

# Facilitating Successful Online Computing Courses While Minimising Extra Tutor Workload

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## Abstract

A key problem in facilitating a successful online course is the highly time-consuming nature of the administrative and pedagogical tasks involved. It is also difficult to achieve a community of learners online, since the lecturer has to overcome the natural reticence of students to post in shared class spaces. In computing courses an additional factor is the tendency of some students to work to deadlines rather than allocating a weekly time for study.

This paper suggests constructive methods of ensuring the success of online computing courses. These include repeating course content in a variety of integrated media, scheduling or automation of course content, encouraging weekly student participation and encouraging students to become active members and contribute to the class.

We report results (from 1999-2003) from three undergraduate and two postgraduate computing courses that each have a significant proportion of the course taught online using the Learning Management Environments (LMEs), WebCT and Blackboard CourseInfo. These courses are studied by students with a wide range of ages, ethnic backgrounds, life and work experiences. We report widely ranging student participation rates in a variety of online discussions and course exercises and discuss the contributing factors.

To save our valuable time we need strategies to utilise the automation available to us in the LMEs and to recognise limitations of the LMEs and opportunities for new strategies.

*Keywords:* online learning, flexible learning, student motivation, discussion forum, bulletin board, Learning Management Environments (LMEs), WebCT, Blackboard CourseInfo.

## 1 Introduction

Many researchers point out the importance of building a community of learners, (Foley and Schuck, 1998, Lehtinen, et al., 1999) so that students can learn from each other. Felder and Brent, (1994) cite research showing that "cooperatively taught students tend to exhibit higher academic achievement, ... better high-level reasoning and critical thinking skills, deeper understanding of learned material, more on-task and less disruptive behaviour in class".

Many educators hope that online learning will facilitate these processes and lead to better teaching and learning outcomes. However it is also widely recognised that it takes significant time to create and administer online courses. Is this extra workload for educators worth it? There has been little research into student usage of electronic materials, with most research instead focussing on the adaptation of teaching styles to the new medium.

Bell, Cockburn, McKenzie, and Vargo (2001) reported a digital lectures project where first year computer studies students were offered CD-Rom lectures as an alternative to normal lectures. They discovered that attendance rates at the normal lectures dropped, because students intended to access the digital versions, but then that the students never got around to accessing them. In conclusion Bell et al. (2001) ask whether flexible delivery is damaging to learning.

Many educational institutions have adopted online course-building shells, or Learning Management Systems (LMEs), such as Blackboard or WebCT in order to provide online learning. Some of these tools were originally designed only as administration and file transfer tools, so often these LMEs do not support good teaching and learning. Solomon (2003) discusses a number of flaws of Blackboard, which he, in part, attributes to the early stage of development of this e-education software. Zhang (2002) also highlights several usability problems with the Blackboard utilities. We could also ask are these popular LMEs damaging to learning?

In considering these questions we decided to look at two separate measures. Firstly student usage of materials – do they actually access the course materials that we put so much effort into assembling in electronic format. Secondly student participation in interactive online activities such as

discussion forums, chat sessions, quizzes or shared knowledgebases.

Online conferences, either synchronous or asynchronous, are generally recognised as a powerful tool for active learning. As Klemm (1998) points out, they require students to “comprehend what is being discussed by others, to create ideas in the context of the topic at hand, to organize thinking coherently, and to express that thinking with carefully constructed language (hopefully, clearly and concisely)”. However it is also recognised that students are reticent about posting in shared class spaces—perhaps because they lack the confidence to assert themselves in public, or they are afraid of embarrassing themselves in front of their peers.

It is all too easy to invite student participation in an online course only to find that the contributions never happen. Klemm (1998) recommends eight ways to increase quantity and quality of student participation in online conferences by designing more successful forms of forum activity. It is also necessary to encourage and cajole students to participate using inclusive, enthusiastic and motivational language. However this is very time-consuming, and can result in the lecturer feeling trapped in a “virtual prison” (Hart and Gilding, 1997).

Some strategies to encourage student participation without increasing workload include:

- Motivational, student-centered, enthusiastic, positive, and conversational dialogue repeated in a variety of media, such as handbook, PowerPoint slides, email, discussion forum posts, time-specific course website announcements and tasks;
- Peer grading or comment and student exemplars;
- Forming student groups and providing group communication tools;
- Encouraging student leaders;

Our previous research has shown a correlation between levels of student usage of the course website and final grade (McSporran and Young, 2001). We found that the students who read and made more discussion forum posts, who attempted more weekly quizzes and who accessed more pages of content scored higher.

It is therefore important to encourage as high a level of usage as possible. In effect our online course has to compete for student attention against all the other websites in the world. We therefore find ourselves in the position of marketing the course website. Some of the strategies we employ to encourage student usage of the course website include:

- Completeness – all course materials should be available
- Currency - the course website should contain the latest versions of all the resources.
- Quality content – students will only visit if it is worthwhile.

- High standard of graphic design – students will be turned off if the website looks old-fashioned. One of the authors has recently begun pushing the boundaries of Blackboard by adding images and other non-standard formatting elements to his courses.
- Promoting the website in a variety of media such as weekly emails, course handbooks, PowerPoint slides and in-class demos.

The main problem we face in enhancing the learning outcomes in our online courses is the additional workload. In this paper we share our tips and experiences for ensuring student participation, while reducing personal time overheads for lecturers, by re-cycling of automated content. However we are often constrained by the restrictive nature of the LMEs we are required to use.

## 2 About the Courses

We discuss three courses in the Bachelor of Computing Systems degree (Internet and Web Development 1 and 2, and Help Desk) and two courses in the Masters of Computing degree (Internet Applications and Website Management). All our courses are taught in flexible task-orientated manner. We generally offer co-ordinated classroom sessions, paper and online lecture notes, practical exercises, and integrated usage of communication alternatives offered by the standard tools included in the course website building shells, Blackboard CourseInfo and WebCT. All of the courses involve some degree of assessment that is conducted online.

Our experiences with student usage of the discussion forum in the first year course Internet and Web Development (IWD) 1, is reported in previous research (McSporran and Young 2001; Dewstow, et al. 2000; Young, et al. 1999). We found very low participation rates, except where participation is assessed. This is disappointing since the remote students have few other ways of forming a community of learners.

In 2000, the Master of Computing degree began at UNITEC. This is taught part-time one weekend a month, with part of the course work taking the form of online activities between the monthly class sessions. After experiencing the low usage of the IWD 1 discussion forum, the decision was made to follow the advice of Klemm (1998) to increase quantity and quality of student participation. We designed structured and/or assessed exercises to encourage discussion forum usage. These exercises, including website reviews, critiques and case studies and group debates, are described in detail in previous papers (Young, 2001; Young and McSporran, 2002). However participation rates were still very low, except where student participation was assessed.

The IWD 2 course involves many practical exercises. However very low participation rates were experienced in the first semester the course was offered. The decision was taken to require participation in subsequent semesters, by allocating a proportion of the first assignment mark for participation. This had a dramatic positive effect on student participation rates in these exercises. In the first

semester that this was implemented, 20 exercises were required, however this resulted in too high an administrative workload for the lecturer, so in subsequent semesters only 9 exercises were required. Student participation rates in the non-assessed exercises returned to very low levels.

### 3 Study Methodology

Data for this study was collected from course website usage statistics. WebCT only gives summary data on the number of content pages read and the number of discussion forum messages read and posted by each student. It also retains the student record of weekly quiz questions.

Blackboard CourseInfo offers a breakdown of each student's page views by website area and by date. However Blackboard does not provide data on the number of discussion forum postings, so it is necessary to manually count the number of postings made by individual students. It is impossible to detect how many posts each student read.

The installation of Blackboard at this institution only retains website usage statistics for the last 30 days. According to the vendor, increasing the length of time that statistics are stored would result in a significant degradation in system performance. In the second semester of 2002, the administrators of Blackboard at UNITEC did archive course usage statistics for the Top 100 courses so we able to report these. From February 2003 onwards our institution implemented a second database to permanently store usage statistics; data from the live system is transferred across nightly. However, our institution has yet to make the data from this system available to lecturers. We therefore have no complete record of student usage of Blackboard, which has a negative impact on our research.

For the WebCT hosted course, we include the records of only those students who have recorded at least one assessment mark. It is interesting to note that some of the students who drop out without submitting an assessment utilise the course website fully, while some of the students who submit one or more assignments never visit the

website. For the Blackboard hosted courses no attempt has been made to remove such students, i.e. enrolled but not attending, from the results.

### 4 Course Website Student Usage and Participation Results

Table 1 reports student participation in the IWD 1 course website, 1999-2002. The average number of discussion forum posts read, and posts made by each student are reported along with number of pages of content viewed and number of weekly quiz attempts. It can be seen that generally participation rates are low except for the 99-00 Summer School, which was completely remote with no class sessions. Here there was a significantly higher average posts read figure- it seems as though this cohort of students really did develop an online community of learners; they really were interested in what the other students had to say.

In contrast, the number of discussion forum posts read by the 00-01 Summer School students was very low. Three reasons for this may be:

- This cohort of students was composed mainly of Asian students who preferred to form their learning teams offline. Felder and Brent (1994) note that co-operative learning can occur in or out of class.
- There was only one lecturer teaching this course and therefore only one lecturer making posts.
- The lecturer teaching this online course was disadvantaged by personal injury and made far less posts than normal.

Participation rates in 2000 were particularly low, but there was a marked improvement in 2001 as we increased our efforts to promote the discussion forum. In 2002 participation declined markedly. There was a change to the teaching team for these semesters, and the lecturers who replaced one of the authors were not as committed to promoting or utilising the discussion forum.

Our previous research describes student forum participation in the Blackboard hosted courses (Young.&

Semester	Average pages viewed	Average Posts Read	Average Posts Made	Average Quiz Attempts*
Semester 2, 1999	172.0	-	-	9.8
Summer School, 99-00	386.5	83.1	4.2	11.9
Semester 1, 2000	291.6	21.9	3.0	8.4
Semester 2, 2000	248.4	23.2	3.1	9.6
Summer School, 00-01	163.4	16.5	3.4	9.4
Semester 1, 2001	231.5	32.0	3.3	9.5
Semester 2, 2001	201.3	30.6	5.3	9.5
Semester 1, 2002	168.4	28.1	2.9	10.0
Semester 2, 2002	162.5	27.7	2.8	9.5

Table 1: Average student utilisation of the IWD 1 course website, 1999-2002.

\* in 1999 there were 18 weekly quizzes, from 2000 onwards there were 20 weekly quizzes.

Course name	Total student logins (sessions)		Page views per student		% of total access to Comms. Tools		% of total access to Group Tools	
	Number	Position	Number	Position	%	Position	%	Position
Internet Applications	2446	# 39	706.8	# 2	65.7	# 1	10.6	# 11
Website Management	1576	# 63	590.3	# 5	-	-	-	-
Internet and Web Development 2	4267	# 18	459.9	# 9	17.2	# 6	22.9	# 7
Help Desk	1829	# 56	440.9	# 10	-	-	-	-

Table 2: Student usage of our Blackboard hosted courses, Semester 2, 2002. The first part of each column is the total number or percentage, the second part is the position of this course relative to all the Blackboard hosted course at UNITEC, when the data is sorted by this measure.

McSporran, 2002; Young, 2001). We categorised our forum activities, based on the work of Klemm (1998) into

- non-Structured, non-Assessed
- Structured, non-Assessed
- non-Structured, Assessed
- Structured, Assessed

In all the courses we found that there was only significant student participation in discussion forums when that participation was assessed.

Masters students would be expected to be more motivated to take part in class discussions than undergraduate students. However levels of participation in non-assessed discussions were equally poor in both undergraduate and postgraduate classes. These low participation results may be because of the non-English speaking background of a large percentage of the postgraduate students.

Levels of participation in General forums (non-structured, non-assessed discussions) are particularly poor. Reasons for this may include:

- There was little attempt by the lecturers to promote discussions.
- Students have to visit the forum to see if there are any new posts (it is a “pull” medium).

Table 2. reports some selected measures of Blackboard hosted course usage in Semester 2, 2002. When the dataset was supplied to us, it was ordered by total number student logins (sessions). To judge the success or otherwise of a course at attracting student usage, it is more useful to order the results by page views per student since this takes into account the number of students enrolled in each course. When the data is sorted by this measure it is clear that our courses are very successful at attracting student usage, in comparison with the rest of UNITEC.

Student usage can be further divided into the percentages for Content, Communications Tools, Group Tools and Student Tools. Unfortunately we were not supplied with this data for two of our courses since the administrators of Blackboard at UNITEC only generated this data for the Top 50 courses in terms of total number of student logins. When the data is sorted by these measures it can be seen that our courses tend to have high percentages for group

work and communication as opposed to simply accessing content. This is to be welcomed since student collaboration will encourage active learning.

The particularly high percentage for Communications Tools for Internet Applications can presumably be explained by the fact that there are two separate assignments conducted on the Discussion Board, and that the second of them has archives of previous semesters made available to students. The high percentage for Group Tools for IWD2 is presumably explained by the group website project assignment. Due to the similar nature of our other courses, we assume that Help Desk and Website Management would both show high percentages of usage attributed to communication and groupwork. Help Desk involves a reflective diary and a personal log book that both utilise the Blackboard Group Tool – a group of one is created. Due to the time-consuming nature of the administration system, such groups are only possible for small class sizes.

## 5 Discussion

### 5.1 Discussion Forums

We have noticed a trend for discussion forums to wither and die. There is often an initial flurry of posts as students excitedly discover the system and look for group members; then the numbers of posts falls off through lack of encouragement. There are a number of strategies for encouraging participation in discussion forums in general website development literature (e.g. Kim, 2000; SitePoint, 2003) which academics would be wise to follow.

It is important for the lecturers to respond quickly to student queries posted in the forum, so that students are not discouraged. However, this sets a precedent and students thereafter expect a quick response. On several occasions we have noted that if a student question on the discussion forum has not been answered within a few hours, the student will then email us their question.

To keep the level of activity on a discussion forum ticking over it is necessary to continually post new material. However this can be very time-consuming. Our strategy for ensuring that contributing to a discussion forum does not overwhelm the lecturers is two-fold. Firstly we recycle posts from previous semesters. We have built up an electronic resource (a Word document) of discussion

forum posts that we can copy and paste into a "new" posting. To the student it appears as if the lecturer has taken the time to compose a thoughtful posting, giving the illusion of a mentor. In addition, if an important current news story occurs we can copy and paste it into the discussion forums for multiple courses.

Our second strategy is to encourage students to take on a leadership role and respond to other students' discussion forum posts, discussed in Section 5.6.

A major problem with the LMEs is that the discussion forums are a "pull" medium and that the students and staff have to make a point of visiting them regularly. It would be ideal if our LMEs showed recent discussion forum postings on the homepage of the course website. Unfortunately Blackboard does not do this – only recent announcements and currently due tasks are displayed on the student homepage.

It would be helpful if the LMEs supported automated discussion forum postings, but neither WebCT or Blackboard allow scheduling of postings. This is frustrating since Blackboard allows all other forms of course content to be scheduled to appear at certain times.

## 5.2 Announcements

We deliver administrative, motivational and content-specific announcements to our students in more than one media: emails, and website announcements and tasks. We believe that a strong integration of a variety of learning materials has a beneficial outcome.

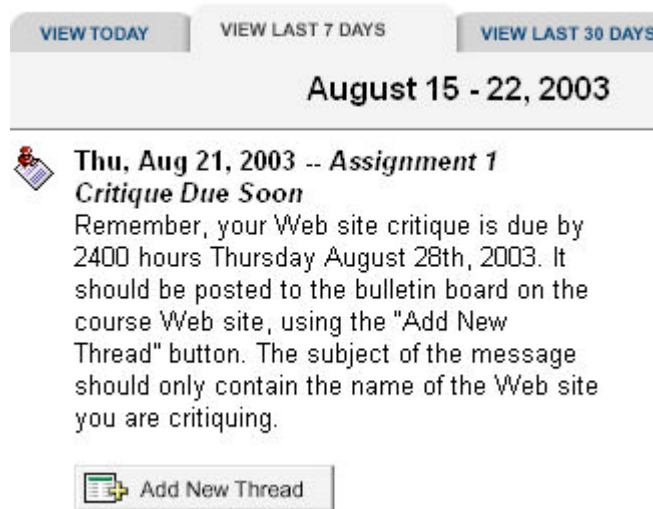
We send out weekly newsletter emails to all the students on the IWD 1 and Help Desk computing courses. These contain content such as class administration issues, relevant news items, motivational material and notification of changes to the course website. A major component of the emails is content related to the assignments, such as upcoming deadlines, milestones (what the students should have accomplished each week) etc. We re-use the weekly emails from previous semesters, but with some editing so it is possible to add new material, for example answers to questions that may have been asked in class. The weekly emails allow the students to revise what they should have accomplished each week, and to prepare for the forthcoming week. They are in a standard format that the students become comfortable with; student comments refer to them as being "well organised".

We utilise two types of announcements. Standard administrative or pedagogical announcements that are reused every semester and one-off announcements that may have come up, for example relevant news stories and questions asked by students.

An example of a weekly announcement from the IWD1 course: "In Week 3 the theory session is on search engines and effective searching while the practical session covers HTML Tables". The same text is re-used in the calendar tool, as a time-limited announcement on the front page of the website, in the weekly email, and in relevant discussion forum posts. An example of a relevant discussion forum post would be: "This week we covered search engines and effective searching in the theory

session. You may find it helpful to share your experiences of using search engines with your group."

An example of an administrative course announcement from a Blackboard hosted course is shown in Figure 1.



**Figure 1. An example administrative course announcement including an image, from Internet Applications, a Blackboard hosted course.**

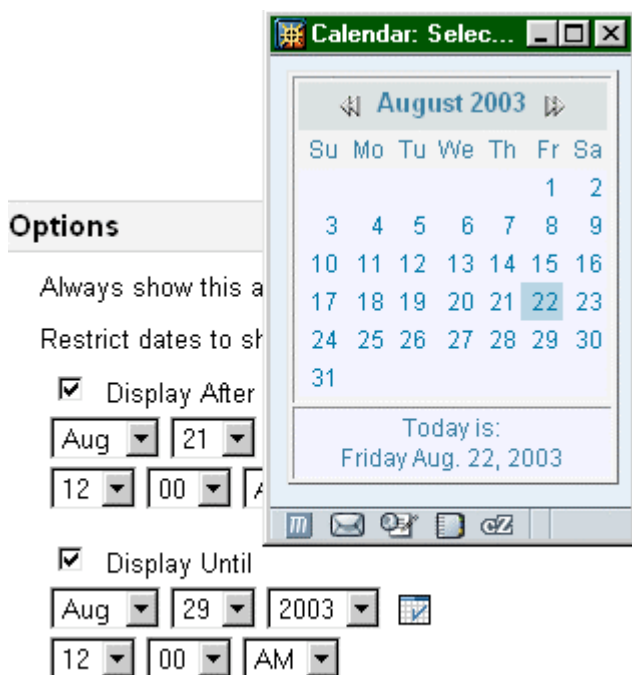
This also includes an image to help students who have never used the Blackboard discussion forum before. In this case the image used is one of the Blackboard images. To display a Blackboard image within a page of content it is simply necessary to identify the URL of that image and to include an HTML img tag including that address. The code for the image shown in Figure 1 is:

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WebCT has a batch upload feature where new data can be uploaded in the form of a comma-delimited text file. When we set the course website up at the beginning of each semester it is only necessary to adjust the dates in the text files. Often we can change these dates using search and replace, saving even more effort. The entire IWD website changeover process only takes about 2 hours in total despite involving many separate steps.

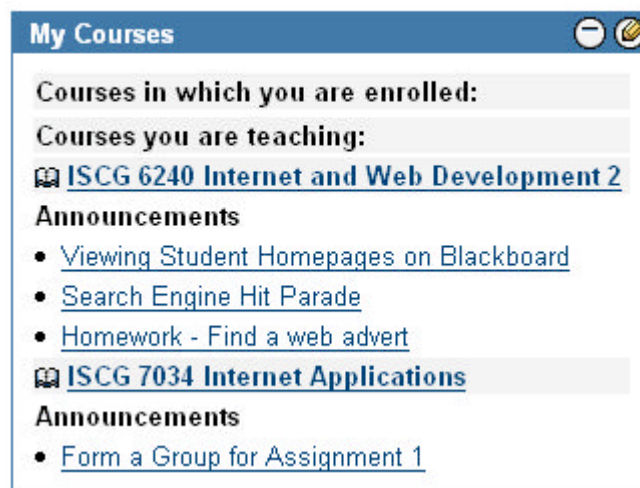
With Blackboard however, to change the dates and recycle announcements and tasks it is necessary to use the course administration web interface, which takes considerably more time, with many repetitive clicks of the OK button. Since there is no batch upload feature these authors have never used the calendar tool in Blackboard. The process of changing the date of an announcement is shown in Figure 2. It is important to be careful that the new date is correct, and Blackboard provides a convenient calendar tool in a pop-up window to check dates and days of the week.



**Figure 2: The Modify Announcement page in Blackboard allows dates to be changed, and announcements scheduled to appear. Also shows the calendar pop-up tool.**

One positive feature of Blackboard is that the course announcements appear on the students Blackboard homepage (see Figure 3). Rather than having to visit the discussion forum, the announcements are “pushed” to the students – they see them when they initially logon to Blackboard. However it does not facilitate student entry to the website since clicking on the link only leads to a My Announcements page. If the student’s interest is triggered by the announcement they would have to back out of the announcements page and then enter the course website to visit the page. It is possible to set up a deep link directly to the course content from an announcement in Blackboard (see section 5.4) although these lead only to a summary page rather than the individual item and the left-hand frame containing the main website menu is lost when following a deep link from the My Announcements tool.

## Welcome, Stuart



**Figure 3: The My Courses toolbox on the Blackboard homepage. This does “push” announcements to students, but it does not encourage follow-up traffic to the course website.**

### 5.3 Tasks

The Blackboard Tasks tool, allows students to see what tasks are currently due. Students can order these by priority or due date, and can change priority and toggle their Tasks from "Not Started" to "In Progress" to "Completed". Initially we thought that this would be a powerful tool for students to manage their own learning, and both authors began to use the Tasks tool in our Blackboard hosted computing courses in Semester 1, 2002. However rates of student usage of the Tasks tool were disappointing, despite the fact these are “pushed” to the student and appear on the Blackboard student homepage. Student comments include “I did complete that task, I just never got around to turning it off”.

### 5.4 Student Usage of the course website

We utilise a number of techniques for encouraging students usage of our course websites. These include:

Continual reminders in other media such as weekly emails, course notes and PowerPoint slides.

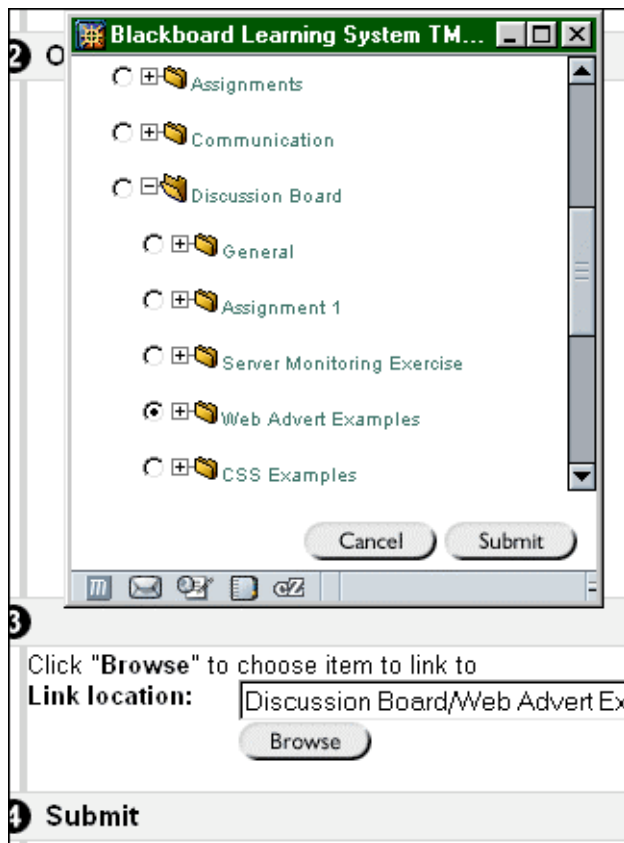
Demos in-class - in particular one of the authors makes a point of always demonstrating the useful tools and course readings for that session by linking to them from the course website (rather than from the PowerPoint slides or from browser Favorites or Bookmarks). It is hoped that this background marketing will familiarise the students with the website and encourage them to visit every week.

Checking student access in the website visitor logs and emailing those students who have not made any use to the website. Ideally this would be done automatically, but neither WebCT nor Blackboard provides this facility.

To encourage use of a web resource, it is best to make it as easy to access as possible, ideally by linking directly to it (often called deep linking). It is possible to create deep links directly to course content in Blackboard 6.0, but

these lead only to a summary page rather than individual items. In addition, as Solomon (2003) also pointed out, these deep-links cannot be added to discussion forum posts.

The process of creating deep links is an example of the repetitive nature of the Blackboard administrative interface (see Figure 2). To create a link it is necessary to browse a navigation panel showing the course structure and pick the page. It is not possible to simply type the path into the Link location: box. The text used for the link is non-editable – it would be ideal to be able to edit this to provide a more descriptive link phrase.



**Figure 4. Adding a link to course content in Blackboard is tiresome using the Browse tool.**

## 5.5 Quizzes

Many researchers highlight the pedagogical benefits of student self-assessment using computer-supported quizzes. We provide weekly multiple choice quizzes in IWD 1. These are well received and relatively well-utilised by the students. We believe that they encourage the students to keep a weekly structure to their learning, and they are also utilised for exam revision. WebCT offers a convenient batch upload feature for the quizzes which we used when we initially set up the course website. However Blackboard only has the web administrative interface. It is thus so time-consuming to author a Blackboard quiz that neither author has considered implementing weekly quizzes in their Blackboard-hosted courses despite the obvious pedagogical benefits that student self-assessment can bring.

## 5.6 Community Leaders

Kim (2000) discusses the importance of encouraging online community members to become leaders and help other members. Leaders can either be in some official capacity, or simply enthusiastic members of the normal community. Oliver et al., (1997) suggest that "ways to encourage capable students in the class to spend the time to view postings and submit solutions, and tips and tricks" should be integrated into the online environment.

We describe our attempts to encourage student leaders within the IWD 1 and Help Desk courses in previous research (Young & McSporran, 2002).

We also acknowledge student excellence by highlighting the best student work. The best student assignment websites are displayed in an annual gallery, and examples of good work in class exercises are highlighted and acknowledged. This is a driver for encouraging quality student work.

One of the authors has experimented with using the Blackboard discussion forum as a shared knowledgebase, but like all of the non-assessed forum activities trialled, there has been little student participation in this exercise.

## 6 Conclusion

To build a successful community of learners online is very time-consuming. Major contributing factors include:

- Motivating and responding to students online;
- Repetitive nature of the administrative interface of the LMEs;
- Lecturer must learn and practice new ICT skills.

If employing teaching assistants is not an option, then to avoid lecturer burnout it is necessary to save time by recycling content, encouraging student leaders, good time-management and good choice of ICT (for example limiting use of the built-in tools in the LMEs in favour of other software with a more flexible and less repetitive administrative interface).

Content can be redistributed and reinforced in a variety of integrated media such as emails, discussion forums, course notes (both hard and soft copy), exemplars, and in the various tools provided by the LMEs such as calendar, announcements and tasks. It is ideal to automatically schedule the appearance of this content to students, to limit lecturer workload while encouraging students to keep to a structure.

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