via the Internet to bring together a group of students in real time. The teacher can present materials (case studies, moving images, ultrasound examinations) and can receive information and feedback from students. The nurse training module is included in the e-learning platform and the learning pathway has been realized through an innovative methodological model combining both theoretical and practical aspects, in order to enhance the learning skills based on the study of real cases. Content is structured in the best way to build gradual competences.

Another innovative approach in the development of our module is the importance of having a nurse as part of the ultrasound health team - a nurse whose presence conveys for the patient's psychosocial and physical needs. The usual patient reaction to illness is anxiety. Ultrasound can intensify anxiety by augmenting a feeling of alienation, creating a deficit of knowledge and/or invading personal space. In this way the module also promotes the belief that the nurse s role in ultrasound has one prominent goal-positive patients relations. The conclusion drawn at the end of the project was that 3D images and virtual classrooms can support medical and nursing professionals in training without having the presumption to be exhaustive, but propaedeutic to practice.

KEYWORDS

Nursing online education, problem based education, ultrasound medical education

1. INTRODUCTION

Medical sector is a particular field in which quality of contents and type of methodology need to respect specific requirements and high level standards. Swanwick (2008) suggests that in the late years postgraduate medical education is moving into a new era driven by the three interlinked trends of professionalisation, increasing accountability and the pursuit of excellence (9) . In this context E-learning can offer an alternative method of education (7).

Precisely for the acute need to be permanent "in touch" with the findings and important issues in medicine, the new technology facilitated learning online methods started to gain ground in recent years in medical education, at international level and in the process of obtaining credentials for the medical profession, also influencing the methods used now in the process of learning. Despite the great interest of medical specialists for this type of training, computer assisted education is sporadically included in medical training. A systematic literature review conducted to assess the impacts of e-learning in nursing education has emphasized that e-Learning or Internet-based learning, has reaped many positive benefits as an efficient and effective educational tool, but still remains comparatively low in usage compared to other tools (4). Another

recent review on 35 evaluative studies of online interventions in medical education showed that e-learning methodology is mainly used to transfer theoretical topics (3). In his study, Feng et al also (2013) concluded that E-learning is a useful adjunct to traditional learning for medical and nursing students (6). Another study conducted by Kokol et al (2006) proved that e-Learning can have many benefits and that it can enhance learning experience in nursing education, if it is provided in a correct manner, but there are still a lot of things to be done in order to increase the experiences and attitudes towards e-learning and clinical skills training (8). Also we must underline that although there has been much research on e-learning in the educational context, far less has been written about e-learning in the workplace (5)

These findings are taking place in the framework of the Recommendation of the EU Parliament and of the Council of the Establishment of ECVET that showed there is a serious need of complementarity between vocational training and higher education (10,11). More, the EU Commission Communicate on Rethinking Education issued in 2012 undelines that increasing transversal and basic skills alone is not sufficient for growth and competitiveness and VET must be able to react to the demand for advanced vocational skills (12). With the development of Multimedia and networking as well as their extensive application in educational field, the learning environment extends beyond the classroom and establishing an E-learning culture is seen as essential to the future of vocational and higher education and the facilitation of life long learning (1,2).

In the light of these previous researches and findings, we started from the idea that the scope of nurse practice must be expanded beyond the core competencies to incorporate additional skills and procedures that improve care for patients and their families and we proposed to provide information and education for nurses by the use of a Learning Management Systems delivered through the Internet, within the framework of e-EDUMED project.

2. E-EDUMED PROJECT

e-EDUMED which stands for e-Learning Educational Centre in Medicine was a two year European project started in January 2011 funded by the Lifelong Learning Programme (Leonardo da Vinci, Transfer of Innovation sub-programme) aiming to cope with the learning needs of medical professionals improving and updating their skills, knowledge and abilities towards a competitive European Medical Brand in ultrasound (US). The project developed a virtual health educational center , providing on-line education and training materials by 2 interactive training modules in ultrasound adressed to medical doctors and nurse education and one online module for patient education.

3. STUDY PROGRAM CONTENT

Medical professionals spend a lot of time in training, refreshment courses, job shadowing and discussions with peers. They daily exploit all main sources of information and deepen any topic relevant for their profession. In this context the challenge of E-Edumed project was to offer an innovative course for medical professionals, a flexible, attractive and focused e-learning training pathway.

The e-EDUMED project started with a research carried in all participant countries aiming to analyse the training needs in medicine and state of art of medical e-learning outlined three characteristics of Medical Professionals in terms of skills and abilities:

- To know: have updated theoretical knowledge;
- To do: have technical or manual skills;
- To be: have communication and relations' skills.

The study program was designed according to the research findings, aiming to provide students with an advanced level of theoretical and scientific knowledge, relevant to the enhancing of practice or management in culturally diverse populations, both nationally and globally. It describes nursing care issues and techniques as they apply to the ultrasound settings, providing informations on:

- Patient preparation before US Examination
- The role of nurse during special US examinations and for special categories of patients
- Patient education after US examination.

The syllabus includes the same topics as the ultrasound module addressed to medical doctors and patients, but from the point of view of the nurse.

4. ON-LINE ENVIRONMENT

For the delivery of the online courses and to host the PBL repositories, an interactive e-learning platform was set up from the beginning of the project. The main goal of the e-learning platform and its applications was to give students the possibility to download course materials, take tests or sustain final examinations and communicate with all involved parties. For this reason the learning platform has been designed to provide accurate, interactive models for student and instructor use and multimedia learning by offering a Managed Learning Environment (MLE), which provides a single point of access for both staff and students with a various range of e-tools and applications including a Virtual Learning Environment (VLE- curriculum, delivery, assessment, tutor support, communication, feedback, quality management) as well as access to related references, organisations, scientific events and research area. Beside the structure and functionalities of the Virtual Centre, the course is empowered by a very effective methodology namely “Problem Based” Learning (PBL) implemented into the PBL environment, the “Virtual Classrooms”.

Claroline was the open source E-Learning platform that we implemented because its relevant added values. It is free, it is built in modules that is it is more flexible, customizable and, finally, it has a huge community of developers and users that means new enhanced releases and debugs and offered us suitable modules for our goals: Teaching Units (training modules), Documents, Forums, and Chats.

In developing the platform and other materials we kept in mind that we address to Medical Professionals interested in refreshing key concepts and acquire knowledge on specific case studies, sharing experiences between other professionals. For this reason the platform offers an attractive ICT environment, high level functionalities and innovative PBL methodology helping the target group to benefit from a very flexible learning system, high level didactic material as well as interactive videos and Virtual classroom to discuss with peers, refresh competencies and exchange best practices/daily work-experience through virtual classroom (figure 1).

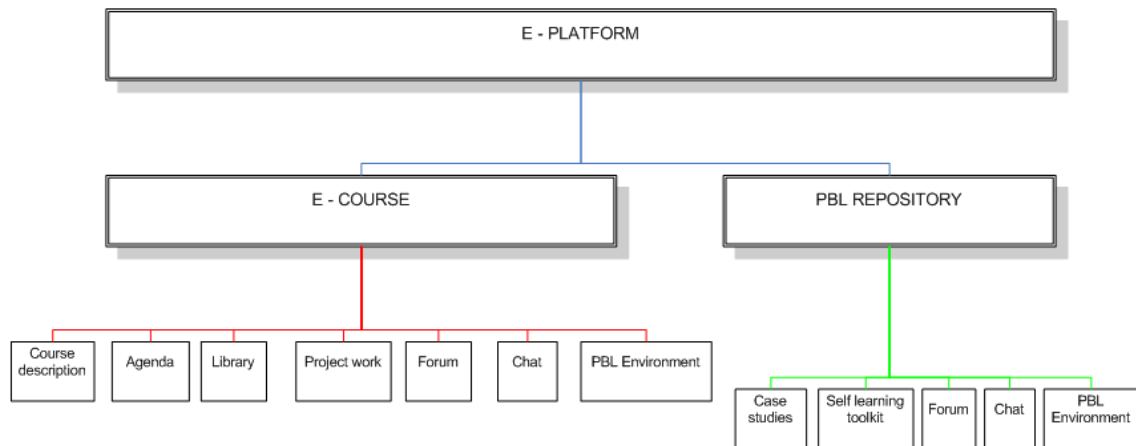


Figure 1. e-Learning platform diagram

The platform hosts asynchronous online courses - educational materials in a traditional style of presentation, PPT and course notes (text and images), questions and tests associated with each section, multimedia lessons that include sections with commented video images. Also the platform includes synchronous online courses - courses implemented in the virtual class E-Edumed allowing a tutor via the Internet to bring together a group of students in real time.

After entering the e-learning platform, the student can access materials and exercises for the courses available. According to individual profiles, each student has a different learning path through a sequence of materials and exercises, which are presented in different forms (visual, text, game-based). The learning path is defined by student type and learning style, and it is dynamically adapted if the student type or learning style changes.

In order to increase the impact of knowledge E-Edumed learning pathway is available in English and national language for Bulgarian, Hungarian and Romanian medical professionals.

5. NURSE TRAINING PACKAGE

This package was delivered for nurses and consisted of interactive nurse courses included into e-EDUMED e-learning platform. The package was divided into subsequent 3 modules and is available in EN, RO, BG, HU. For this modules we provided the curriculum/syllabus, schedule of courses and educational materials (WWW-based). All the materials are free to download. The total of developed materials was as shown in table 1.

Table 1. Nurse training package content

| Text- pg | Multimedia lessons | PPT- s slides | Multimedia lessons | Virtual classes | Quizzes | Size |
|----------|--------------------|---------------|--------------------|-----------------|---------|-------|
| 126 | 6 | 335 | 4 | 10 | 80 | 50 MB |

The nurse ultrasound module entitled "NEW SKILLS FOR NEW CHALLENGES- THE ROLE OF NURSE IN ULTRASONOGRAPHY" includes texts and PPT presentations, addressed to the nurse and its roles in ultrasound: completing the report with aspect, dimensions and particularities of the investigated organ ,on the recommendation of the investigator, to know what kind of probe has to activate for this US evaluation, to place the patient in the proper position for examination, to prepare the patient prior to the investigation and to offer explanation to the patient after examination.

The proposed educational module is a continuous medical education approach by internet, interactive on-line education by consultancy with accredited programme tutors, assuring a secured final evaluation, as well as by the informational support offered, with links and specific portals.

6. THE LEARNING PATHWAY

The Learning pathway has been realized through an innovative methodological model combining both theoretical and practical aspects, in order to enhance the learning skills based on the study of real cases thanks to the Problem Based Learning (PBL) approach implemented into a virtual environment (virtual classrooms). The methodological approach is based on modular three-level architecture (presentation level, intermediate level, data level). The student can choose the level and/or type of training (competence in echography, nurse, LL training). In this way E-Edumed pedagogical model meets the medical professionals learning needs through the synergy of a virtual Problem-based Learning approach, a peer training methodology, and a self-direct learning approach, to promote the attainment of practical skills relating to ultrasound.

The virtual environment has a simple but effective structure and functionalities in order to allow the user to have suddenly clearer the core aims, the didactic and IT tutors and the key online tools. In particular, the learning pathway is introduced by a General presentation of the course with a description, targets, topics' list, help desk contacts, staff involved and learning tools. An agenda allows teachers or tutors to stress important course deadlines or events. A library allows teachers or tutors to add and store documents or links useful for the medical professional like Lecture notes to deepen the audio lesson contents, Reports, videos or Guidelines.

The virtual centre is also provided of a Forum which allows a classical asynchronous communication among professionals to share feedbacks and remarks; while a chat is at disposal for a synchronous communication tool. Access to virtual classrooms and to record virtual classrooms is also provided.

Once the trainee introduces his/her data, the first page of the course will open, with language options (RO, EN,BG, HU). The trainee can choose the option that he/she prefers and read the course description, consult the agenda or announcements for course schedule or events. Also he/she can use the platform facilities- forums, chat (figure 2).

For accessing the course materials there are 2 modalities:

- *Learning path* for a review of the educational material, videolessons and self assesment quizzes
- *Document* for text (lecture notes).



Figure 2. The learning pathway for the nurse module

The texts are structured as chapters of a book and follow the same order of contents. Each text begins with the course objectives, prerequisites and gained competencies and ends with a selected bibliography. Power point presentations are included in a classical manner (figure 3) or in the form of multimedia lessons.



Figure 3. Classical Powerpoint presentation in the nurse ultrasound module

As concerns the key element of didactics, multimedia and dynamic lessons are provided with text, images and animations synchronized together with experts' audio contribution. The student has the total control of the audio lesson flow by clicking on the stop/go button, the forward button, the backward button, and with an index for jumping from one slide to another (figure 4).

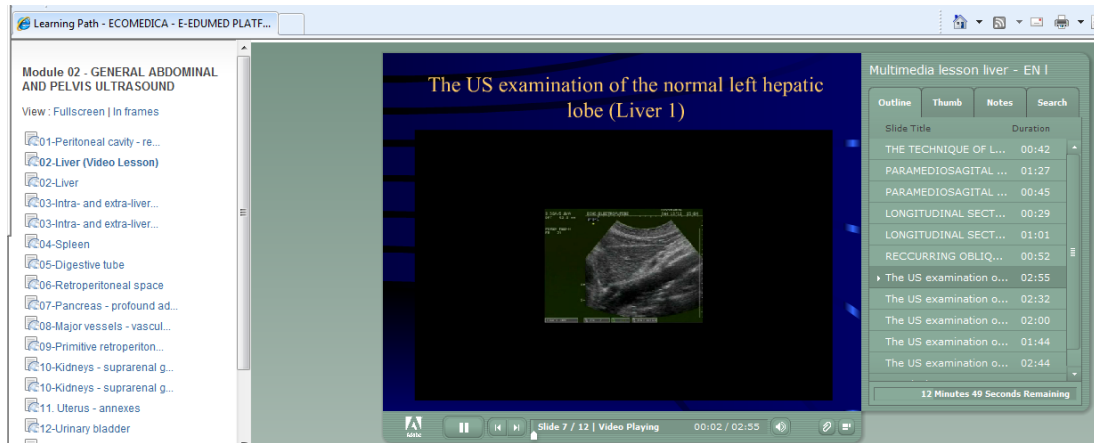


Figure 4. Print screen of a video included into multimedia lesson

Students are able to publish their work thanks to a Project work Qualitative assessment and Teachers give feedback on their works and assess students directly on-line. Quizzes are also valuable tool for the student to assess himself about a course module. The student ought to answer to different kinds of questions receiving an immediate feedback. Once a quiz session has been completed, the student will see the total score carried out and if he has passed the quiz.

Each module have a list of available learning objects SCORM compliant, ensuring the total reusability and tracking of student activities.

Pilot testing of the prototype of the platform was carried on in order to check the prototype fitness for the purpose, and the suitability of knowledge provided, user interface, language level, graphic approach and interaction level. Both trainers and trainees were involved.

Quality criteria of software characteristic were applied as follows: Functionality, Reliability, Usability, Efficiency Maintainability, and Portability.

Pilot testing by the users- test group- as training packages (after integration of the didactic material into the e-learning platform) was also carried, at the beginning of the training sessions. Tutorials evaluated the degree of successful usage and integration the system by the lecturers by the use of on line questionnaires.

87% of participants had witnessed a high level of satisfaction regarding the online environment and quality of didactic material.

7. CONCLUSION

The aim of this paper was to present the results of the LDV TOI project e-EDUMED, which resulted in an on-line educational platform in ultrasound imaging which is globally focused, flexible, innovative, diverse, contemporary and ICT-based (both in content and implementation) and focuses on meeting the needs of medical professionals.

An innovative aspect of the project is a virtual environment for clinical practice, which host trainees in an active learning environment by giving them problems and training them to identify what they need to learn to solve those problems. The e-modules provides students with extensive learning materials and the PBL environment. The main advantage is that the beneficiaries of the course, being professionals with different work experience, are able to choose their path according to their specific learning needs as well as medical field. Ultrasound is in fact a technique used in plenty of situations and medical contexts and therefore a user should have the possibility to quit some topics, deepening others and so on.

Another advantage is that content is structured in the best way to build gradual competences, by the use of:

- Internet resources
- Group discussions and ultrasound case analyses
- Quizzes & examinations
- Ultrasound laboratory live (virtual classrooms) & video demonstrations (multimedia lessons) Students' study trainings based on Power Point presentations and texts
- Students' self study trainings based on the references provided.

Based on students evaluation of the program, the interest shown for e-learning for all categories investigated in the target group was great. All participants were satisfied with both content and implementation of the training modules.

Analysing the field survey results and the documentary research, the general conclusions is that the use of ultrasound online platforms for medical education can be useful in the following conditions

a. To achieve competence in ultrasound. Considering the modality of examination that leads to obtain competence in ultrasound, online education can have a real value for theoretical module (teaching and assessment) by providing recent and systematized, specific information, in a didactic approach, a real opportunity for online evaluation of theoretical knowledge and possibility of simulation of examination. The e-platform also can be valuable in preparing for practical test examinations and video examination, but also to support video on line examinations. Other advantages consist in the possibility of accessing material at any time and from any location, the sharing of information between students on the forum, opportunity of brainstorming, access to trainer s opinion and Second Opinion.

b. In continuous professional training and obtaining CME credits e-learning is a reliable and superior alternative to classic courses that require accommodation, time, etc.

Our paper demonstrates that e- learning education in ultrasound and development of interactive learning platforms with an integrated imaging database remains a perfect option for continuing professional development and formal education by the possibilities offered in review and updating knowledge, sharing information and brainstorming. 3D images and virtual classrooms can support medical and nursing professionals in training without having the presumption to be exhaustive, but propaedeutic to practice.

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