

SUPPORTING OFF-CAMPUS STUDENTS USING WEB-CT: AN EXAMPLE IN MEDICAL ULTRASOUND

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Abstract

Off-campus distance learning (DL) students are required to study under far less favourable conditions than their on-campus colleagues. They miss the social and educational advantages of mixing with both their fellow students and their lecturers/tutors. In order to compensate for this lack of personal interaction, academic staff involved in the conduct of DL courses need to find ways to encourage other forms of effective and efficient communication.

In this paper we will describe the manner in which communication with these DL students is maintained, specifically in one unit, SON4000: Physics of Ultrasound and Instrumentation. It was decided for 2003 to use WebCT to encourage lecturer-student and student-student communication and provide support generally. We briefly describe the available WebCT tools that we have specifically chosen to use to support SON4000. We discuss the initial cost to staff in setting WebCT up for a subject like SON4000, the perceived long term benefits to the teaching staff, and most importantly, the reactions and responses of the students in accessing the WebCT site and contributing to the various communication options. A summary of the WebCT student-tracking data and the use of the mid-semester evaluation survey is presented.

Keywords

Distance learning, flexible learning, WebCT

Background

The SON4000 unit, Physics of Medical Ultrasound and Instrumentation, is a 6 credit point unit, one of 8 units offered by the Department of Medical Imaging and Radiation Sciences that comprise the Graduate Diploma of Medical Ultrasound. This is offered only in distance learning mode to off-campus students, studying part-time over 2 years. These mature-age students are normally all working in the field of medical diagnostic imaging or radiography, and most will have a formal qualification in radiography. In order to become accredited by the Australian Sonographer Accreditation Registry, and pursue a career in sonography (diagnostic ultrasound) they must all complete an additional qualification, either through their professional body, the Australasian Society for Ultrasound in Medicine, or by the Graduate Diploma offered by Monash, or similar offered by other tertiary institutions.

SON4000 is a first semester unit for students undertaking the Graduate Diploma, and is taught via a hybrid system of printed and digital resource materials, supported by an online WebCT site. When designing this unit, the primary motivation has been to use best practice theories where possible (Chickering & Gamson, 1987), to develop a highly engaging and interactive unit with frequent feedback to students (Salmon, 2000) in a friendly environment. Many students undertaking this unit will have no previous experience with learning in a distance education mode or with learning online, and are likely to face the normal issues for off-campus students of juggling work and family commitments with their studies (Bishop, 2002; Evans & Nation, 2000). It was considered of vital importance to begin their online

experience in a supportive and nurturing environment, and to maintain a high level of engagement by fostering the development of an online learning community (Kazmer & Haythornthwaite, 2001; Stacey & Rice, 2002).

Students enrolled in SON4000 are provided with a comprehensive set of notes (about 550 pages) prepared in late 2000 with assistance from staff in Monash University's Centre for Learning and Teaching Support (CeLTS). In addition, they receive 2 CDs; one containing similar material in a different, e-book, style, and the other an image processing program, Scion Image, plus relevant images. All students are encouraged to attend a 2-day, on-campus workshop in early May, but distance usually means that not all of the students can attend.

Previous electronic communication methods

SON4000 has been conducted previously in 2001 (with 8 students) and in 2002 (with 12 students). In these two years the unit was generally well received from the limited feedback obtained, and this year the unit has attracted 19 students. During 2001 contact with students was primarily by conventional email. Being effectively a one-to-one form of communication this did not engender any form of online community and also meant that in many instances the unit lecturer (PW) answered similar queries from different students on unit material.

During 2002 communication included discussion group activity supported by the my.monash portal (Kennedy et al, 2002). The portal system allowed greater flexibility but still had a number of shortcomings; it seemed very slow to respond at times (even from within Monash), allowed only text-based material on the portal pages which meant that additional pages using graphics and symbols (in equations, for example) had to be saved on a separate server with the attendant time delay until this was up-loaded by the network administrator. The overall effect from the students' point of view was an improvement from the previous year, but a rather disjointed presentation of supporting material. While more supporting information was provided, little use was actually made of the discussion groups by the students.

Current unit details

In preparing for the 2003 intake it was decided to change (somewhat late in the scheme of things) from the portal to WebCT in order to provide enhanced student support for SON4000. In doing this, the other units in the Graduate Diploma of Medical Ultrasound also had WebCT sites generated, along with an additional site to provide information that was common across the range of units offered. The WebCT support for SON4000 unit is the most highly developed of all these sites and is the only one that is discussed in this paper.

The 2003 SON4000 unit commenced in February with 19 students; 1 from overseas (New Zealand), 1 from the Northern Territory, 1 from Queensland, 5 from New South Wales and the remainder from Victoria. It is delivered over a 16-week semester with the last week's topic ending on 13 June with a short revision period before the final examination in June (this is similar to the previous two years). Each week is devoted to a single topic; Topics 1 – 11 are essentially on the physics and instrumentation of medical ultrasound, and Topics 12 – 16 concerned with the digital aspects of medical imaging in a more general manner. The assessment of the SON4000 unit is unchanged from previous years as:

1. Final examination paper (3 hours) 55%
2. 1500 word assignment 10%
3. Workshop report 20%
4. Computer imaging exercises 15%

In addition there are two 'hurdles' where students are required to undertake certain activities, but no mark is returned towards the final assessment. The first hurdle activity, in Week/Topic 7, is a test where students are required to identify 10 image artefacts in diagnostic ultrasound. The second hurdle, in Week/Topic 11, requires students to search for a web-site with an interesting feature related to recent advances in sonography and present a short discussion of the material.

The other activity is a 2-day workshop conducted on the Clayton (Victoria) campus in May. This allows all students to complete the first 11 topics prior to attending the workshop. The workshop is lead by an expert sonographer who picks out important elements of the unit, with particular emphasis on the link between the clinical and physics/instrumentation aspects of diagnostic ultrasound, and demonstrates these ideas using modern ultrasound imaging scanners. In this workshop students are required to repeat and extend these demonstrations. Images acquired during the workshop are provided (in electronic form) to all attendees for inclusion in a subsequent report. Those students unable to attend are provided with the images as examples of the activities of the workshop, but are required to construct their report using ultrasound images acquired in their own workplace.

Following the workshop the students complete the remaining 5 topics on digital imaging. Each topic has two short assessable exercises (each worth 1.5%) to be completed and returned in electronic form.

Use of WebCT in 2003

In designing the SON4000 WebCT site a number of decisions were made, including use of a uniform set of icons, style and layout across all SON units in the Graduate Diploma of Medical Ultrasound. This was done in an attempt to make the navigation around these sites similar for students new to this type of communication.

Other decisions made specifically with regard to SON4000 were: as many pages as possible would be written in html to minimise download times for these off-campus students, all additional pages would be opened in a new window to decrease the possibility of students inadvertently closing the SON4000 website, a separate discussion group would be arranged for each topic, plus separate discussion groups for the workshop and WebCT questions, all discussion groups would be public and all WebCT Mail would be private. The tools used are basically restricted to single pages (including a Unit Information page as the first homepage icon), the Calendar (to reinforce and correct where necessary the details in the unit printed material), Quiz and Survey links, and Assignment links. To encourage appropriate use of the discussions tool, the lecturer posted the first message in each separate topic, to demonstrate to students which topics to post particular queries to, and also importantly, to create a friendly online personality and hopefully break down some of the barriers to communication between strangers (Salmon, 2000).

The printed material included a “getting-to-know-you” questionnaire. However, the questionnaire file was made available and students were encouraged to submit this electronically as an assignment within WebCT. The purpose was to provide familiarisation with electronic submission and to encourage later assignments and reports to be submitted electronically. This exercise was fairly successful with all but 4 of the 16 returned questionnaires being submitted electronically.

For Topics 1-11, the purpose of the WebCT site was to allow students to seek clarification on difficult concepts they came across in their reading of the printed material and also to assist them if they were unable to get correct answers when performing numerical calculations. With Topics 12-16, the site was used mainly to explain in detail the precise manner in which the Scion Image software was used to perform specific image processing tasks required in their assessable exercises (although the software manual was provided electronically, few students took the trouble to read this or print it off!).

In the previous two years, the Topic 7 artefacts test was provided as a Word file on the CD, with responses being submitted in a variety of ways! For 2003, the 10 images were presented using the Quiz format provided within WebCT. This was reasonably easy to set up as the basic data was in electronic form to start with, and all the students have completed this quiz. It is a ‘one attempt only’ quiz using multiple choice format, where students select the artefact name from a list of choices. The immediate feedback to the student using the WebCT quiz was a strong incentive to use this form of testing.

Other uses of WebCT were in providing the previous year’s examination paper (as a pdf document) and hints on using WebCT, suggestions to students for setting up their computer to accommodate the screen layout, and the use of student evaluation surveys within the Quiz and Survey tool. It was decided to conduct a mid-semester survey (to check on the way the students handled this supporting online technology) as well as a final evaluation survey just after the examination. In the previous two years the

use of evaluation surveys in printed form following the exam had delivered 0 and 1 responses in 2001 and 2002 respectively.

It was hoped that the use of a brief, but well designed, electronic mid-semester evaluation survey would bear more fruit for the final evaluation late in June. The first survey stressed to students the anonymity of the evaluation process and the value we would place on all surveys to improve the unit and its support for future students. Students were also informed that an analysis of the first survey would be provided, and where relevant and possible, prompt changes made to assist their learning. For interested Monash staff the SON4000 WebCT site can be viewed (from the student perspective) at <http://webct.monash.edu.au>, using peterw-s as both name and password.

Student and staff time commitments

Students are expected to devote about 3-4 hours per week to this unit. For each topic, students are provided with printed notes (between 5 and 25 pages), and a number of attached Readings (up to about 20 additional pages). The notes also include worked examples, activities (with answers in relevant cases), plus a few “typical” exam questions and useful web-pages (URLs).

In 2001 (for 8 students) the lecturer spent typically 30 minutes per working day answering emails, letters and telephone calls in supporting students. This would translate into about 2-3 hours per week which would be about the time devoted to conventional lectures and computer laboratory supervision for on-campus students. In addition to this was the considerable time spent in preparing the written notes and CD material with the assistance of CeLTS. In 2002 the time weekly commitment for the lecturer (with 12 students) was similar; less time was devoted to basic material preparation but a deal of time was spent learning to use the my.monash portal.

This year the time devoted to setting up the WebCT site amounted to about 1 full working week; attendance at a January 2-day workshop to learn the basics of WebCT plus about a further 20-30 hours to get the SON4000 WebCT site in acceptable form (after a few abortive attempts!). In addition, it takes about the same 30 minutes per working day to attend to the questions and concerns of the present students using the Discussion Groups and WebCT Mail. It was made clear to students from the start that all contact had to be through WebCT unless they had real difficulties – in the end there were 2 phone calls and 1 conventional email only from students who were experiencing computer problems (not essentially associated with WebCT).

Evaluation plan

As noted above, a decision to conduct a mid-semester student survey was made early on, in addition to the final survey following the exam in June. The key questions to be addressed were as follows:

1. Is transferring of the unit support to the WebCT platform achieving the intended effective contact with students while also improving efficiency in academic workload?
2. If so, is this likely to be a long-term benefit, or is it dependent on the current academic lecturer for SON4000?
3. Do students feel they have sufficient personal interaction with their lecturer and with each other?
4. Do students feel that the design of the unit has allowed them to achieve their maximum learning outcomes? If yes, how? If not, why?

The mid-semester survey was underway at the time of preparing this manuscript. It is ‘time-stamped’ within WebCT to operate between Weeks 7 and 8. This is another advantage of WebCT in that certain pages/tools/activities for the students can be designed, implemented and tested within the WebCT environment well before their intended use, and then only made available to students within given time intervals. The use of a ‘dummy’ WebCT student account has proved essential so that the designer/lecturer can actually test out the various activities, as in some activities the student’s view and what the designer can see are somewhat different.

Evaluation methods

The methods for evaluation SON4000 in 2003 are as follows:

1. Monitoring of the online unit support (particularly discussions) by an external evaluator (DW from HEDU/CeLTS) in order to gain data on both staff-student and student-student interactions.
2. Surveying students in mid-semester; again to seek information about the level of interaction and support, but also to gain data on unit design and online material (currently underway).
3. Interviewing, on a regular basis (fortnightly) the academic in charge of the unit (PW) by the external evaluator to gain information on the level of interaction and to collate data on academic workload and efficiency. This also allowed time for some reflection on the whole process.
4. Tracking the students' access to the online material and their Discussion Group and WebCT Mail postings. This was to be conducted on a weekly basis (although the first week's data was lost when the Monash ITS WebCT team 'reset' all WebCT sites just prior to the commencement of the normal first semester teaching!).
5. Discussing the online support provided with students during the workshop (for students able to attend), or by phone for those unable to attend.
6. Surveying students directly after the examination in late June; asking questions on perceived learning outcomes, communication and support, as well as on the overall design of the unit.
7. Analysing the final examination marks, and marks from other assessment components with the level of participation in the online Discussion Groups and other means of communication through the SON4000 WebCT site.

With the timing of the final writing of this paper, the following discussions and conclusions are necessarily tentative and incomplete, however, it does provide the opportunity to respond to students' concerns well before the final assessment and the due dates for the assignment and workshop report. In this way, current students are benefiting from the evaluation process, and not just future students.

Student tracking

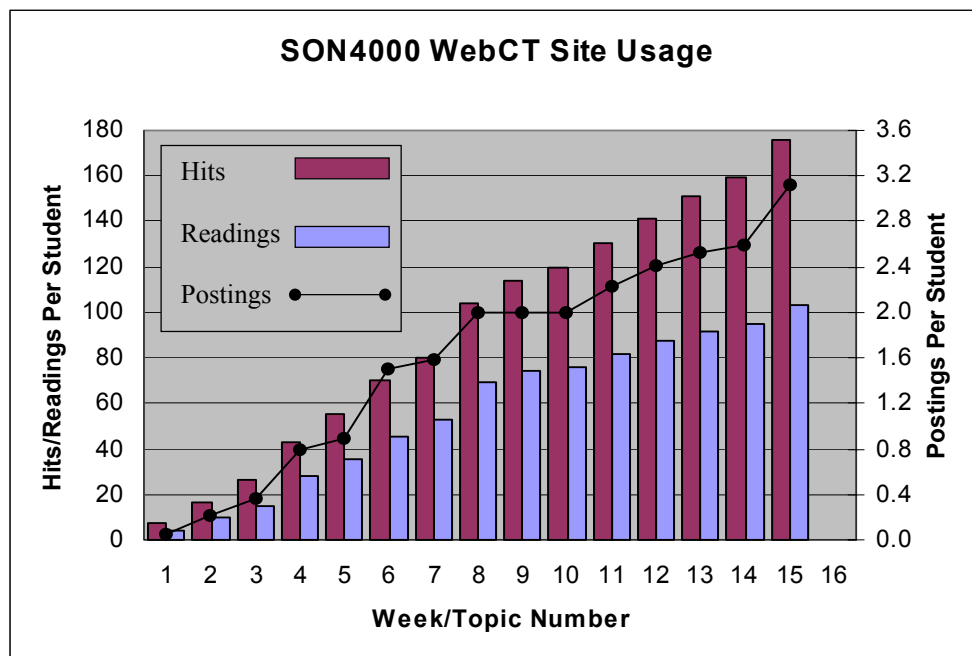


Figure 1: Summary of student access to the SON4000 WebCT site to Week 15.

Of the 19 students who commenced this unit in February 2003, 17 remain; one student withdrew in week 5 and another in week 7. Figure 1 shows the total number of 'hits' made by the students on the SON4000 WebCT site on a weekly basis. In addition, Figure 1 also shows the number of total discussion group

items read during these site visits, and the number of discussion group items posted by students. For completeness, the data to the end of week 2 was apportioned between weeks 1 and 2 (see above). There are currently (to the end of Week 15) a total of nearly 3000 'hits'; 1760 items read by students, and 53 postings, averaging just over 3 for each student.

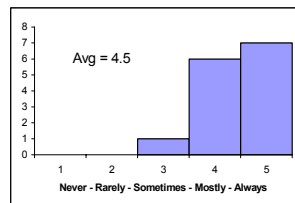
In Figure 1 the averages can be mis-leading. By the end of week 2 the number of hits for any one student varied between 0 and 50 with an average of 16.5. However, by the end of week 15 this variation has diminished considerably and the number of hits per student ranged between 105 and 266, an average of 176 with a standard deviation of 46.4 (26%).

Mid-semester survey

The mid-semester survey comprised 10 multiple-choice and 3 short answer questions. The emphasis on this survey was to enquire whether students were comfortable with the online technology used in supporting SON4000; specifically the SON4000 WebCT site. Over 1/3 of the students had responded within 1 week of the survey being made available online. The questions and scores from the 14 students who eventually responded (74%), with additional comment summaries, are as follows:

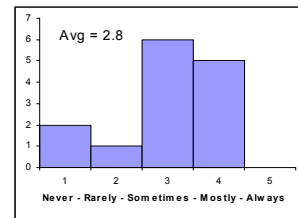
Question 1:

Did you feel you knew where to look for information about this unit?



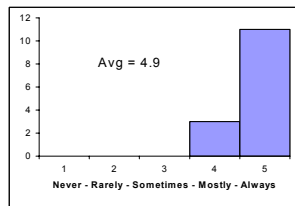
Question 6:

Have you been able to keep up with the pace of the unit (the topics week-by-week)?



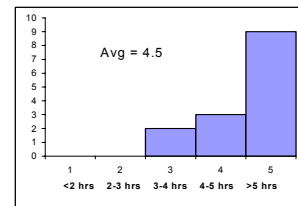
Question 2:

Have you felt able to contact your lecturer on areas of difficulty?



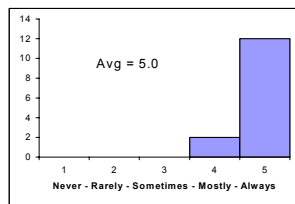
Question 7:

How many hours per week do you generally spend working on this unit?



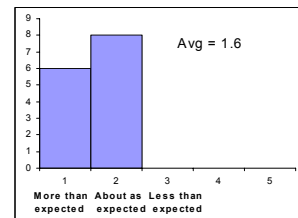
Question 3:

Have you felt welcomed/encouraged to contact your lecturer on areas of difficulty?



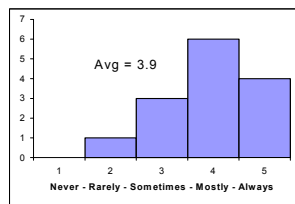
Question 8:

Is this more or less time than you expected to spend?



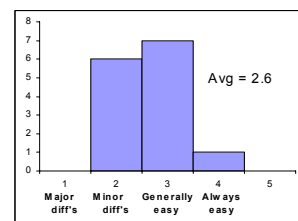
Question 4:

Have you felt able to contact your fellow students in your unit?



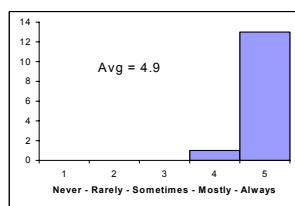
Question 9:

Have you had difficulty in learning how to use the features of WebCT?



Question 5:

Did your lecturer answer questions posted (from you or fellow students)?



Question 10: Have you had any difficulties in learning online in general? Tick as many boxes as appropriate.

1. Internet access problems	Ticked by 13% of students
2. Problems with access to a computer	Ticked by 13% of students
3. Difficulty with using WebCT	Ticked by 0% of students
4. Other technical difficulties	Ticked by 50% of students
5. Lack of online resources	Ticked by 0% of students
6. Motivation issues	Ticked by 13% of students
7. Time issues	Ticked by 100% of students

Question 11: What have you enjoyed most with this unit so far?

“unit progresses really well, one topic leads into the next”,
“interface with the lecturer and students via WebCT, is great”,
“applying the physics in practice, worked examples are given how this knowledge will be used”,
“the format of the topics and the way in which things are explained”.

Question 12: What have you enjoyed least with this unit so far?

“earlier stuff was bit dry but getting more interesting as I go”,
“I have found that each topic has taken me longer than I thought it would”,
“find it very hard to maintain my concentration when doing the readings”,
“not having any hands on experience, it is sometimes hard to apply theory without practise”.

Question 13: Do you have any other comments?

“finding it difficult to keep up because I don't have a background in radiography”,
“the course is well run, with lots of help available”,
“the workshops are great ideas, both for resolving any queries and to meet other students”,
“I receive more support in this subject”,
“reading through all the emails online is very time consuming and often is a waste of time”,
“would probably be easier to manage if the notes were a little more structured”,
“the support from staff is fantastic, thank you”.

Discussion

The most important point to make is that the use of WebCT in terms of student access far exceeds that for the previous two years in terms of electronic communication. However, students obviously found the accessing and navigation around WebCT more difficult than envisaged by the lecturer. This is put down partly to the printed notes not being up-dated in time to include specific details about how to access and use WebCT (the printed notes still contain details about the portal!).

There is no doubt that some technical difficulties were also experienced by students, and from earlier comments this included: never having used computers online previously, not having access to a computer from the start of the unit (despite being a ‘pre-requisite’ for enrolling in the unit!), and problems with internet service providers. All these appear to have been solved by about week 3.

The time commitment was also well in excess of what students (and the lecturer) expected. Whether the online support engaged students for long periods of time (indicated by one response to survey Question 12) is difficult to say. The comments about the time commitment is more serious than in the previous two years with the unit material essentially unchanged.

Many students have commented on the positive aspects of WebCT in terms of getting immediate feedback to questions (they were told in the notes that their questions would be attended to within 2 working days). There was some (but not much) student-to-student interaction within WebCT, and this was partly due to the lecturer indicating a couple of times that he would respond to specific questions only after leaving students to ‘have a go’ first. This approach was used sparingly, but did appear to work. Apart from the direct feedback gleaned from this mid-semester survey and other comments, the following more general points are offered:

1. There were no 'repeated questions'; students did look at the lecturer's responses to questions previously raised by other students.
2. Most students, from the start, placed their questions of a general unit contents nature in the correctly identified Discussion Group.
3. Most students differentiated from the start between queries that required a 'public' response (using a Discussion Group) and those that required a 'private' response (using WebCT Mail).
4. Despite the significant number of times the students have accessed the SON4000 WebCT site, there were comparatively few discussion questions posted, although, it has to be pointed out that on many occasions, each posting outlined 4 or 5 areas requiring clarification by the student. With an average of over 2 items raised in each posting, the total number of items discussed in this manner is well in excess of 100.

The early evaluation also provided rapid feedback about the varying backgrounds of the students and the areas of mis-match between the students knowledge and the lecturer's expectations; always difficult with students whose previous tertiary course work was over 5 years before, and made all the more difficult to address with off-campus DL students.

Areas of particular concern that surfaced during the early discussion group postings were twofold. First was the unfamiliarity with the language and jargon of physics (sorting out definitions of related terms like energy, intensity, power and waves, beams, rays, and going over ideas from another viewpoint that involved 3D concepts originally covered using 2D drawings, for example Huygens' wavelets). Second was the difficulty some students had in handling numerical problems like solving $N = D^2/4\lambda$ using $c = f \lambda$ (calculate N given D, c and f; the problem being that of re-arranging equations and handling units and dimensions), and solving equations containing trigonometric functions like $\sin(\theta) = 1.22 \lambda/D$ (problems with using calculators, radians/degrees). These were readily, and speedily, attended to using WebCT. The other very useful WebCT tool was the ability to provide coloured images quickly to further explain a point from the (black & white) printed material.

The mid-semester survey data was analysed and presented to students as promised. In addition, some minor changes to student work load (making the topic 11 hurdle optional and altering slightly some assignment due dates) was implemented. Further, some changes (assessment weights to more carefully match work loads and including a small percentage for the Topic 7 artefacts quiz) were proposed for SON4000 in future years and are currently under discussion in the faculty.

Conclusion

The unit is still underway but close to completion. Maybe the slight jump in hits, readings and postings is a reflection of the closeness of the exam! However, all the indications are that the move to WebCT has been reasonably successful. Despite early problems for some students in accessing their online materials (due partly to a lack of printed support documentation), students appear to have appreciated the support provided using WebCT. Most problems have arisen from a lack of access to hardware or network services, and from occasional hiccups in the central administration of the WebCT service.

Active participation in posting questions in the discussion groups and mail has been lower than expected, despite a conscious attempt to be as nurturing and personable as possible, but this can partly be explained by students submitting multiple questions in each discussion message posted.

Feedback from the use of other WebCT tools has been similarly encouraging. The Week/Topic 7 artefacts quiz was completed by 80% of the students within one week of the quiz being available. They reported that they who found the exercise worthwhile and use of the WebCT Quiz tool appropriate, and was far more efficient in the use of the lecturer's time than in previous years. Response rates to the mid-semester evaluation survey are significantly higher than seen in previous years, and are generally positive in terms of what we have attempted to achieve using WebCT.

The academic workload associated with the move to the WebCT environment has been reasonable, and no more than in previous years while supporting a large increase in student numbers. Apart from an initial investment to prepare online materials and to structure the WebCT unit (about one week, including training in the use of WebCT), the ongoing time commitment is comparable to the time that would be

required to teach the same unit face-to-face, or to run the unit in a different online format. The generally positive responses by the students to this WebCT support has also helped make the whole exercise a rewarding, if challenging, exercise.

The ability to use text/graphics/equations in providing supporting electronic material, especially in response to student's questions, and being able to up-load these pages to the WebCT site independently of a network administrator has also been a distinct advantage.

It is also expected that additional useful student feedback will be returned at the conclusion of the unit based on the mid-semester response, and thus subsequent iterations of this unit should require a decreased time commitment in establishing the unit, although all material will be reviewed annually for relevancy and currency of information. A more complete analysis of this SON4000 unit will be presented at the Exploring Educational Technologies conference on 16-17 July.

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