A Proposed Framework for Accreditation of Online Continuing Medical Education

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Abstract

Continuing medical education tends to be considered compulsory in most countries although it is described by the Union of European Medical Specialists as an ethical duty. Accreditation of CME and allocation of credits is not yet mandatory in the EU but it is important for providers of educational activities to meet certain quality criteria so as to be prepared for future requirements. Many software platforms and Learning Management Systems (LMS) can be used to support web-based courses for online CME. Certain standards like SCORM, define the set of specifications that enables cross-system workflows. Updates and extensions of SCORM specifications enable further enhancements. The current research proposes a framework for the accreditation of online CME courses through the enhancement of the SCORM model and the use of metadata, using a SCORM-compliant open source LMS platform, namely, moodle. The model assumes the definition of learning objects and learning outcomes for a specific target audience of the course and the design of an instructional module incorporating several types of learning material.

1. Introduction to medical education and accreditation

Education represents knowledge and skills that people acquire throughout their lifetime, allowing them to understand, think and feel and, therefore, be able to achieve their endeavors. Over the last decade people worldwide are asked to participate in a new reality, competitive and dynamic, brought in by the economic and social globalisation. In each country, priority is placed on training and education. Medical Education is a subject that encompasses not only the essential issue of education, but also the sensitive issue of health. The importance of adequate qualifications of medical professionals in order to confront the increased needs in treatment and research makes it necessary for doctors to update their knowledge and skills regularly throughout their professional lives. Continuing medical education (CME) tends to be considered compulsory in most countries although it is described by the Union of European Medical Specialists [1] as an ethical duty.

Developments concerning the globalization of Higher Education, as well as, the expansion of technologies have forced institutions to develop alternative forms of delivery of education. Virtual universities and distance learning platforms are examples of use of the Internet and information and communication technologies (ICT) as a means to deliver education. Despite this rapidly changing structure of education, it is believed that learning experiences remain unaffected and learning outcomes may be achieved through any kind of delivery [2]. However, when teaching and learning methods are special, the means and criteria to evaluate and assess

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the course programmes cannot be the same. Distance learning or e-learning requires the adoption of new standards that will be applied independently of the educational delivery method.

Although the accreditation of CME programmes and the allocation of credits is not yet mandatory in all European Union (EU) countries, it is important for providers of educational activities to meet certain quality criteria so as to be prepared for future requirements.

In this paper a framework for the design and implementation of web-based courses and their accreditation and awarding of CME credits is proposed. The model framework is carried along the notion of providing accreditation authorities with a secure mechanism for the overall assessment of taught programs, and assumes the definition of learning objects and learning outcomes for a specific target audience of the course. The remaining of this paper is structured as follows. After the background section on accreditation, the proposed framework is presented, firstly by considering the possible components of an instructional module, and then by setting the attributes of each component regarding the format, the learning hours and the learning credits. Finally, a possible validation scheme for the model is discussed.

2. Background

2.1. Accreditation of Continuing Medical Education (CME)

Accreditation, or in some cases "validation", "certification" or "recognition" was initially referred to by universities to convince other institutions that their students should be accepted by them, and vice-versa. It evolved into a form of public accountability providing assurances to those outside higher education that the institution had the capacity to offer its programs [3]. According to the Council for Higher Education Accreditation [4] "Accreditation is a process of external quality review used by higher education to scrutinize colleges, universities and higher education programs for quality assurance and quality improvement".

Learning activities that can be awarded adequate CME credits are diverse: participation in seminars, paper authoring and peer review, attendance or lectures in conferences and congresses. One of the common features across countries for the accreditation of CME is the accumulation of duration hours of each activity; in most cases 1 hour activity equates to one credit and according to Peck [5] activities are divided into three categories: (i) live or external activities (courses, seminars, conferences); (ii) internal activities (teaching, consultation with colleagues, pratice-based activities etc); and (iii) enduring materials (print, CD/DVD or web-based materials with assessment).

The management and appropriate procedures of accreditation and definition of quality standards of medical education is regulated by a number of international or EU bodies related to the accreditation of education in general or to medical profession in specific. The most significant ones are: the Association for Medical Education in Europe (AMEE) concerned with the current and future needs in the continuum of medical education, the European Union of Medical Specialists (UEMS), aiming to achieve the harmonisation of training of medical specialists and the defence of the professional interests, the European Accreditation Council for Continuing Medical Education (EACCME) with the aim to improve the quality of specialist medical care in Europe and allow the secure exchange of CME credits, the European Association for Quality Assurance in Higher Education (ENQA) and others. However, none of the abovementioned authorization bodies have so far declared the criteria that would guarantee the successful online or distance learning CME programme and that would facilitate the development of such accredited programs.

2.2. Technical conditions/Applied Settings for e-learning courses

Many proprietary and open source platforms can be used as platforms to support web-based courses and perform as Learning Management Systems (LMS) that enable the management of e-learning courses. The need for interoperability between different applications and transfer of an e-learning course from one platform to another called for the development of communication protocols and fixed structures.

LMS standards define the set of specifications that enables cross-system workflows. The Sharable Content Object Reference Model (SCORM) [6] adapts requirements regarding accessibility, adaptability, affordability, durability, interoperability, and reusability. It is based on widely accepted technology standards such as XML and JavaScript and it is embraced by a large number of providers, institutions and corporations worldwide. It is also used as the basis for evaluation of e-learning platforms [7]. Although the Advanced Distributed Learning Initiative (ADL) which organised SCORM has released several updates of SCORM specifications, a number of studies have proposed extensions that will enable enhancements in usability and adaptability, like sequencing rules that support auxiliary resources and allow better connectivity between learning activities [8], new metadata elements extending the Educational category and others describing reusability and quality issues [9]. Simoes et al [10] have implemented and tested a prototype extending SCORM metadata, using a new category that supports non-traditional course entities like bibliography, faq, course programme and evaluation rules.

Metadata are used by many distance-learning standards in order to tag learning material, but most of them do not offer provisions for assessment metadata [11]. To that extent, the current piece of research proposes a framework for the accreditation of an online course through the enhancement of the SCORM model and the use of metadata, using a SCORM-compliant open source LMS platform, namely, *moodle*.

3. The proposed framework

The development of a web-based course involves not only the availability of material to the student and the platform to host the course. It imposes mainly the establishment of a teaching method or strategy that will accommodate the design requirements. The proposed framework will provide the accreditation authorities a secure mechanism for the overall assessment of the program taught, as illustrated in Figure 1.

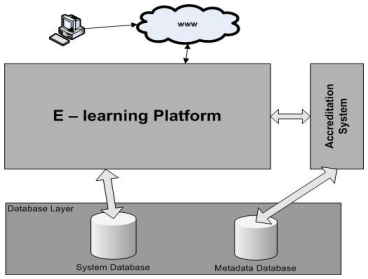

Figure 1. System Components for the Accreditation framework

The model assumes the definition of learning objects and learning outcomes for a specific target audience and the design of an instructional module incorporating several types of learning material such as lecture notes, video, audio, communication/interaction activities. The above learning material may be created using different formats, and may be given through synchronous or asynchronous modes. However, even though SCORM provides mechanisms

for tracking all the activities of the learner and the time required for their completion, the assumption that a course can be accredited when every component has been successfully completed within a defined time constraint would sacrifice many distance-learning advantages, mainly the opportunity for flexible learner-centered course program.

A minimal scenario will demonstrate how various modules of educational activities can be made available to the learner, and the availability of options to choose from, while respecting the course structure from the educational strategy point of view. A set of metadata defines the minimal set of properties needed to allow these modules to be managed, validated, and accredited. This set includes information on:

a. learning hours that need to be dedicated for the successful completion of the educational activity
b. the number of learning credits allocated to each activity
c. the instructional purpose of each activity
d. the validation attribute (compulsory, optional)

3.1. Scenario

Assuming that for a specific topic in medical education, several learning objects and outcomes have been defined, content delivery modes can be diverse, ranging from lecture notes and bibliography to quizzes, exercises, assignments, interaction activities, and other evaluation means. Each of these modules can be delivered in various formats, i.e. interaction or communication activities can be performed through synchronous delivery like chat or live videoconference, or through asynchronous mode like forum discussions, according to the learner's preferences. In addition, each of these activities are designed by the instructor to be achieved within some time, therefore calculation of learning hours is necessary, since it is the main criterion for the allocation of CME credits. Table 1 offers a representation of a minimal scenario on the framework proposed.

Table 1. Accreditation attributes

Course Topic	Modules	Format	Learning hours	Learning Credits	Instructional purpose
Definition of learning objects Definition of learning outcomes	**Lecture notes**	**ppt, text, pdf, html page etc**	**2**	**2**	Main lecture
	Bibliography	**pdf, html page**	**-**		Additional material
	Quiz		**½**	**1**	Practice
	Exercise		**½**	**1**	Practice
	Assignment		**1**	**2**	Practice
	Interaction/ Communication	**Forum, chat, audio/ video conference**	**2**	**2**	Practice
	Evaluation	Quiz, exercise	(determined)	**½**	Assessment

Furthermore, the purpose of every module within the educational structure needs to be defined, so that the educational strategy is respected. Certain modules are aiming to provide the main lecture content to the learners, others serve as additional material motivating learners for further reading, such as relevant bibliography. Another type refers to the modules aiming to enable learners to practice. Practice can be achieved through various modules, such as exercises, assignments, interaction activities, quizzes. Finally, a module is dedicated to evaluation, through which assessment of the learning achievements is measured. The instructor can set the score that needs to be reached for the assessment to be considered successful, such as a percentage >=66%.

Table 2 depicts the definition of the compulsory modules for accreditation of the CME online course by the instructor. A set of metadata enclosing all the elements shown in the two tables would allow the instructor to define that for the awarding of 5 CME credits to the

learners, each learner would have to successfully complete through the e-learning platform 2 credits for the main lecture material, 1 credit for either the quiz or the exercise, 2 credits for the

Table 2. Accreditation attributes for compulsory modules of CME online courses

Course Topic	Modules	Instructional purpose	Validation	CME credits
Definition of learning objects Definition of learning outcomes	**Lecture notes**	**Main lecture**	**Compulsory**	2
	Bibliography	**Additional material**	**Optional**	
	Quiz	**Practice**	**1 out of 2 compulsory**	1
	Exercise	**Practice**		
	Assignment	**Practice**	**1 out of 2 compulsory**	2
	Interaction/ Communication	**Practice**		
	Evaluation	Assessment	Successful comletion compulsory (66% pass)	

completion of the assignment or for 2 hours of interaction activities, and the successful completion of the assessment. Using this framework, the learner has the freedom to choose between different modules, but also to complete all modules as practice material before attempting to go through the assessment.

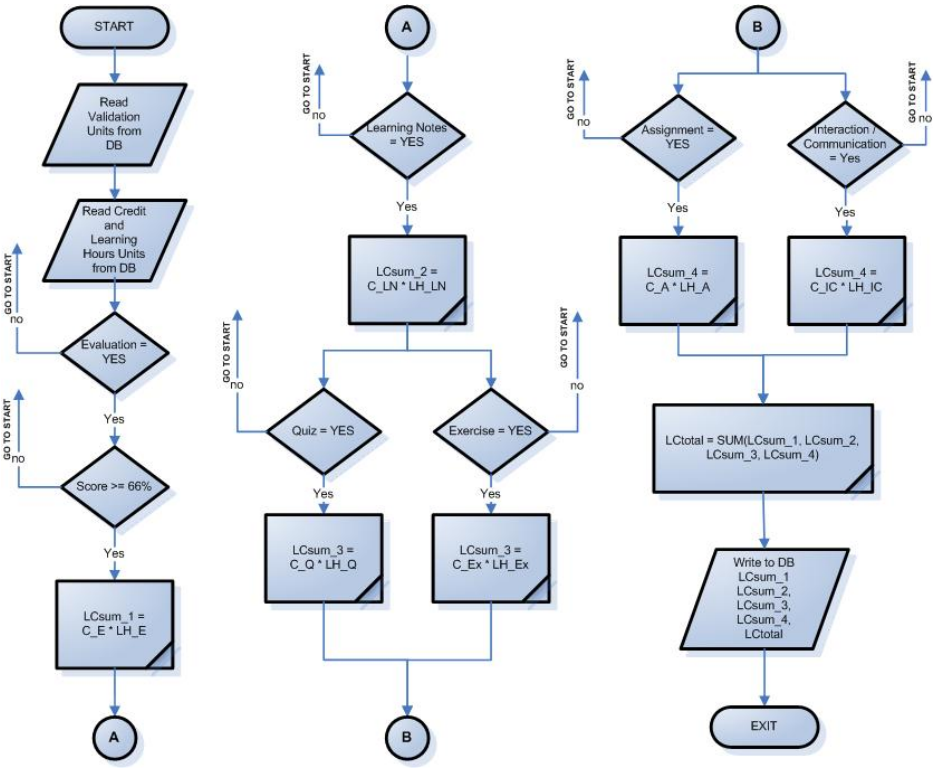

Figure 2. Assessment mechanism of the proposed framework

The flow chart in Figure 2 illustrates how the overall assessment of the completed course is made before an awarding certificate of a CME activity is issued. The system starts by checking if evaluation has been completed with a score at least equal to 66%. If yes, the first Learning Credit is allocated (LCsum_1) but if not, it cannot proceed with accreditation. It also checks (from point A to point B) if the Learning Notes section has been completed within a Time frame allocated for this scope. If it is completed successfully, Learning Credits are awarded (LCsum_2). Subsequently, the system requests information from the database using metadata

about the completion of the Quiz, the Exercise, the Assignment and Interaction activities. The total of Learning Credits (LCtotal) awarded allows the system to award the appropriate CME credits.

4. Discussion and future work

The framework presented herewith enables the providers of CME activities to design their instructional material with their own educational strategies and methods, giving at the same time the possibility to the accreditation authorities to assess the overall course and award the appropriate CME credits. A prototype of this research is currently being developed through moodle, a SCORM compliant open source e-learning platform, with the application of Learning Object Metadata (LTSC IEEE LOM). The IntraMEDnet and CrossBorderHealth projects currently running will serve as test-beds for this framework (cf ackowledgements). As soon as the metadata relations are established and SCORM specifications are expanded, the model will be able to serve other educational activities besides CME. Moreoever, an attempt is being made to align the proposed model with higher education requirements with the adoption of the European Credit Transfer and Accumulation System in distance learning.

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