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THE INTRODUCTION OF ON-LINE LEARNING TO INSERVICE TRAINING IN CLIMATOLOGY

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Abstract: The discussion in this paper is based on the online delivery of selected sections of a Climatology Inservice Course conducted at the NIE, Singapore. The various considerations taken while designing the online course are discussed. In particular, the allowance for self-paced access, reduction in travelling time, visualisation facilitated learning, constantly updated course materials, quizzes tailored based on learners' progress and the resource-rich nature of the World Wide Web (WWW) are among some of the considerations. Some problems that were experienced during and resulting from the implementation and delivery of the online course are discussed and recommendations have been made to rectify these problems for future runs of the course. For example, the prerequisite that course participants have basic WWW navigation skills is insufficient as many learners do not even know how to archive the information on the web-pages. As a result, more specific guidelines as to what constitute prerequisite skills will be outlined in addition to a mandatory orientation lesson. Examples from this experience may be used as a reference for other online inservice courses.

Introduction

Teachers are normally involved in a number of other activities apart from teaching in the classroom, such as lesson preparation, marking and reviewing of students' work and administration. These activities present a spatial as well as temporal constrain on attending inservice training courses conducted outside of their school. The inservice teacher training course "Teaching Selected Aspects of Climatology for Geography Teachers (Secondary)", XSS227-5 has been run under a lecture-tutorial manner for the past few years by the second author. It has been felt that some aspects of this course could be mounted on the World-wide Web (WWW) since the delivery of some material is highly presentational. In addition to reducing the inconvenience of travelling and the autonomy to access materials at one's own pace, the WWW also provides a "*simple, familiar interface by which the students and educators ... can access and use*" (McCormack and Jones, 1998: 1). However, the WWW still cannot replace the face-to-face requirements of some aspects of the course. For example, discussion and sharing of effective pedagogies in selected aspects of Climatology include the use of tactile as well as motion-based strategies, which cannot be represented easily in an electronic medium.

Why WWW?

Learning arises from a constructive process of reflection on the material provided and *interacting* with it (Farnham-Diggory, 1990). Indeed "[k]nowledge is not merely a collection of facts" or even a recollection of facts. "*Although we may be able to memorise isolated undigested facts for a short while at least, meaningful learning demands that we internalise the information: we break it down, digest it and locate it in our pre-existing, highly complex web of interconnected knowledge and ideas, building fresh links and restructuring old ones.*" (Megarry, 1989:50) Although some material to be mounted on the WWW is highly presentational, the resulting web-pages need not be mere electronic manifestations of information. Interactive web-based learning supplements the classroom learning experience by providing "*an interactive environment similar to the classroom but with*

more attention to individual students needs" (McIntyre and Wolff, 1998: 257). Indeed, the web is capable of providing "*rapid, compelling interaction and feedback*" to the student (McIntyre and Wolff, 1998: 257). Among some of the advantages of using the WWW as a mode of delivery are the allowance for self-paced access and learning, reduction in travelling time, visualisation facilitated learning, constantly updated course materials, quizzes tailored based on learners' progress and the resource-rich nature of the WWW.

Implementation

The implementation of the on-line learning component can be summarised by the following stages:

Stage 1: Courseware Specification

- Target audience is secondary school Geography teachers who have basic WWW navigation skills and who aspire to further their knowledge in selected aspects of Climatology and to enhance the teaching of these selected topics.
- On-line course materials provide the content knowledge base which then acts as material for face-to-face class discussions and bulletin board discussions.
- The on-line courseware is managed by WBT Systems' TopClass© residing on the School of Arts server. Access to courseware is through the World Wide Web for registered users with valid usernames and passwords.

Stage 2: Scope of Course

- To enhance the content knowledge and to share and hence enhance teaching strategies of selected topics in Climatology.
- Delivery of content knowledge is mostly presentational with visual aid (graphics and animations) and some degree of interactivity (navigational features).

Stage 3: Resource Summary (specification of all activities that consume resources)

- The courseware team comprises of the authors who jointly contribute to the content, pedagogical and technical aspects of the courseware development. A technical support staff from the Computer Services Centre, NIE was also responsible for part of the technical and the administration aspects of the courseware development.
- On-line courseware is developed mainly by hypertext markup language (html) scripting and uploaded to TopClass web-base management system.
- 100 work hours were planned for the initial development of the courseware to its final revision and its consequent uploading to the server. The actual time taken was, however, 130 work hours. This does not take into account the subsequent maintenance of course material, review of student responses to questions and facilitating of bulletin board discussion.

Stage 4: Content Development

- Course content can be outlined under the following sections:
 - a) Atmospheric Composition and Energy Balance
 - b) Atmospheric Moisture
 - c) Atmospheric Motion
 - d) Climate Classification

- e) Humans and their impact on Climate.
- Courseware content is designed with the intention to provide sufficient content material to further the knowledge of the reader and more importantly to prepare the reader sufficiently for discussion of issues (content and pedagogical) in face-to-face and online environments.
- Materials are presented in a non-linear format in which users can access different sections of the course material through the use of an active content navigation bar (by the use of frames).

Stage 5: Prototype

- A prototype was created using one of the major sections of the courseware and sampled by a neutral colleague who is not in the team. This was done to troubleshoot potential technical problems with the web-base management system, since this was the first course to be mounted on the system on the SOA server.

Stage 6: Courseware Integration

- Sections of the courseware were integrated using the active hyperlink toolbar.

Stage 7: User database Preparation

- Users were created (usernames and passwords) on the system by the technical support staff.
- Basic information like identification numbers were entered.

Stage 8: Full-scale implementation

- Implementation of final product on 6 March 1999.

Stage 9: Maintenance

- Review questions are set at the end of each section for evaluation. Submissions are reviewed and feedback is given to each student.
- Update and revise selected sections. Refinement of material is continuous and ongoing.
- Discussion topics were hosted on the bulletin board.

Considerations

There were some specific elements of a web-based learning environment which we considered when developing the on-line courseware.

Communications

- The WWW connects the learner to the instructor allowing real-time assessment. In this course, all participants have WWW access, either at home or at school. Some course quizzes are auto-corrected while others that require open-ended responses are reviewed by the instructor asynchronously. This reduced the number of face-to-face contact hours required for the course. In the past, the course required 20 hours of face-to-face contact. Under the web-based system, only 9 hours are face-to-face (a 55% reduction). This also reduces the number of hours spent on travelling. The advantage of using hypertext web pages over linear presentation of information is that the learners can choose for themselves which pathway they want to explore. Megarry (1989:50) argues that giving the learner more autonomy in choosing how to interact with the information base makes for more effective learning. This self-directed access is important in a learner-centred course as it facilitates immediate access at the point of need. It also enables

students to pace themselves, allowing them to explore issues about a topic of interest more deeply, and spending less time on concepts that are already understood. Learners in this environment are no longer “passive learners attempting to mimic what they see and hear from the expert teacher” (Collins & Berge, 1995: 6), but are “more active participants in the creation of knowledge and meaning” (Brown and Thompson, 1997).

- The use of Discussion List in the TopClass system enables collaborative learning in this course. The discussion board/list is fully automated for ease of management. The discussion list is categorised by topic. As the discussion list allows a written transcript of the online discussion, it enables a collaboratively built knowledge base about the topics being discussed. Webb (1989), in a message map analysis of interaction patterns on discussion lists, found that students do respond to the messages of others, adding on and building to the ideas proposed. The asynchronous nature of online discussions allows learners to respond at a time that “best suits them” (Brown and Thompson, 1997). It allows reflection and further research on the topic before responding. Hiltz (1986:98) found that ‘time for reflection’ was an important factor in learning effectiveness. It also allows immediate clarification when the need arises or to learn from “whatever discussion is taking place even though they may not themselves have initiated it” (Brown and Thompson, 1997).

Visualization

- WBL allows for information to be presented in multimedia. In particular, visual images may “increase learner interest and motivation,” present “inaccessible processes and events” to the learner, “sharpen powers of observation, guide learners to think and make conclusions, present relationships, organize new information, function to integrate facts, skills and judgement” (Chatterjea, 1998). Furthermore, “visual representation can play a role in synthesising information or in identification of concepts as when we need to use diagrammatic and visual forms to communicate information, represent data and show relationships” (McLoughlin, 1997). Indeed, the use of animated visual images has produced some positive feedback. A few participants have requested permission to use the animations in their own classes.

Timeliness

- Information is up-to-date and can be updated continually. In fact, review questions were posted during the course based on the progress of the class. In other words, review questions for each topic were planned based on the performance of participants throughout the course.

Resources

- Physical space is no longer a constraint as the WWW may be accessed from practically anywhere on the island (subject to availability of suitable hardware and infrastructure). Since all the participants have either web access at home or at work, the web-based course’s ability to liberate the user from spatial constraints becomes highly viable. However, there is the problem of access speeds depending on the type of hardware used.
- The WWW is a rich source of information, much like a set of encyclopedia or a library. Unlike the CD-ROM, which can only hold about 600 megabytes of information, the WWW is made up of many machines around the world, and allows almost limitless storage of information. Some activities and discussions are built around this aspect of web-based learning. Participants are instructed to collect materials from other web sites (some common links to the selected topics are provided on the course) for class discussion.

Problems

There are several key problems that were brought up during a debriefing sessions with the participants as well as a discussion session among the authors. They are listed below:

- Repeated failed logging-in.
- Problems with saving the course content on the hard/floppy disk.
- Malfunctions of Javascripts™
- E-mail problems on TopClass
- Attendance

The problems encountered were all technical problems which imply several things. Firstly, the problem of repeated failures in logging-in to the TopClass System was primarily due to a problem with the NIE server configuration. The problem was only faced by participants accessing from work (using school's computers networked through MOE). But this problem has been solved since. Teachers accessing the course from home had few problems with logging in. Some participants had logging-in problems due to a lack of typing skills. A few cases involved repeated mistakes in the typing of usernames or passwords. The problem was only discovered when the teacher tried to log-in from NIE in the instructor's presence.

Secondly, the problem of saving course content on the hard/floppy disk reflects general incompetence with regard to computing skills. Although a prerequisite of computer literacy was made known to all course participants and that all of them claim to have basic computer literacy, the problem may be corrected in future courses by specifying the specific skills required rather than a general requirement on "Basic Computer Literacy". Indeed 57.1% of the participants rate themselves as beginners in terms of computer skill level and 78.6% of them have not received any form of web-based training in the past.

The problem with malfunctioning Javascripts™ was a software dependent problem. Some earlier versions of web browsers are incapable of supporting Javascript™. Although this potential problem was highlighted to the class, participants still faced the problem as the web browsers in their school/home have yet to be upgraded. Furthermore, the problem of incompetence in computer skills is further displayed when some students couldn't identify which version of the browser they were using.

The E-mail function resident on the TopClass system poses a user-interface problem to the participants as the various functions such as "Create Mail", "Send", "Forward" and "Attach" are represented on the screen by graphical buttons. Although a handout that explained the function of each graphical button was given out at the beginning of the course, the problem still persisted in the earlier part of the course. As the participants became more familiar with the user-interface, the problem dissipated as the course progressed.

Attendance may be monitored using TopClass but policing it is hardly an equally achievable task. One of the features of using the WWW is that it allows self paced access and learning. Just how many log-ins are required and how long should each online session be? The criteria definition by itself is problematic to begin with. Furthermore, users can actually log-in, go for a cup of coffee and come back to the terminal later and that time lapsed will be counted by TopClass. Although TopClass automatically logs-out the user after 30 minutes of inactivity, 30 minutes is still recorded as the log-in time. A shorter log-in time, however will be insufficient as reading information on each page may take some time.

Recommendations

Based on the problems encountered during the course a few recommendations have been made to improve future running of the same course. Firstly, a set of prerequisites pertaining to computer skills and access are to be specified at the beginning of the course. For example, the hardware configurations of the user's computer, the type and versions of browsers and the required plug-ins such as Adobe Acrobat Reader™, FLASH™ or Shockwave™ have to be specified. Once these have been sorted out, potential problems like using older versions of browsers and inability to identify graphical buttons will be reduced.

Second, a very important consideration will be to include an orientation lesson (in addition to the intended number of contact hours) to familiarize participants to the web-based course. Although this has been done for this course, it is felt that the orientation lesson should be longer. This is crucial as the participants will troubleshoot potential problems and become more competent with using the interface.

The problem of attendance may be solved by formatting web pages shorter coupled by a reduced inactivity time to automatic log-off. This will ensure that users have to be constantly "clicking" in order to register their access on the page. However, this still doesn't solve the problem of deciding how many sessions and how long each sessions should be.

Conclusion

The course was reasonably successful as 85.7% of the course participants felt that the objectives of the course have been met. Some course participants have indicated that the course has been helpful to them. In fact some of the participants have indicated that they would like to use web-resources from this course for their own classes (with adaption). The use of interactivity and animation has enabled not just mere knowledge assimilation but the provision of examples with which the teachers can use in their own classrooms. In particular, the course participants have found that the partial mounting of the course on the web has released a substantial amount of time for other work and thus enabled them to learn at their own free time and pace. Although the level of computer skills in participants can be improved, the inclusion of an orientation class to enable practice will surely improve the situation.

Although there has been some problems in the first attempt at the partial mounting of the Inservice Climatology course on the web, these problems can be solved and avoided in further implementations with the experience gained and some careful planning. It is hoped that the experience acquired in this project will help others in their designing of web-based courses.

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