Derleme / Review

# Continuing Medical Education and E-Learning for Health Professionals

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**ABSTRACT:**
## Continuing medical education and E-learning for health professionals

E-learning is the new and changing face of Continuing Medical Education (CME) for health professionals. Developments in information and communication technologies assist the formation of structural changes in the continuous education of health professionals. Since this method enables learning for health professionals, who work under rotation system in various geographic divisions asynchronously, e-learning could provide numerous opportunities for their career development.
**Key words:** E-learning, health professionals, continuing medical education

**ÖZET:**
## Sağlık profesyonellerinin eğitiminde E-öğrenme

E-öğrenme sağlık profesyonellerinin eğitiminin yeni ve değişen yüzüdür. Bilgi ve iletişim teknolojilerindeki gelişmeler sağlık profesyonellerinin sürekli eğitiminde yapısal değişiminin olmasına yardım etmektedir. E-öğrenme farklı coğrafi bölgelerde rotasyon sistemi ile çalışan sağlık profesyonellerine asenkronize öğrenme imkanı sağladığı için, sağlık çalışanlarının kariyer gelişiminde çeşitli imkanlar sağlamaktadır.
**Anahtar sözcükler:** E-öğrenme, sağlık profesyonelleri, sürekli tıp eğitimi

## INTRODUCTION

Developments in information and communication technologies have assisted in the structural changes in education (1). Since the internet grows in popularity as a medium for knowledge transfer and is widely used in medical education, it has had a strong impact on the development of Continuing Medical Education (CME) activities for health professionals (1,2-5). Internet technologies that enhance knowledge and performance can be integrated into CME programs and could provide a flexible, convenient and interactive form for CME (2,6).

The importance of CME is increasing for improving both physician's competence and outcomes of health care (7). CME, therefore, is widely acknowledged as an indispensable part of the working life of health professionals and a key element for the quality and efficiency of a health system (6,8,9).

E-learning is described as a learning method in which information technologies and learning process are integrated by using internet (10-12). E-learning is also called Web-based learning, online learning, distributed learning, computer-assisted instruction or internet-based learning (1). Since E-learning provides a bridge among education, training and updated practices for professional organizations in CME, it could be thought as an effective alternative to face-to-face learning (5,12-14). In this system, there is a visual class which is different from all learning models (13). It is quite effective for improving knowledge, skills and behaviors for the practices of health professionals (15). It provides an asynchronous education opportunity for health professionals who work under rotation system in various geographical divisions (10,16). At this point, it should be noted that E-learning shall provide numerous opportunities and benefits for career development for health professionals (17). Considering work conditions in

health services, E-learning is an application that, unlike traditional in-class learning, saves time in acquiring new knowledge and skills. It provides a learning opportunity based on personal needs, offers flexibility and self-direction for learners, since it is an application that has fast and high-quality information change (17,18). Standard scenarios that are influential on professional applications are created in clinical education for health professionals (19). At the onset of E-learning program, there are certain factors that are influential in the success of system: transfer of sufficient information about program, application-oriented presentations, presenting an overall view on courses and the whole education and appropriate allocation of the period (20).

During application phase, education requirements are identified at first, the kind of technological tools to employ for fulfilling these requirements are clarified and afterwards, research is conducted to detect the content appropriate to education objectives. Within the organization, in order to execute these tasks and to form strategic execution plan, a team consisting of clinic training, information systems, organizational behavior and administrative representatives must be established. While evaluating educational requirements, technologic resolutions and content decisions must be taken into consideration (21).

Since E-learning is also defined as the utilization of digital technologies and media, the main principles for E-learning are enabling active participation of learners, stimulating learning via different means and integrating learners into the process through technology (12). By means of E-learning, learners enhance their self-learning experiences. Downloading education files on internet enables them to study by themselves, take online exams and perform distance learning (13). Since internet and distance cooperation constitute the base of the system, E-learning education materials are based on digital multimedia content. In addition, multimedia education that supports education models and communication between learners and tutors, technical assistance, tutors, system developers, multimedia editors, system administrators and network administrators are curtail parts of the system for E-learning (13).

Health professionals access to learning activities, library resources, tutors and other learners via internet. Their technical and communication skills are improved by using chat rooms, web pages, e-mail and computer. The greatest barrier in using web technology is learning how to utilize it (22). In this system, discussion forums are elements, which promote active learning and improving learning. To sum up, self-discipline of the learner, effective time management and possessing basic computer skills are the conditions providing success in online work programs (23).

**Standards and E-Learning Management Systems**

An E-learning environment can be characterized as a Learning Management System (LMS). Its standards define the set of specifications for workflows and complemented with synchronous and asynchronous communication tools (8, 24). This system provides collection of tools and functions to support teaching and learning processes regarding course management tools, online group chat and discussion, homework, collections, grading, and course evaluation (24).

Moodle (Modular Object-Oriented Dynamic Learning Setting), as an open source web learning platform, possesses a technological structure providing varying degrees of freedom to users and helps educators in creating high-quality courses. Forum, chat and video conference are the tools needed for success in this platform. Learners can establish communication in virtual classroom, share knowledge and take part in small exams. Moodle learning management system assists the tutor by forming a virtual classroom and guides the tutor in forming connection with learner (13). Mixing content of various media types created with different software is made possible by Sharable Content Object Reference (SCROM) (25,26). It is the sum of standards aiming to form the contents of reusable education. This approach gives the tutor more time to focus on quality for restructuring simple educational modules to reuse (1,13,25,27).

The SCORM standard is defined into two frameworks, including the CAM (Content Aggregation Model) and RTE (Run-time Environment). This main framework of CAM comes with three major elements: content model, metadata and content packaging. The courseware is defined as content objects and the elements for reuse. It is also known as SCO (Sharable Content Object). Moreover, the elements in SCO are known as assets. Metadata files as "card catalogue" in digital age are used to describe information on the courseware through XML (28). Content packaging

uses the Manifest XML files to arrange and pack SCO as the framework of the course (29). Runtime is the software that monitors the relation between student and learning objects and overcomes communication problems. Runtime enables the functioning of learning objects above E-learning platforms and monitoring of students' performances by tutors (28,29).

The Learning Technology Standards Committee (LTSC) within the Institute of Electrical and Electronics Engineers (IEEE) has adopted a broad definition for learning objects that could be digital or non-digital form (30). Learning Object Metadata (LOM) includes the title, author, description, keywords, educational objective, and other relevant information (25, 27). Metadata specifically refers to both descriptive information for improving information retrieval, the content, structure and logistical information of all data including electronic resources. Moreover, it helps to enhance document retrieval and navigation. Agreement on a metadata standard is a crucial element of this infrastructure. The main metadata standard from a cross-domain perspective the Dublin Core is, now recommended across Europe for use in many sectors as the gold standard of choice to ensure interoperability between resource discovery systems on the internet (31). IEEE Reusable Competency Definitions (RCD) Draft Standard for Learning Technology defines a data model for describing, referencing, and exchanging in online learning. Moreover, the IEEE Learning Technology Standards Committee studies on the draft standard such as Simple Reusable Competency Map (26).

With the use of these standards, the aim of the CME is to improve patient care by high quality content that is focused, well indexed and convenient technical properties (32). In CME, the delivery method ranges from simply placing static text on a Web page to animated, interactive courses and simulations that mimic the ''real'' world (33). Diagnostic and therapeutic choices in daily practice (4), skin cancer management for physicians (34), ophthalmological management of diabetic retinopathy by RETIDIAB® (35) in clinical practice are samples of CME examples in E-learning. CME by E-learning as dynamic environment, the interactive format of the CME cases allows the participant to submit immediate comments or criticism to case authors and receive instant feedback (36). Moreover, some organizational samples to E-learning educational programs can be given in the education of health professionals. French Virtual Medical University (UMVF) is one of the E-learning platforms utilized in France Medical Schools (37). International Virtual Medical School (IVIMEDS) is an international organization and establishes cooperation between medical schools and institutions (1, 37). Minnesota Virtual Clinic is a web-based educational tool and is based on electronic patient records for presenting cases. Web Based Simulation of Patients also focuses on integrating this system to medical sciences (37). MEDICOL (Medicine and Dentistry Integrated Curriculum Online) has a role in the continuity of the distribution of problem-based learning chat room learning resources and synchronous communication. The functions provided by education administrators can be described as monitoring student progress, improving student-student / student-tutor interactions and they are known as personal learning components, containing multimedia learning models (37).

In E-learning, the critical points to highlight are enhancing learner-faculty communication, cooperation among learners, employing active learning techniques, receiving feedbacks, focusing on timely execution of the task, achieving communication containing high expectations, rendering respect to different learning methods and different skills. The practical nature and simple applicability of E-learning program facilitates the approval of the system, however its high cost and restricted computer competency pose critical problems. The problems faced by E-learning are insufficiency of experience on E-learning production, need for resources, technology assistance, lack of experience in utilizing learning objects during structuring process and the need for information technology broadband internet access and learning management system. Disadvantages for the learner are lack of interaction throughout structuring process and incompetency in computer literacy.

Finally, it must be remembered that E-learning provides asynchronous education opportunities for health professionals who work under rotation system in various geographic divisions. Technical background, standards and functional learning objects are important factors for success of the system. In this frame, continuous medical education applications by using E-learning are key factors for improvement of health professional's career and quality in health care.

## REFERENCES


1. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med. 2006;81(3):207-212.
2. Curran VR, Fleet L. A review of evaluation outcomes of web-based continuing medical education. Med Educ. 2005;39(6):561-567.
3. Wong G, Greenhalgh T, Pawson R. Internet-based medical education: a realist review of what works, for whom and in what circumstances. BMC Med Educ. 2010;10:12.
4. Casebeer L, Engler S, Bennett N, Irvine M, Sulkes D, DesLauriers M, Zhang S. A controlled trial of the effectiveness of internet continuing medical education. BMC Med. 2008;6:37.
5. Cobb S. Internet continuing education for health care professionals: an integrative review. Journal of Continuing Education in the Health Professions. 2004;24(3):171-180.
6. Hugenholtz NI, de Croon EM, Smits PB, van Dijk FJ, Nieuwenhuijsen K. Effectiveness of e-learning in continuing medical education for occupational physicians. Occup Med. 2008;58(5):370-372.
7. Davis D, Thomson M, Oxman A, Haynes R. Evidence for the effectiveness of CME. A review of 50 randomized controlled trials. JAMA: the journal of the American Medical Association. 1992;268(9):1111.
8. Bamidis P, Nikolaidou M, Konstantinidis S, Pappas C, editors. A proposed framework for accreditation of online continuing medical education. 2007: IEEE.
9. Weston CM, Sciamanna CN, Nash DB. Evaluating online continuing medical education seminars: evidence for improving clinical practices. Am J Med Qual. 2008;23(6):475-483.
10. Carbonaro M, King S, Taylor E, Satzinger F, Snart F, Drummond J. Integration of e-learning technologies in an interprofessional health science course. Med Teach. 2008;30(1):25-33.
11. Reime MH, Harris A, Aksnes J, Mikkelsen J. The most successful method in teaching nursing students infection control - E-learning or lecture? Nurse Educ Today. 2008;28(7):798-806.
12. Glen S. E-learning in nursing education: Lessons learnt? Nurse Educ Today. 2005;25(6):415-417.
13. Sajeva M. E-learning: Web-based education. Curr Opin Anaesthesiol. 2006;19(6):645-649.
14. Juntunen A, Heikkinen E. Lessons from interprofessional e-learning: piloting a care of the elderly module. J Interprof Care. 2004;18(3):269-278.
15. Ryan G, Lyon P, Kumar K, Bell J, Barnet S, Shaw T. Online CME: an effective alternative to face-to-face delivery. Med Teach. 2007;29(8):251-257.
16. Peterson KJ, Van Buren K. Implementing Essentials of Critical Care Orientation: one hospital's experience with an online critical care course. Crit Care Nurs Q. 2006;29(3):218-230.
17. Billings DM. Understanding the challenges of e-learning. Nursing. 2007;37 Suppl:36-37.
18. Chang WY, Hsiao Sheen ST, Chang PC, Lee PH. Developing an E-learning education programme for staff nurses: processes and outcomes. Nurse Educ Today. 2008;28(7):822-828.
19. Hawthorne K, Prout H, Kinnersley P, Houston H. Evaluation of different delivery modes of an interactive e-learning programme for teaching cultural diversity. Patient Educ Couns. 2009;74(1):5-11.
20. Jonsson BA. A case study of successful e-learning: a web-based distance course in medical physics held for school teachers of the upper secondary level. Med Eng Phys. 2005;27(7):571-581.
21. Berke WJ, Wiseman TL. The e-learning answer. Crit Care Nurse. 2004;24(2):80-84.
22. Twomey A. Web-based teaching in nursing: lessons from the literature. Nurse Educ Today. 2004;24(6):452-458.
23. Hermann ML. Technology and reflective practice: the use of online discussion to enhance postconference clinical learning. Nurse Educ. 2006;31(5):190-191.
24. Bamidis PD, Konstantinidis S, Papadelis CL, Perantoni E, Styliadis C, Kourtidou-Papadeli C, Pappas C. An e-learning platform for aerospace medicine. Hippokratia. 2008;12 Suppl 1:15-22.
25. Hersh WR, Bhupatiraju RT, Greene P, Smothers V, Cohen C. Adopting e-learning standards in health care: competency-based learning in the medical informatics domain. AMIA Annu Symp Proc. 2006;334-338.
26. Hoa D, Micheau A, Gahide G. Creating an interactive Web-based e-learning course: a practical introduction for radiologists. Radiographics. 2006;26(6):e25.
27. Hersh W, Bhupatiraju RT, Greene PS, Smothers V, Cohen C. A standards-based approach for facilitating discovery of learning objects at the point of care. AMIA Annu Symp Proc. 2005:979.
28. Ruiz JG, Mintzer MJ, Issenberg SB. Learning objects in medical education. Med Teach. 2006;28(7):599-605.
29. Wu YH, Lin SH, Chong FC, Lun JJ, Lin YJ. An E-learning Content Authoring tool for Transforming DICOM into SCORM. Conf Proc IEEE Eng Med Biol Soc. 2005;3:2890-2893.
30. Agostinho S, Bennett S, Lockyer L, Harper B. Developing a learning object metadata application profile based on LOM suitable for the Australian higher education context. Australasian Journal of Educational Technology. 2004;20(2):191-208.
31. Thirion B, Loosli G, Douyere M, Darmoni SJ. Metadata element set in a quality-controlled subject gateway: a step to a health semantic Web. Stud Health Technol Inform. 2003;95:707-712.
32. Casebeer L, Bennett N, Kristofco R, Carillo A, Centor R. Physician Internet medical information seeking and on-line continuing education use patterns. J Contin Educ Health Prof. 2002;22(1):33-42.
33. Kokemueller P, Osguthorpe JD. Trends and developments in continuing medical education. Otolaryngol Clin North Am. 2007;40(6):1331-1345.
34. Harris JM, Salasche SJ, Harris RB. Can Internet-Based Continuing Medical Education Improve Physicians' Skin Cancer Knowledge and Skills? Journal of General Internal Medicine. 2001;16(1):50-56.
35. Beynat J, Ben Mehidi A, Aubert JP, Bron AM, Massin P, Creuzot-Garcher C. RETIDIAB®: Assessment of a continuing medical education website for the improvement of diabetic retinopathy management. Diabetes & Metabolism. 2011;37(2):118-123.

36. Horn K, Sholehvar D, Nine J, Gilbertson J, Hatton C, Richert C, Becich M. Continuing medical education on the World Wide Web (WWW): interactive pathology case studies on the Internet. Archives of pathology & laboratory medicine. 1997;121(6):641-645.

37. Beux PL, Fieschi M. Virtual biomedical universities and e-learning. Int J Med Inform. 2007;76(5-6):331-335.