

Using technology to deliver cost-effective Continuing Professional Development (CPD)

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ABSTRACT

The work is based on engineering the audio video contents of the didactic presentations at the Regional Symposium on Sleep Medicine delivered to the target audience at NAMSCON 2013. The audio was extracted and then synchronized with Power Points, re-synthesized as **SCORM (Sharable Content Object Reference Model)** compliant packages and integrated with Moodle (**Modular Object-Oriented Dynamic Learning Environment**) as Learning Management System (**LMS**). The preliminary evaluation results showed high satisfaction with the content, its short loading time and smooth playback. These attributes were demonstrated to be effective in enhancing learning. The Moodle as LMS also allows tracking the participants' progress, involving them in social groups and open discussion forum for further enriching the online content and also helps in statistical analysis through its inbuilt web analytics. The technology is not only flexible and economical but also a cost-effective delivery method for Continuing Professional Development Programmes.

INTRODUCTION

At the World Summit on Medical Education* held at Edinburgh in 1993, under the aegis of World Federation for Medical Education (WFME), several pertinent recommendations were made regarding Continuing Medical Education. It was emphasized that *'undergraduate medical education and postgraduate medical education, regardless of their duration, are insufficient to ensure life-long competency. Complex social, political, epidemiological and technological changes will always affect professional competence in unpredictable ways. Continuing Medical Education is essential to maintain the competency of new graduates, to influence the practice of older graduates, to remedy practice gaps, and to enable all doctors to respond to the challenges of the professional environment. The content of such educational programme must be responsive to the needs of the practitioners with both professional and public input. These programmes need thoughtful educational planning including objectives, strategies, skills, and assessment' (1).*

As a follow-up of the above mandate, Executive Council of the WFME published ** a Report on Continuing Professional Development (CPD) of Medical Doctors as a part of

WFME Global Standards for Quality Improvement. CPD mainly implies self-directed and practice-based learning activities rather than supervised training. As well as promoting personal professional development, CPD aims to maintain and develop competencies (knowledge, skills and attitudes) of the individual doctor, essential for meeting the changing needs of patients and the health care delivery system, responding to the new challenges from the scientific development in medicine, and meeting the evolving requirements of licensing bodies and society (2).

Schostaka J *et al* 2010 (3) based on their report to GMC, UK considered that CPD goes beyond what doctors do and that there is *"no single, singular or correct way of doing CPD"*. In organizational terms:

- flexibility is of vital importance in the development and provision of CPD, as are principles of justification and transparency. Active modes of learning, linking of CPD with learning needs analysis and integration of knowledge with everyday practice were major contributing factors to effective CPD.
- flexibility raised issues for assessing and accrediting and for recording CPD.
- the range of providers of CPD is extensive and diverse.
- the boundary between CPD and quality

* Prof. J.S. Bajaj attended the Summit Meeting as a Member of the WFME Executive Council in the capacity of President, South-East Asia Regional Association for Medical Education.

**Prof. J.S. Bajaj was Member of the WFME Executive Council which finalized and approved the Report on Continuing Professional Development in 2003.

assurance can be a grey area.

The multiple use and global standards for using internet were discussed by Ruggeri, Farrington and Brayne in 2013 (4). On the other hand recognizing the importance of Continuing Professional Development in dental education, Kavarella *et al* (2013) detailed the recommendation on development of *e*-modules for dental professional education (5).

The present study is an organized attempt to explore the feasibility of engineering the already prepared symposium content for an effective and economical delivery of academic content over the internet using Moodle as Learning Management System (LMS) and SCORM compliant modules produced by re-synthesizing the audio content and synchronizing with Power Point presentations of the course faculty.

BACKGROUND

All India Institute of Medical Sciences, Jodhpur hosted the 53rd Annual Conference of National Academy of Medical Sciences (India) from 25-27 October 2013. As part of the conference, a NAMS Regional Symposium on Sleep Medicine was held on 25th October. The symposium, chaired by Prof J S Bajaj and Prof V Mohan Kumar, was attended by about 200 medical students, Junior and Senior Residents, fellows and members of NAMS and faculty members of AIIMS, Jodhpur and Dr SN Medical College, Jodhpur. There was willing and

enthusiastic participation of medical students from 1st and 2nd year courses of MBBS. It was felt that topic was not only of contemporary relevance but was also a model for integrated teaching involving basic scientists, pharmacologists, clinicians and practitioners of relevant super specialities. Vision 2015 document of Medical Council of India envisages using integrated teaching, both vertical and horizontal, in all specialities and also optimal use of information technology to deliver it; the outcome of such efforts has not been encouraging so far.

The event of NAMS Symposium not only provided an opportunity to capture the presentations but also provided a framework along with a set of contents which can be tested and experimented with a variety of formats to constitute an effective tool of Continuing Professional Development. The value of live CME was evaluated and proved effective (6). It showed that a well planned educational activity with defined educational objectives delivered through content experts, under a conducive environment, provides high satisfaction to participants in gaining knowledge, improving skills and enhancing competencies. Such activities motivate participants and encourage them to seek additional educational programs and academic assignments for their self development. It was further shown that use of DVD of same academic program in the presence of a single resource person was equally effective and participants had shown similar, although not identical, level of satisfaction in all parameters

except they were less satisfied vis-a-vis *'organizers made use of any critical comments I made'* since all locally available resource persons were not present to clarify their doubts (unpublished observations).

AIMS

1. To seek alternative method and technology for delivery of contents of NAMS Sleep Medicine Symposium
2. To explore utility of web technology as a mode for effective delivery of academic content aimed at Continuing Professional Development.

METHODOLOGY

NAMS Regional Symposium on Sleep Medicine had 12 presentations from content experts dealing with selected aspects of sleep medicine along with 2 interactive problem based sessions. Arrangements had been made for audio-video recording of the whole event through High Definition (HD) twin positioned cameras along with a AV Mixer receiving feeds from both cameras as well as from PowerPoint. The mixing equipment was used to produce real time video output. The same AV clips were further edited for enhancing content effectiveness and were uploaded to the NAMSCON website and are presently installed there permanently.

With the increasing use of computer and information technology, systems and learning theories have been formulated for web-based learning. Such

a web-based delivery method has been used in the present study. It has been unequivocally demonstrated that learning management system with web-based technology can provide a great variety of features and is capable of harnessing fully academic courses/assignments, provided pedagogical principles are followed. Prima facie, these appear to be rather inexpensive and effective but their application remains mostly limited in terms of technical design and therefore at times appears more costly. Moreover, considerations such as cost of student time, internet availability and its usage are seldom taken into account. Using multimedia over internet requires technical expertise. The video files are quite large and they require streaming server (as provided by the YouTube) instead of web server to play.

From the raw video captured at the Sleep symposium, the audio were separated by VLC player and were then synchronized with Power Point presentations using trial version of iSpring pro, an add-in to Microsoft Power Point. It has options for integrating with Learning Management System (LMS) which can be quite complex. As described, the LMS are web-based software application platforms used to plan, implement, and assess learning processes related to online and offline training administration and performance management. LMS allows an instructor to create and deliver content, monitor learners' participation, and assess student performance. LMS also allow learners to use interactive features such as threaded

discussions, web conferencing, discussion forums, and other methods of communication.

The multimedia content should also be compliant to SCORM, which is a set of specifications that, when applied to course content, produces small, reusable e-Learning objects. A result of the Department of Defense's Advanced Distributed Learning (ADL) initiative, SCORM-compliant courseware elements are easily merged with other compliant elements to produce a highly modular repository of training materials.

We used the SCORM 4 packaging to produce the multimedia contents. For LMS we selected Moodle which is open source LMS software and is highly customizable and is mostly useful to programmers and education theorists. It was installed on the personal website of KS for experimentation (drkuldeep.org/namscon). The installation though easy, nevertheless, the configuration requires extensive study of documentation. Plugins were installed for multimedia contents and its use over mobile phones/smartphones. After initial registration, user can operate the account for learning at his/her own pace.

Evaluation was based on structured questionnaire, telephonic interviews, personal discussion and focused group interview with students, residents and faculty.

RESULTS

The *ad hoc* results are based on pilot testing with 10 registered users. It is still ongoing and expected to obtain additional responses. In the initial phase, there were 3 females and 7 males as the participants. All participants showed satisfactions with the technology (100%). They did not encounter any problem with registration, logging in, content loading and use of navigation buttons. Since the media player was customizable in size, they did not face any problem while viewing in a web browser of their choice. They were able to play it forward and backward without much time lag. They also liked the web interface and flexibility to choose options for open discussion forum. 20 % faced some problem with their player. On interrogation the errors were due to java virtual machine (JVM) and were rectified on reloading the java program.

As can also be seen from **Table 1**, the cost of the present method is just half the cost of CD based and just 1/20th of cost of DVD based educational program with a single resource person. The technology thus could be relatively inexpensive when the cost is compared to that of organizing a live symposium. However, the most advantageous aspect of this CME would have been live interaction which is face to face. This conforms to the adult learning principles also since learning is maximum when the query is satisfied and feedback is provided immediately. Nevertheless the web based system can also be customized similarly to

provide early feedback.

Although considerable knowledge as gained about the Moodle, its flexibility and customizing ability, the awareness of its capability to integrate with portfolio development using Mahara Open source software was also demonstrated. In this

way, students can also demonstrate their learning to peers and can also control the level of their exposure to assessment system. They may allow full accessibility to their mentor, teacher and guide and limited power to their colleagues as per their desire or Institutional regulations (7).

Table 1: Cost of various mode of delivery utilized on framework of NAMS symposium

SI No	Method	Cost	Remarks
1	Live*	Rs 1,25,714	Included expert's travel & stay, resource material development, video recording
2	Recorded DVD with a single expert as a resource person*	Rs 72005	Included single resource person's travel, stay, printing etc. Require DVD player and heavy usage of RAM.
3	CDs with Power point presentations with video script**	Rs 7600	Burning presentations on CD and postal dispatch. Require CD Player and use memory
4	Web based using Open Source Learning Management system (LMS) like MOODLE which is SCORM (Sharable Content Object Reference Model) compliant (The present study)	Rs 3500	Only require internet and web browser. Can work even with slow internet connection and on mobile phones also

Note: Source *: Unpublished observation on *“To Assess Comparative Effectiveness of a model CME Program using validated non-print methods for Medical Education”*
 ** Unpublished observation on *“Evaluation of the Learning Resource Material based CME on CD”*

In addition, options 1 and 2 are time-selected and available to finite number of participants for a limited time, whereas options 3 & 4 were available anytime and to infinite number of participants forever.

Table 2: Focused Group Discussion

Theme	Responses
Utility of method for CPD	Supplement new areas not usually touched in conventional teaching.
Self-directed learning	Best for highly motivated. For others constant guidance, reminders, mailers will be needed. It will also depend on our need and topics. We can use portfolio often if it provide incentive- grades, scores or prizes
Role of faculty in this module	Increased from content expert to a guide/mentor
Suggestion for improvement	Extra text in few presentations needs to be reduced since same information is there in audio form. Topics should be more focused and short. Level of difficulty should be included.

DISCUSSION:

With advent of web technology many methods have emerged for the delivery of content over internet (8, 9). These include Adaptive and intelligent Web-based educational systems (AIWES) which aim at providing learners with an environment that reacts intelligently to the learners' needs. The term adaptive refers to the functionality of the system to automatically provide different suggestions, courses, or activities to learners with different characteristics and needs. The term intelligent means that a system uses artificial intelligence techniques in order to support learners or identify their characteristics, needs, and situation (10).

As early as 1980, Keegan (11) described 'Distance education' as instructional activity having separation between educator and learner, process being intermediated by an educational institution. The technology utilized for transferring knowledge with a two way communication between teacher and learner. E-learning (as well as online learning, virtual learning, computer-assisted learning, web-based learning, etc.) is a method of distance education that utilizes electronic and/or technological resources for delivering the educational materials. The prefixes e-, web-, etc. define the means or the tools for transferring information and not the pedagogical principles or the learning outcome. On the part of content designer it calls for application of sound pedagogical principles. If optimally harnessed, e-

learning in the health sciences, particularly for continuing education, can be valuable and offers several advantages over traditional face-to-face teaching. These include the following: flexibility in time and place; adaptation to individual needs; presentation of procedures in different formats; the possibility for interaction and communication at a moment that is relevant for the learner; adaptation of learning materials across countries; and the ease of keeping the material up to date. Based on their project based on systematic review of literature, Childs explored the barriers to e-learning for health professionals and students (12). Barriers to the successful implementation of e-learning include the following: (i) barriers related to the development and provision of e-learning material, such as the initial costs for course development, poor design packages, inadequate technology, resistance to change, need for face-to-face contact, unrealistic time frames, outdated material; and (ii) barriers related to learners participation, such as the alienation, lack of relevant skills, excessive workload and lack of support. They also suggested solutions to these barriers. These barriers may be overcome by more structured strategies and targeted interventions by the organizing institution (5). The face-to-face contact is an important aspect of health professional education with regards to practical procedures. Therefore, rather than having excessive reliance on e-module, the program designer should concentrate on learner's need. Moodle is the most often used open source LMS used for education worldwide. Another open source Learning

Management System, ATutor has also been used successfully in medical education by professionals from Teheran, Iran (13). The Moodle has also been used for teaching ethics by Halkoaho A (14).

While the debate still continues regarding comparative cost analysis while calculating the actual cost of CPD, the need and utility of these programs remains undoubted (15).

CONTRIBUTORS:

1. Dr Kuldeep Singh conceived the idea, explored the avenues for cost-effective delivery of NAMS Regional Symposium on Sleep Medicine, created his own web space, engineered the content of symposium for its online delivery using various softwares, choosing Moodle as Learning Management system (LMS) and customizing sufficiently to optimize delivery in order to preserve the pedagogical principles and exploiting adult learning theories for individual learning. He also conducted the study to find out the utility of the technology in cost-effective Continuing Professional Development among his colleagues and students

2. Prof J S Bajaj gave guidance on learning objectives for program development, use of data of NAMS Regional Symposium on Sleep Medicine for variety of modes including uploading as YouTube files, recording on DVD, resource material use in CD format for seeking its use as an integrated module. He provided evaluation methodology and

the method of calculation of satisfaction index for program evaluation. Finally, he reviewed the content and participated in writing of the final manuscript.

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