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Thomas MENKHOFF
Singapore Management University, thomasm@smu.edu.sg

Yue Kee WONG
Singapore Management University, ykwong@smu.edu.sg

Tze Yian THANG
Singapore Management University, tythang@smu.edu.sg

Donata Ty Edgardo

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Thomas MENKHOFF
Practice Associate Professor of Organizational Behavior
Lee Kong Chian School of Business
Singapore Management University
50 Stamford Road #05-01, Singapore 178899

Yue Kee WONG
Practice Associate Professor of Information Systems
Centre for Teaching and Learning
Singapore Management University
70 Stamford Road #05-22, Singapore 178901

Tze Yian THANG
Senior Manager
Centre for Teaching and Learning
Singapore Management University
70 Stamford Road #05-22, Singapore 178901

and

Edgardo Donato TY
Content Producer
Centre for Teaching and Learning
Singapore Management University
70 Stamford Road #05-22, Singapore 178901

ABSTRACT

In 2005, the authors of this essay led the development and launch of SMU's (Singapore Management University) first e-learning package on 'Knowledge Management'. This package has been integrated into the overall teaching strategy, thereby fulfilling the University's mission to be "committed to an interactive, participative and technologically-enabled learning experience"

Since its inception in 2000, SMU's educational and administrative practices are modelled after American institutions, in particular the Wharton School of the University of Pennsylvania. To support SMU's unique pedagogy, wireless technology for mobile computing is a central feature at SMU.

Against this background, the paper presents a self-critical and reflective case study of the roll out of an innovative e-learning module blended into a 'Knowledge Management' (KM) course. In the paper, we

- share the rationale behind the design features of the module and the implementation platform;
- describe the effort to blend the module into the teaching of the KM course and
- provide a critical impact assessment of the module based on students' feedback and evaluation results.

Keywords: blended learning, design rationales, student feedback, evaluation

1. BACKGROUND

Course information

SMU offers a Knowledge Management course (elective) for undergraduate students aimed at exploring the on-going shift towards a knowledge society/economy, the theoretical and empirical origins, definitions and domains of knowledge management (KM), its use and practical implications in terms of human resource management [10].

SMU's KM course attempts to provide learners with answers to the following core question: Which forms of creating and utilizing knowledge can enable both individuals and organisations to transform learning and innovative capabilities into key competencies? The course focuses on both the theoretical and applied literature on knowledge-based society/economy, knowledge work(ers) and knowledge management.

To achieve the various learning objectives, students are requested to analyse several case studies aimed at appreciating the challenges managers experienced who tried to find answers to the issues raised above as well as to outline the benefits and consequences of 'good' KM. They also have to conduct their own empirical research on KM applications in local or foreign organizations.

To realize the goal of a shared learning experience between students and instructor, the course is aimed at integrating actual KM problems, practical KM experiences, problem-based interaction with practicing KM consultants (if available), individual/group projects, and critical reflection on the various course materials. About one third of the course is delivered in an e-learning format ([1] [2] [3].

Collaboration with the Centre for Teaching and Learning (CTL)

SMU's Centre for Teaching and Learning is tasked to initiate, promote and support innovations and transformations in teaching and learning. It achieves this through the application of innovative teaching methods and the use of the most current but well-tested information and communication technologies.

In 2005, faculty members were invited to submit content project proposals. Proposals that were successful would receive funding and project management support from CTL. The types of projects received and accepted ranged from multimedia courseware to videos to simple games and applications. The proposal submitted by Professor Thomas Menkhoff was one of them.

Evaluation studies were conducted for every project that was successfully completed and delivered. Some were used for self-paced learning or as review materials for the students while others were integrated into the classroom delivery to generate further discussions and reflections.

The e-learning module for the KM course featured in this paper was designed to be a mix of self-learning followed by assignments to be submitted. There are a total of 6 e-learning units to be delivered over 6 weeks during the semester.

The final product is the result of team effort that consists of seven persons: one CTL staff as the Project Manager, the instructor as the Subject Matter Expert, one student research assistant and four external consultants and developers.

2. DESIGN CONSIDERATIONS

Content Structure

As most of the content comprises text and static images, the project team had to find a way to find the correct blend of text, graphics, animation, sound, and video [6] [7] [8] [13].

The e-learning package comprises 8 modules (6 learning modules and 2 assessment modules altogether). Each assessment module covers the content of 3 modules. The total e-learning content duration is estimated to be about 360 minutes (6 hours), which includes interactive activities like short review questions within each sub-topic.

The target learners are undergraduate students in the 20 to 25 age group, a generation raised in the Internet milieu and expected visual cues and online communications to be the norm. In order to meet the target learners' profile and needs, the courseware makes use of relevant photo-realistic images to describe concepts and present factual data. Information is being organized into smaller and manageable 'chunks' to make it easier for the learners to digest.

This courseware design requires the learner to complete all the sub-topics within each topic, but not necessarily in any specific sequence. Learners with no prior knowledge are strongly encouraged to follow the recommended sequence. However, to provide focus, the topics are released linearly, one at a time, so that everyone is in synch with each other. This is done through the selective release feature of the learning management system (LMS). Features include:

Review Questions at the end of each sub-topic – These objective-based quizzes are designed to reinforce learning and not to test the learners. Thus there are plenty of hints and feedback given. Although quiz results can be tracked in an external database, this feature is not a requirement for this courseware.

Assessment - There are 2 assessment modules to help students self-assessed if they have accomplished the objectives of the course. Assessment 1 covers the content from topic 1 to 3, and Assessment 2 covers the content from topic 4 to 6. Assessments are controlled and released individually by the faculty. However there is no requirement for these assessment results to be tracked even though it is possible to capture them in an external database.

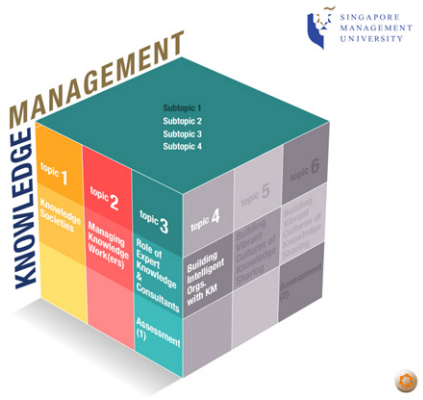
Online resources – End of topic summaries, case studies, case study links in each topic and additional online articles are supplementary materials that students can use for their assignments.

Interface design

One of the challenges that the project team faced was how to design and present the menu and navigation to the students in a fresh and engaging way without overwhelming them.

The project team decided that the main menu should be as dynamic and visually enticing as possible to catch the students' attention but not overly animated to prevent distraction.

After pondering about various different menu designs, the project team finally adopted a cube menu as it offers a clean interface with minimal user-action to view all the topics at one go.



When a new learner first enters the Main Menu, all available topics titles are shown in white against a grey background. Grey background indicates unvisited state. If a topic is not yet been released to the learner, the topic title text will be dimmed.

When learners mouse over each topic, the sub-topics will be shown on the top face of the cube. Clicking on any of the sub-topic will result in its launch. When a sub-topic is fully completed, the subtopic title will change from white to the respective colour scheme of the topic (e.g. topic 3, sub-topic 1)

Instructional design

A sample page in the e-learning module is shown above. Standard features of a traditional courseware have been incorporated, including the Back and Forward navigation control, Page Indicator, Help, Glossary, Site Map, Audio on/off control, Narrative replay and anytime Exit.

However, the following are some features that have greatly enhanced the user experience:

(1) Degree of Importance – The 3 cubes beside a piece of article or information can highlight to the learners the degree of its importance relative to the topic being studied. The number of cubes coloured ranges from none to three and signifies the progressive importance of that piece of article or information.

(2) Printing of contents – By clicking on the 'Lesson Outline' button, which is located in the last page of each sub-topic, the learner is allowed to print the entire text content of a sub-topic via PDF file upon completion. This facilitates note-taking and the review of contents without having to go online.

(3) Single sign-on via learning management system (WebCT Vista) – The courseware can be uploaded into Vista. So all students enrolled for the KM course will have access to this courseware without the need for additional login information.

(4) Standard compliance– The KM courseware is SCORM 1.2 RTE 1 standard compliant. This means that tracking can be achieved if implemented in a SCORM compliant learning management system like WebCT Vista. Unfortunately, implementation within the platform has not been straightforward. Nevertheless, after much study, we are able to use Vista's student data and values from the SCORM table to construct Progress Map for individual learners. This map keeps each learner motivated as they can keep track of their learning progress down to sub-topic levels.

(5) Bookmark – Similarly by drawing information from a SCORM variable, a learner taking the course will automatically be prompted to resume from the first page of the last visited sub topic upon revisiting the courseware. The learner, however, is free to resume or restart from any sub topic available.

3. EVALUATION & ANALYSIS OF STUDENT FEEDBACK

Both quantitative and qualitative surveys were conducted to evaluate CTL's e-Learning module (ELM). Below are summaries of the students' feedback, giving us useful insights into the strengths and weaknesses of SMU's first ELM on knowledge management. This gives us opportunities to further improve on the design of all our e-learning packages. While there are good suggestions made to improve the module, the benefits have to be weighed against the costs and efforts required. We will clarify any technical limitations as well as highlight the tools that are already available within Vista for learners to use.

Strengths of the ELM

Flexibility: Since students can access the module any time anywhere, they relish this flexibility and are independent in structuring their learning activities instead of being bounded by a rigid classroom schedule. Students also reported that they felt more responsible for their own learning.

E-Content: Students pointed out that with electronic content, definitions of unfamiliar terms are easily available due to the inbuilt glossary enabling them to find out the meanings very quickly. Students reported that the use of multimedia elements like narration, videos, animations and pictures in addition to the text made learning and recall of content easier, implying a more engaging learning experience.

The interface and graphical design of ELM was described as "beautiful" and "unexpectedly interesting".

Structure: The organisation and structural elements of the ELM were perceived as conducive for learning especially the user-friendly sitemap. It has helped them in their revisions as they could go to any part of the ELM that contained the information they wanted.

The students appreciated the review mechanism that has helped them to monitor their own learning progress. Students also assessed case studies, case study links in each topic and the additional online articles positively. ELM related videos were also seen as value added features.

Tracking of progress: The system 'remembers' where learners leave off, and helps them to return to that particular slide when they have re-logged in. Students felt that this reduced the inconvenience of remembering and then navigating to where they had last left the ELM.

Weaknesses of the ELM Addressed

Progress monitoring: Evaluation data suggest that without appropriate guidelines or tracking of progress some students might lack the self-discipline to go online while some learners just click through the pages so as to get to the end of each topic quickly.

(1) Tracking of Progress - It was suggested that the module should track the scores for review and quiz questions, and the rate at which the users are going through the topics. Respective reports should be sent to the instructor automatically on a weekly basis to enable him/her to monitor learners' progress, identify potential issues and questions that might need class discussion. CTL is currently working on a tracking application that can be added onto SCORM compliant e-learning modules and will satisfy this requirement.

(2) Since the progress of each student is tracked, they should not be expected to answer the review questions after the first time they cover the topic, which would waste their time. This will facilitate the students in reviewing the topic quickly the subsequent times they revisit a topic. Together with data captured in an external database, the tracking application can offer learners an option of whether they want to redo the review quizzes.

E-content: The key e-content issue was that it lacked two-way interaction. This had impacted learning in some negative ways. Doubts could not be cleared immediately if students did not fully understand the given explanations. Other issues concern the coverage of main content and supplemental resources as well as the ingestion of some fun elements.

(1) Communication and Collaboration - Students have requested for communication facilities to be integrated into the ELM itself so that users can interact with each other conveniently and in real time if they are online. They would also like to upload their assignments onto the system to be shared with their peers. CTL has assessed that both commercial tools like MSN Messenger and SKYPE as well as the chat tool, discussion forum and Assignment Submission tool in Vista are sufficient and readily accessible to meet this requirement. Moreover, the development effort is costly and not easy to maintain.

(2) Glossary – Students would like the glossary to be as comprehensive as possible so that key terms and abbreviations are fully explained within the ELM itself. It was also criticized that there were too many abbreviations which were not immediately explained. It has been suggested that the ELM provides links directly for the explanation/definition of each term as they appear. Providing such links has been done before by CTL in other e-learning modules and can be an invaluable feature in addition to a more comprehensive glossary.

(3) Content coverage - Students felt that the coverage of some topics was not in-depth enough. We felt that the sufficiency of the contents really depends on whether the materials are supposed to be supplemental or replacement. If it is designed for the former, then it is important for the instructor to follow up the ELM with extra contents and learning activities in class to complete the learning.

(4) Fun and competition in learning - There were also suggestions to make the quizzes more competitive and motivating by employing a 'game style' in which students get gems or points whenever they answer the questions correctly, and giving a prize to the person with the highest score at the end of the course. Some users stressed that quizzes should be graded so that more thought and effort are put into answering quiz questions. Finally, sounds of applause or other multimedia applications could be activated every time a correct answer is given to motivate students. CTL can certainly consider the creation of small games to inject some fun in their learning. However, tracking will be required to store their scores and grades. With complex games that require online competition, a lot more resources would be required and may not offer a lot of learning value in return.

Structure: The manner with which content is chunked, sequenced and accessed by the users plays an important part in their online learning experience.

(1) Faster page access - While the sitemap was perceived as accessible and easy to use, some users reported that actual navigation to the pages that they wanted to access was "cumbersome", requiring (too) many clicks before reaching them. So, students suggested that the ELM could use a bookmark style of navigation so that they can assess (with one click) any page immediately instead of going through the main page. For now, CTL relied on the SCORM variable to capture where the user

last left the courseware so that he could resume whenever he comes back. The progress map also has useful "bookmarks" to let the user know how much he has covered for each sub-topic. A bookmark feature as proposed by the students will require additional programming effort.

(2) Feedback - While the review questions and case study questions were seen as useful, many users highlighted that more detailed explanations could have been given in cases where questions had been answered wrongly since no one is around to clarify their queries.

(3) Too many clicks - Comments with regard to the ELM case studies and links suggest that there needs to be a refinement on how these items are presented. Users highlighted that pop-ups showing certain instructions and links were at times pointing to blank assignments. The fact that links and case studies opened in another window was also perceived as problematic. Several students felt that they find the hassle of clicking on many different icons discouraging. CTL acknowledge that improvements can be made in this area.

Technical Problems: Many of the technical problems encountered were related to Vista as the ELM is launched through the platform. However, they can be resolved mostly through the proper installation of the necessary environment variables for the ELM to operate.

(1) The system made use of a SCORM variable to remember where the user had logged off and to return the user to the same page on the next login. However, if users accidentally closed the main LMS window, this would result in the whole session not being recorded at all. Consequently, the user had to start all over again when he returned. To prevent this from happening, users were prompted with a message to confirm if they really wanted to leave without the session being recorded. Although this was seen as "very inconvenient", this is the next best measure.

(2) Students pointed out that the login procedure into Vista was very difficult to follow. To improve the user experience, an installation wizard was perceived as very necessary with clear instructions so that users do not need to fret about login problems at all. CTL noticed that the problem prevailed mostly with first time users of Vista. Hence user training, user guide and installation demos are all helpful suggestions.

Threats

One danger of the ELM is that it might create the impression that classroom teaching is redundant. This might cause some students to miss classes. Since the KM ELM is only a supplement to classroom teaching and discussions, there should be a thorough integration between what is learnt online and what is discussed in class. It is important that there is sufficient time for the discussion of (online) case studies and clarification of ELM issues in class to ensure effective knowledge transfer between instructor, students and peers [15] [16] [17] [18].

As stated earlier, the ELM is weak when it comes to social interaction between users and instructor. Some courses are unsuitable to be taught via the ELM since they require hands-on work, while some other courses require a face-to-face environment where individuals can share their opinions and experiences on certain issues. Hence, even with the introduction of fora, chatting facilities, and other online collaborative technologies, the ELM can only provide limited interaction.

There is also the danger that some media might not be sufficiently comprehensive or relevant to illustrate the desired knowledge; in other instances, they might contain too much detail and consume too much time. Hence, e-content has to be carefully chosen for maximum learning impact.

4. CONCLUSIONS

As the students' evaluation indicates, there is room for improvement with regard to some of the design features of the ELM as well as the pedagogical approach used to impart KM related skills and competencies online. As one course participant stressed in her course evaluation paper, course-related online games and graded knowledge tests represent critical features of attractive and sustainable e-learning modules in the local context of Singapore something which the 'foreign' instructor did not really anticipate during the development stage of the module as reflected in the paper's title. Our findings echo results of an empirical study conducted by other e-learning researchers who found out that students are strongly influenced by perceived performance consequences when it comes to assessing the benefits of online tools [8] [14] [19]. Adequate technical support, prior experience in using computers and the Web as well as instructors' knowledge of student reactions to innovative learning technologies turned out to be important variables influencing their (positive) perceptions.

E-learning is a mean to an end which is to enable learners to appreciate concepts and/or do certain things in line with curricular premises. As some analysts have stressed, "the tools have change[d], the job hasn't" [4]. In assessing students' competencies, for example, the expected learning outcomes need to be assessed rather than proficiency and frequency in/of utilizing online tools such as bulletin boards, online discussion groups, blogs or wikis. If educational needs warrant it, e-learning can add substantial value to learning processes. To add value and substance to e-learning, it is important that e-learning researchers and instructors shed more light on the theoretical underpinnings of their respective online initiatives and that they are open when it comes to criticizing this new technology. As Nichols (2003) has stressed, "We must research to establish theory not evaluation, principles not practices, pedagogies not applications. Only then will a literature base be developed that can be applied across multiple institutions and education settings" [12]. Besides more localized research on effective e-learning approaches in Asian contexts [10], greater emphasis has to be put on equipping instructors who are interested in utilizing e-learning frameworks with respective up-to-date

online teaching and learning skills to ensure sustainability of ELM initiatives.

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