



Using the WWW in Teaching

Is it worth the effort?

Professor Brian Stone

University of Western Australia

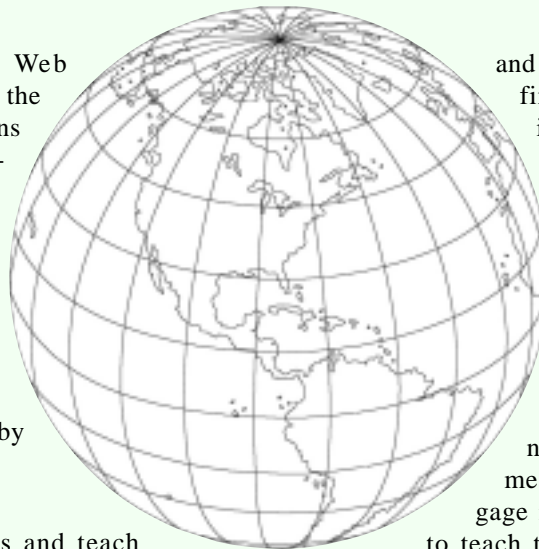
This article is a summary of a presentation made at CDTL on 12th February 2000.

The use of the World Wide Web (WWW) in teaching has been on the increase. There are many reasons for this and often it is a combination of some of these reasons that result in a new 'convert' to the WWW. Typical reasons, in no particular order of importance, are:

1. to be or to appear to be 'Hi-Tech',
2. to satisfy a requirement by an employer,
3. to aim at teaching better,
4. to reduce teaching loads and teach more efficiently,
5. to be able to teach at a distance, and
6. to allow students more choice in how and when they learn, often termed flexible delivery.

In the writer's case the main motivation was the desire to teach better. The subjects involved were first year engineering dynamics and vibration. Both of these topics involve motion and the ability to animate motion was clearly an advantage compared to a static blackboard or overhead projector. As a result of many years of computer simulation of dynamic systems, it was not too difficult to produce animations for the WWW. Some examples of the material produced for vibration may be seen at <http://www.mech.uwa.edu.au/bjs/Vibration/OneDOF/>. (In particular, try the example at <http://www.mech.uwa.edu.au/bjs/Vibration/OneDOF/OOB/Starting/OOB.html>.)

The animations are used in lectures and students may investigate their understanding by varying parameters



and seeing what happens. The writer finds some satisfaction in producing 'good' material, particularly when student surveys show that the animations were helpful. It is also satisfying when other institutions use the material.

One of the major advantages of producing such WWW material is not immediately obvious. As the delivery platform is relatively new and has few constraints, it means that the lecturer will often engage in serious reflection on how best to teach the material. Many teachers just teach in the way they were taught and rarely reflect on the way they teach.

In the writer's experience it has been noticed that though good WWW notes with animations are appreciated by students, it is rare for such material alone to result in raised pass rates in exams. The only demonstrated way to improve pass rates has been found to be by using the WWW as a tutoring system with continuous assessment. Such a WWW-based system has been developed at the University of Western Australia (UWA) and a recent project has resulted in the transfer of this technology to the Faculty of Engineering, NUS. Students are given a series of problems to solve and enter their answers via the WWW. The system is diagnostic so that students get immediate feedback on wrong answers. After doing a set of required but not assessed problems, the students then proceed to do some assessed problems. An online help forum is attached to each problem. Lecturers only have to answer any question once as all students can see the posted questions and responses. An example of the system may be viewed at <http://>

www.mech.uwa.edu.au/courses/e101/. (Choose 'the computer-based tutorial system' and use the 'guest' facility.)

It has been found that the WWW-based tutorial system produces improved exam performance *if* the students make full use of it. It has also been found to be very efficient in staff time. The system also has a comprehensive monitoring facility so that the lecturer is at all times fully informed about the progress of the whole class. This informs the lectures so that they may be adjusted appropriately to the various difficulties being experienced by the class.

The tutoring system has been extended to calculus and uses *Mathematica* to check answers in equation form. Again diagnostic feedback is given and is quite detailed, giving the parts of the equation that are wrong. This may be viewed at <http://ae.maths.uwa.edu.au/>. (Again use the 'guest' facility.)

The question that was posed at the start, "Is it worth the effort?", needs now to be addressed. For most academics, the effort in writing WWW pages is significant. To produce interactive animations and diagnostic tutorials is far more demanding. Recently, I co-presented a keynote paper entitled: 'We did it our way—you must do it your way'¹. The main thrust of the paper was that the skills/knowledge of individual lecturers varies so much that each will develop material in a unique way. Some will be able (as N.W. Scott and myself were) to write all their own material. Others will need expert assistance in the areas of programming and multimedia. However the effort required is very significant. So is it worth the effort? Consider some good and bad outcomes, such as the following:

Better Teachers

Though perhaps obvious, it needs to be stated that poor teachers and poor materials do not somehow transform into being excellent, simply by using the WWW. The writer has had many uncomfortable moments with people who wish to show their (in my opinion) very poor material. It is a major issue for all universities to develop some policy statement on quality of WWW materials. Is there to be some central control and checking of material or are staff to be responsible for their own pages? Whatever is decided, the result can have major implications on the enthusiasm and creativity of staff. If the control extends to specifying the exact format/layout of WWW pages, then creativity is inevitably killed. WWW pages that make good and innovative use of the WWW require the freedom to be creative. However teaching may improve significantly, particularly if serious reflection occurs while creating WWW material.

Promotion and Recognition

Some universities take teaching into account when promotion is considered. The use of the WWW in teach-

ing may then prove to have been very helpful. Also some universities and countries have significant prizes/recognition for outstanding teaching. In Australia, the National Teaching Awards are worth A\$40,000 to the winners in each category. If a university wishes to improve teaching, then appropriate rewards are a necessary part of the process. The culture of 'publish or perish' is a serious handicap to improving standards of teaching.

Dependence on Programmers

For most academics, the need to do research and publish means that they do not have the time to produce excellent WWW materials. The solution is often to attempt to get grants/money to employ programmers and multimedia professionals. These people rarely have any specialist knowledge of the subject matter to be put on the WWW. As a result, it is possible for the academic to expect too much and not give the guidance that only an experienced teacher can give. It is also often the case that good programmers, after gaining the necessary skills and producing a 'product', are not retained. The expertise lost is often catastrophic so that a policy of long term opportunities for programmers is both cost-effective and necessary to the maintenance and upgrading of WWW pages. Universities must therefore be aware of the costs of producing and maintaining good WWW materials and provide the appropriate funding.

Final Word of Advice

It is our experience that academics who decide to make an investment in producing WWW pages often aim too high. It seems to be a characteristic of academics that they wish to attempt Mount Everest before climbing smaller mountains. The result is they fall short and nothing useful and of good quality is produced. We have come to the view that nothing is too simple if it is helpful to students. We now have a preference for numerous small building blocks. Each has a very specific purpose and may be used in a variety of contexts—something like the pictures available in *ClipArt* software though this is now rather *ClipEd* (as in Education). Thus WWW pages may use a selection of such material and academics may add to the collection.

Conclusion

The effort in producing and maintaining good WWW material is significant. To expect academics, who have many other demands on their time, to take on this extra load is unrealistic unless **good teaching and good quality WWW materials receive appropriate recognition in the promotion process.**

Reference

1. Scott, N.W. & Stone B.J. 'We did it our way—and you must do it yours'. Keynote paper at AaeE Conference, Adelaide, September 1999. *Australasian Journal of Engineering Education*. Vol 8, No 2, Nov 1999. pp. 99-123.□

The Faculty of Pharmaceutical Sciences Web-Based Learning Centre

Simon P. Albon

Senior Instructor
Faculty of Pharmaceutical Sciences
University of British Columbia, Canada

Introduction

As the tidal wave of technology continues to sweep over the University of British Columbia (UBC), the Faculty of Pharmaceutical Sciences, like most faculties at UBC, is greatly challenged to deal with the technological onslaught in the face of limited resources and time, and increasing public demands and professional pressures. In recent years, a shift placing greater emphasis on learning has begun to emerge in the Faculty as 'pioneers' practise more progressive approaches to education. This evolving learner-centred approach to pharmacy education has the potential to be combined with computer technologies, the Internet and the World Wide Web (WWW) to create effective educational resources to further develop student learning, as well as enhance teaching practice. This article provides a description of our Web-Based Learning Centre prototype developed specifically to utilise educational technology to facilitate and support on-going pedagogical change in our pharmacy programme.

The Web-Based Learning Centre (WBLC)

The WBLC prototype success fully integrates four pharmacy courses in two disciplines of the pharmaceutical sciences into a seamless re-

source. Components of the WBLC include the WBLC homepage and four *WebCT*¹ courses. The interface utilises a combination of text, animation, stills, hypertext linking, and a simple navigation system to meet the pedagogical objectives of the project.

1. The WBLC Homepage:

- represents the focal linking point of the WBLC resource providing operational information as well as links to individual *WebCT* courses (see Figure 1), and
- contains a main menu that leads to these sections: 'Getting Started', 'Tutorials', 'Site Map', 'Frequently

Asked Questions', 'Project Background', and 'Design Team'.

2. Each WebCT course contains:

- a homepage built on top of the WebCT framework,
- six common internal elements,
- links to improve integration within (Intralinks) and between (Interlinks) pharmacy courses,
- links to other sites on the Internet (URLs),
- graphics, animation, and stills to enhance course materials,

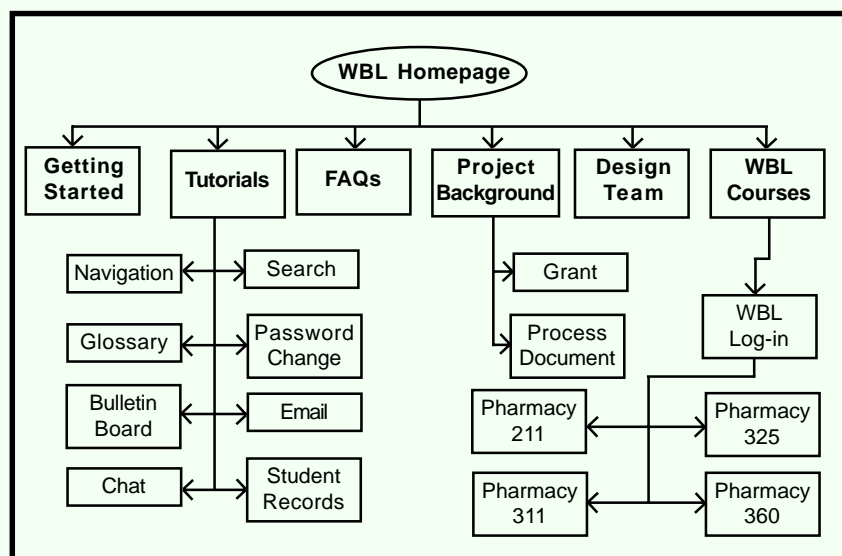


Figure 1: Site map for the WBLC Resource

- an integrative problem to promote the use of the resource links, and
- a set of communication tools including email, bulletin board, and real-time chat.

3. The features of the interface include:

- a simple navigation bar based on a 'three clicks to anywhere' principle (*see Figure 2*), which ensures that students get anywhere they want in the WBLC web site within three clicks of the mouse.

- providing new learning opportunities in the form of integrative case-based problems designed to utilise the resource links, and
- providing an improved sense of a learning community through extensive communication and feedback mechanisms.

Future directions of the WBLC project includes release of the latest version of the prototype in September 2000 with a full evaluation of the resource to be completed by the end of the 2000–2001 academic year. The WBLC can be visited at <http://www.ubcpharmacy.org/wbl>.

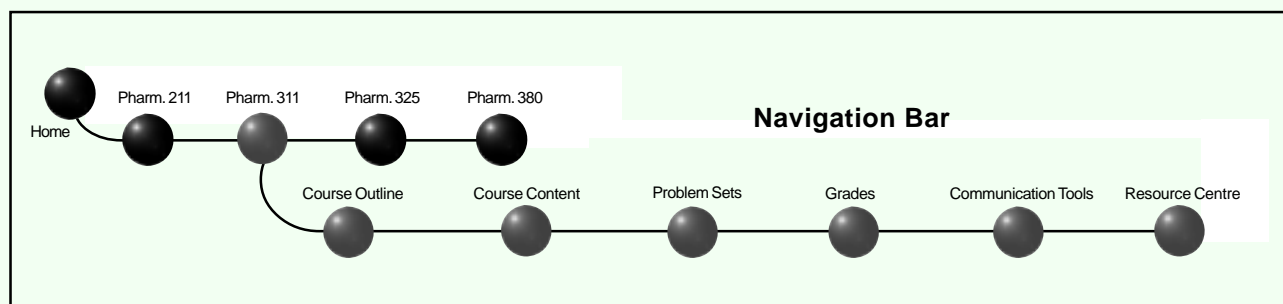


Figure 2: The Navigation Bar used for the Pharmacy 311 course

- a comfortable visual environment, and
- common design elements and icons in each course.

WBLC Effectiveness

Implemented in the first, second, and third years of our pharmacy programme during the 1999–2000 academic year, the WBLC prototype has the potential to address the limitations in our current pharmacy programme at both the individual course and overall programme levels. Although the effectiveness of the WBLC has not been fully evaluated, early observations indicate that the prototype does overcome some of the traditional barriers to teaching and learning in the current pharmacy programme by:

- integrating course materials between different disciplines of the pharmaceutical sciences with the strategic use of hypertext linking (Intra- and Interlinks),
- providing enriched learning materials through the use of interactive multimedia,
- providing improved access to resource materials through the Internet and WWW,

Footnote

1. *WebCT* (Web Course Tools; <http://www.webct.com>) is a software product developed at and licensed from UBC which provides a template for faculty members to create password protected courses in the web environment. *WebCT* is a powerful tool that provides approximately 30 different tools to support 3 aspects of course design: course development, administration, and communication. □

Computer-Mediated Collaborative Learning: Laying the Foundation for an Awareness of Regional Perspectives

J.A. Gilles Doiron

Principal Educational Technologist, CDTL

Many world-class tertiary education institutions have taken steps to broaden the knowledge base of their students by exposing them to a multi-disciplinary core curriculum. In a similar way, student exchange programmes and credit for external courses at a university from abroad contribute greatly to the formation of the knowledgeable 21st century professional. They enable the students to experience learning from different social contexts, and to discover the influence of cultural, political and economic realities on the application of knowledge. Our future ASEAN professionals can benefit greatly by being cognisant and attentive to each other's perspectives.

In this era of pervasive desktop information and communication technology (ICT), there are new ways to initiate and encourage the development of cross-cultural social and professional relationships. Prevalent web applications such as email, discussion forums, bulletin boards, and relay chats can be used to enable online collaborative learning activities (Gay, G., & Lentini, M., 1995). Such activities can contribute to promoting regional collaboration and partnership, or improving local and regional competitiveness.

Even with the large diffusion of computers in all faculties, the extent to which their use will ultimately affect the conventional teaching model is not very clear (Beckett, D., 1998; Faseyitan, S.O. & Hirschbuhl, J., 1992). However, it is clear that ICT is enabling a shift towards a student-centred, socio-constructivist approach in acquiring and assimilating new knowledge. Hence, computer-mediated collaborative learning is a viable approach for sharing and refining an individual's own construct of knowledge. This approach, which uses ICT to monitor and enable small peer group teamwork, is gaining recognition because of its focus on the students' validation of their own perspectives through peer and mentor feedback (Larose, F.D., Dirand, R., Karsenti, J-M., Grenon, T., Lafrance, V., Sylvain-Cantin, J., 1999).

Computer-mediated collaborative learning also inherently promotes the creation of the rules of online social interaction while providing insight into efficient online human communication. It requires responsible social interaction among participants, and promotes teamwork organisation, relationship building and incidental learning, while exposing each individual to regional variants of curriculum relevant issues.

One example of the critical importance to understanding regional variants is a concern of ASEAN law firms. In his opening address at the 4th ASEAN law ministers' meeting held in Singapore in November 1999, Prime Minister Goh Chok Tong concluded: "Finally, to achieve many of these tasks I have raised, a more basic need must be achieved in ASEAN: greater networking, more mutual understanding and knowledge-pooling among our legal institutions and people. We should not confine it to only the officials. We should harness the private legal profession as well as University Law Faculties and other legal institutions. I am pleased that the Law Ministers have been discussing how to establish such networks for the legal officers and law graduates of ASEAN countries." In his vision of the development of ASEAN, the Prime Minister is clear in his expectations that professionals throughout ASEAN must have closer ties in order to achieve a personal level of understanding and support that will lead to regional growth and prosperity.

In response, it seems that ASEAN Law students need to establish better communication and cultivate understanding among themselves, specifically those students who will shortly take up their employment in a local law firm. They will surely find that the nature of their job will become increasingly reliant on ICT to support vital regional networking.

To prepare them for this eventuality, the Faculties of Law, with appropriate ICT facilities, from across ASEAN could assign some final year students to online teams (3-6 students from different countries). Through a dedicated web site giving access to the necessary online communication tools, a lecturer or student would be able to post a case study in a discussion forum environment. Such assignments could highlight an area of knowledge specific to the social, economic, legal, cultural, political and physical realities of a particular region. Participants from other universities would be required to post comments about each case study and point out the differences with respect to the perspectives from their own region. Student groups could also collaborate through email, file transfer, discussion forums and chat sessions in order to research and co-write a term paper covering some aspect of regional collaboration related to their profession. Other strategies such as role playing in a given scenario, team problem-based learning assignments, and online debating team competitions could also be explored.

Will these activities promote socialisation? Certainly we know that from the start the World Wide Web (WWW) was intended to help connect people with common interests. Now with a much wider reach it's easier for people to make new friends (Parks, M.R. & Floyd, K., 1996). Though it must be noted that social interaction on WWW sites having unrestricted access is subject to anti-social behaviour, restricted membership access provides the means for accountability. The convenience of real-time (synchronous) and delayed response (asynchronous) communication has also spurred the adoption of computer-mediated communication (CMC) as an acceptable mode of social interaction (De Kerckhove, D., 1997).

Relationship building through CMC is a pragmatic exercise, which could enable students to experience the social, economic and political realities within ASEAN. Its importance with regards to institutions and individuals involved in regional and global cooperation will increase proportionately with the propagation of ICT to every corner of the world. Can undergraduate students with common learning goals, but from different ASEAN countries, collaborate effectively through CMC activities for sharing knowledge? Can such activities lay the groundwork for relationships beyond the boundaries of the project? Will participants exhibit responsible behaviour, and gain the trust and support of online colleagues? These are some of the questions to investigate.

References

- Beckett, David. (1998). 'Disembodied Learning: How Flexible Delivery Shoots Higher Education in the Foot, Well Sort of'. *Electronic Journal of Sociology*: 3, 3. [<http://www.icaap.org/iuicode?100.3.3.2>]
- Faseyitan, Sunday O., & Hirschbuhl, John. (1992). 'Computers in University Instruction: What Are the Significant Variables That Influence Adoption?' *Interactive Learning International*. 8(3):185-94.
- Gay, G., & Lentini, M. (1995). 'Use of Communication Resources in a Networked Collaborative Design Environment'. *Journal of Computer Mediated Communications*. Vol. 1, No. 1.
- De Kerckhove, D. (1997). *Connected Intelligence*. Toronto: Somerville House Publishing.
- Larose, François David; Dirand, Robert; Karsenti, Jean-Marie; Grenon, Thierry; Lafrance, Vincent; & Sylvain-Cantin, Judith. (1999). 'Information and Communication Technologies in University Teaching and in Teacher Education: Journey in a Major Québec University's Reality'. *Electronic Journal of Sociology*: 4, 3. [<http://www.icaap.org/iuicode?100.4.3.3>]
- Parks, M.R. & Floyd, K. (1996) 'Making Friends in Cyberspace'. *Journal of Computer Mediated Communications*. Vol. 1, No. 4.
- Speech By Prime Minister Goh Chok Tong at the 4th Asean Law Ministers' Meeting on Friday, 5 November 1999. Singapore Government Press Release, Media Division, Ministry of Information and The Arts. <http://www.gov.sg//mita/pressrelease/99110501.htm>. □

Use of the World Wide Web in Teaching: A Personal Experience

Dr Raj Komaran

Formerly from Department of Marketing
Faculty of Business Administration

The widespread application of Internet technologies and the World Wide Web (WWW) will transform the process of instruction and learning. The fact that web-based information, especially that over the Internet, can be retrieved by anyone, at any time and anywhere, is forcing instructors and academics to ensure adequacy, accuracy, and currency of their material. There are, however, some drawbacks.

Problem of Pedagogical Balance

Virtual lessons add variation to face-to-face sessions, but there are risks that the habitual adoption of digitised notes, graphics, audio files, video clips, and hyperlinks may discourage students from serious reading of print material that contain more scholarly and researched work.

Keeping Up With the 'Competition'

With increase in the amount of material available on the Internet, there will be anxiety to be distinctive. For example, in the field of statistics, a simple keyword search for topics such as 'Chi Square' and 'ANOVA' will call up a great number of different professors' approaches and resource banks. Inevitably, students will compare courses and material as long as they are accessible on the Internet. Besides the preoccupation with multimedia, instructors may find it difficult to keep up with evolving technologies and e-learning software.

Temptation to Plagiarise

The Internet is a good source of data, information, and reports. But in encouraging its use for research, some students may be tempted to plagiarise, both unwittingly and deliberately, as it is easy to copy and paste from online journals, reports, abstracts, newspapers, and newsletters.

There is no doubt that the Internet and the WWW are here to stay. What follows are some tips derived from my own experience:

Some Do's

1. When authoring your course web page, ensure that every hyperlink is relevant to the course because the presence of unrelated or expired links can confuse and frustrate your students.
2. When using a 'live' web page for a class, go early to class to cache the web pages on the personal computer (in the lecture hall/classroom) to speed up the downloading during use, but be ready with backups such as screen captures or saved versions of critical web pages in case of connection problems.
3. Regularly check the hyperlinks on your site and update your web pages for new semesters.
4. Design the pages for easy navigation by adopting a uniform format throughout the semester.
5. Schedule student research on material from the Internet as

supplementary assignments and classify web-based information as supplementary reading after your students have done the required reading of print references.

6. Assign groups or individual students to report on content relating to course topics on the WWW and evaluate the veracity of such material in class.
7. Have a 'What's New' section for easy reference and access to information that is newly posted.
8. Get suggestions from students—the ultimate users. They are net savvy and spend more time accessing the Internet for different purposes and different courses.

Some Don'ts

1. Don't attempt to emulate all that others are doing. Instead, try to understand their design features and adopt those that suit your course.
2. Avoid large files because of potential downloading problems. It is tempting to use high-resolution graphics or to digitise video and audio clips for the web, but such files usually require longer time to load because of bandwidth limitation when accessed from homes.
3. Resist the temptation to hyperlink to tangentially related sites or even to humour sites. Focus on the integrity and professionalism of your site.

The WWW and the Internet are not just about improving the visual and content but represent a revolution in the way learning will be accomplished. Just as people have adjusted to the arrivals of new technologies through the ages, innovative educators are developing and introducing new pedagogies for online instruction and training. For instance, one possible development is for instructors around the world to work together to offer joint courses. New technologies and software can improve the methods of presenting information, knowledge integration, project assignment, and assessment, only if instructors have the resolve to use these new tools at hand. □

Glossary of Basic Technical Terms

(used in this *CDTL Brief*)

World Wide Web (WWW, Web), the:

a global system of connected documents on the Internet where information is published (in textual, visual and/or audio format) and accessed through a web browser

Internet (Net), the:

a global network of individual computers and smaller computer networks that allows all connected computers to exchange and share information

Intranet:

a network of computers within an organisation or company that functions very much like the Internet, except that it caters exclusively to the organisation or company

web site:

a collection of web pages on the WWW belonging to a single organisation, company, or party

web page:

a document on the WWW containing information in textual, visual and/or audio formats

web browser:

a programme used for viewing web pages on the WWW (e.g. Netscape Navigator, Microsoft Internet Explorer, etc.)

hyperlink:

a connection from a point in one web page to another point within the same page or in another page on the same web site, or on a page in another web site

hypertext:

text that contains a hyperlink

cache:

an area on the computer's hard drive where previously accessed information is stored for quicker viewing when the information is accessed again

screen capture (screen grab, print screen):

temporary saving of the current



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These include teaching and learning support, research on educational development issues, as well as instructional design and development.

contributors

Brian Stone, Simon P. Albon,
J.A. Gilles Doiron, &
Raj Komaran

advisor

Daphne Pan

editors

Christina Low & Verena Tay

content editors

J.A. Gilles Doiron & Kiruthika Ragupathi

layout

Ma Lin Lin

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Comments, suggestions
and contributions
should be addressed to:

The Editor, *CDTL Brief*
Centre for Development of
Teaching and Learning
Central Library Annexe, Level 6
National University of Singapore
10 Kent Ridge Crescent
Singapore 119260

Tel: (65) 874 4692

Fax: (65) 777 0342

Email: cdtlowc@nus.edu.sg

<http://www.cdtl.nus.edu.sg>