Using a Digital Knowledge Repository to Personalise Learning in Medical Education: A Follow-up Report to TeL2013

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Extended Abstract

Introduction

Technology-enhanced learning (TEL) offers educators the opportunity to personalise learning in medical education, through harnessing its potential to enable the continuum of undergraduate, postgraduate and continuing professional development or lifelong learning. TEL offers students access to educational materials and personal choice by showing what is available (which allows a student to sample, explore, and consume educational content to match their individual learning preferences and requirements, at a time and place of the learner’s choosing). For educators, digital scholarship provides a method to publicly document teaching and educational activity, to facilitate evaluation of the quantity and quality of these educational activities; and allows peers to critique and build on educational initiatives. Why then is the potential of TEL not more fully realised in day to day teaching? This paper will explore these issues through the use of four educational case studies—1) in undergraduate radiology teaching at the Yong Loo Lin School of Medicine (YLLSoM); 2) postgraduate radiology training (CaseBasedLearning@NUHS) in the Department of Diagnostic Radiology at the National University Hospital, Singapore; 3) the Learning@NUHS initiative to create and utilise a clinical case and knowledge repository to facilitate undergraduate, support postgraduate, and promote lifelong learning at the National University Health System, Singapore; and lastly 4) in faculty development activities locally and regionally through the Medical Education Unit (MEU), NUS and internationally through the Association of Medical Education in Europe (AMEE) eLearning committee.

Main Section

As a clinician educator in radiology, over the last 20 years, I have been and currently am involved in monthly teaching activities with undergraduates (lectures~300 students, small group tutorials~20 students), postgraduates (lectures~up to 30 residents from different institutions, small group tutorials~12 residents, and individual supervised clinical training for residents and clinical fellows), as well as wider faculty development both locally, regionally and internationally in clinical radiology (up to 50

participants); and faculty development in medical education (large group presentations–up to several hundred, workshops and small group presentations–up to 50 participants). As both a teacher as well as a course and programme developer, I have developed a deeper appreciation and understanding of the great strength of the educational approach which utilises deliberate practice with a broad spectrum of examples (in online and digital mobile formats) used in training for expert performance and mastery (Anders Ericsson, 2004; Anders Ericsson, Krampe & Tesch-Romer, 1993), and of the challenges that individual teachers and students face in using TEL in these settings (Mason, et al., 2014).

Over the last five years, these educational activities have increasingly and now exclusively utilise over 5000 online hyperlinked indexed (anonymised) radiology and clinical cases, and over 5000 curated hyperlinked and indexed online educational resources including clinical guidelines, topic reviews and scientific papers accessible via a digital knowledge repository. These educational resources are presented via thematic websites and blogs, with student and faculty engagement promoted via SMS and email contact, with substantial discussion and elaboration occurring face-to-face and online via topic- and theme-based blogs. The great advantage of using such a digital knowledge repository is the possibility of personalised content selection and usage, by both faculty and students, very similar to a restaurant analogy (see Figure 1).

![Figure 1. Personalised content selection and usage using a digital knowledge repository illustrated with a “restaurant” analogy. Taking the analogy further by using that of a “grocery”, faculty get additional access to the “raw ingredients”, an index of “reusable digital objects”, e.g. key diagrams, illustrations, tables and take home points.](Image)

( CPD–continuing professional development; CME –continuing medical education)

In the last two and a half years, these websites and blogs have generated over 125,000 page views. For lecture-based undergraduate teaching, Google Analytics and SlideShare Analytics reports have shown page views equivalent to class size (300 students), in the 24-hour period just before and just after each large group lecture, with downloads of the teaching material equivalent to the class size (300 students) during/just after each lecture, and in the weeks just before the semester exams. For postgraduate residency small group teaching, documentation of clinical performance and sharing of teaching points for whole cohorts has been achieved over the last 12 months via a combination of SMS notifications of a series of unknown cases to review immediately prior to a face-to-face teaching session, email submission by all residents of short answers and justification for each clinical radiological image diagnostic problem (all 12 residents, including those on leave and on rest session post-night shift), face-to-face discussion and feedback followed by dissemination of tutorial notes,
case answers and illustrations via a topic-based blog (CaseBasedLearning@NUHS). For sharing of wider clinical (anonymised) case-based teaching resources, including key learning points, together with created and curated educational content, the Learning@NUHS initiative over the last 12 months has involved an increasing number of departmental early adopters (9 out of 21 clinical departments/clinical divisions in NUHS). It uses a common NUS SharePoint site coupled with Google Analytics reports to evaluate the volume of educational activity as well as the quality of content by the number of content “citations” via hyperlinking/recommending, and frequency of digital downloads. Wider faculty development education activities with the MEU in NUS and the AMEE eLearning committee through the systematic use of blogs to share educational material, as well as promote and document engagement with students over the last 2 years have shown exponentially increasing page views (over 25,000 to date), as well as adoption by other educators in MEU and the AMEE eLearning committee as a key feature of the regular bimonthly faculty development workshops run by the MEU, and an annual scientific meeting of AMEE.

Apart from page views, hyperlinking and downloads, what is the evidence for student and resident engagement with the educational material and learning process? For undergraduate large group lectures, lecture halls have been full despite having educational content provided before the lecture. For resident teaching, attendance and engagement has also been full and enthusiastic. The attention paid by undergraduates and postgraduates to the educational content, and their engagement with the educational process can be viewed “live” in large and small group teaching settings, and also monitored online via Google and SlideShare Analytics. Qualitative feedback by undergraduates and postgraduates, as well as faculty have been also positive. The digital learning and engagement process also allows assessment and evaluation of actual learning, and documents the learning process and outcomes. This will be elaborated upon further in the oral presentation of this paper.

What are some of the difficulties encountered by students and staff members in using this approach? One common and major obstacle I have found through personal observation and working in faculty development at the local, regional and international level, and highlighted in the case studies, has been the much greater demands placed on staff for pre-class preparation. However, this can be reduced significantly on aggregate by focusing efforts to create and curate a digital indexed hyperlinked knowledge repository, which reflects what is actually taught and what is assessed. A greater initial effort to create and curate educational material in digital format at its most granular, reusable form facilitates subsequent use and reuse of this material easily by both students and faculty, especially when this material is visible and accessible via a digital knowledge repository.

Conclusion

Our experience using a digital knowledge repository in medical education, illustrated in four case studies, has demonstrated the utility and feasibility of this approach to use technology to support and enhance learning, as well as promote digital scholarship. The evidence for this is the exponentially increasing viewership (online page views) of this repository by students and fellow teachers; increased documentation and visibility of actual student learning; as well as adoption of the digital process and platform by fellow educators correlating directly with the amount of content, the quality of the content, together with degree of awareness of and integration of this content into a curricular and pedagogical framework. Difficulties in using this approach on a wider scale can be progressively overcome with increasing faculty awareness, training and institutional support; as well as through
experimentation, and gradually developing expertise and confidence among educators as digital scholars.

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References


