Taking Medical Education into the New Millennium:
Implementing Problem-based Learning (PBL) in the Faculty of Medicine

by the Dean & Members of PBL Committee
Faculty of Medicine

The Medical Curriculum: Need for Change

"...the NUS Faculty of Medicine needs to respond decisively and appropriately to the rapid changes in medicine and medical education, to ensure that its graduates are well equipped to meet the challenges of medical practice in the years ahead."
(Dean's Message, Curriculum Bulletin, No. 1, March 1999)

Many leading medical schools in the world have extensively revised their respective course curriculum to prepare 'Today's Medical Students' to become 'Tomorrow's Doctors'. Our Faculty of Medicine has recognised that there are clearly "a number of potential short-comings" with the existing *traditional* undergraduate curriculum. First, students lack a clear perspective of the context and the clinical significance of their learning in the early years of medical school, due primarily to a lack of integration in the teaching of the basic science disciplines, as well as between the basic sciences and the clinical disciplines. Moreover, the traditional lecture, the main instructional mode used, provides a mainly passive learning environment that promotes the memorisation and regurgitation of facts in examinations.

The need to revise the medical curriculum was therefore inevitable. In the academic year 1999/2000, the new undergraduate medical curriculum will be implemented for Year I students. The "direction and substance of the curriculum reform—was guided by the vision of the type of graduate which it aspired to train", as stipulated in the overall educational objectives of the medical course. In essence, our Faculty has adopted "an *integrated systems-based* approach supplemented by *problem-based learning* methodologies" so as to "encourage active learning processes while ensuring that the medical graduates retain a strong basic science foundation which would underpin their clinical practice" (Dean's Message, op. cit.).

Problem-based Learning (PBL) and Its Expected Educational Outcomes

"Problem-based learning (PBL) is grounded in the belief that learning is most effective when students are actively involved and learn in the context in which knowledge is to be used."
(The Challenge of Problem-based Learning, 2nd edition, edited by D. Boud and G. Feletti, London/Stirling (USA): Kogan Page Ltd, 1997)

Taking Medical Education in the New Millennium

Problem-based learning (PBL) is an innovative educational approach with the potential to enhance the educational process and its outcomes. The main instructional strategy used in PBL is the *small group tutorial* in which students are actively involved in and take greater responsibility for their own learning and the teacher/tutor *facilitates* the learning process that is therefore highly *student-centred*. In PBL, content learning occurs in the context in which knowledge acquired is applied to understanding or solving problems commonly encountered in medical practice.

Essentially, PBL is *problem-first* learning (i.e. *before* the acquisition of new knowledge). The problem presented in the first tutorial (Session I) serves as the stimulus and focus of learning. It then leads progressively to *student-directed* problem analysis, generation of ideas and hypotheses, identification of learning needs and issues (goals, objectives), assigning learning tasks to group members and search for information through independent self-directed study, including the use and evaluation of appropriate resources (including staff expertise) available. In the second tutorial (Session II), students share and integrate their newly acquired knowledge to re-analyse the problem, critique and refine their initial hypotheses and then attempt to resolve the problem. Students also perform *self-* and *peer-evaluation* (including the tutor) regarding individual and group progress in and contributions to the learning process and the learning achieved.

The expected educational outcomes of PBL include knowledge acquisition with sound comprehension, enhanced knowledge retention and recall, and motivation of student learning through the joy of learning in a PBL environment. Students also have better opportunities to develop critical thinking and reasoning, and problem solving skills with enhanced ability to *apply, analyse, synthesise* and *evaluate* information and knowledge. Through group work, students also learn and develop important *process skills* (including communication, interpersonal and social skills), peer instruction and interaction, and self- and peer-evaluation, independent self-study, teamwork, cooperation and the efficient and critical use of resources. More importantly, achieving the overall educational outcomes will foster the development of *independent, self-directed* and *lifelong learning*.

Implementing PBL in the Faculty of Medicine

In the academic year 1999-2000, 20% of the curriculum time for Year I will be allocated to PBL which, together with our revised conventional curriculum, will form a *hybrid* system similar to that implemented in the Harvard Medical School. Each small group will have 10-12 students with a total of 17 tutorial sessions running simultaneously during each study period. A pool of 50 tutors (comprising mainly Year I teachers with some clinical teachers) will serve as facilitators for the PBL sessions.

Getting Teachers and Students Ready for Change

As our medical curriculum is deeply entrenched in traditional methods of teaching, the need to change the *mindsets* of teachers from teacher-centred lecturer to student-centred tutor (facilitator) and those of students from highly teacher-dependent students to skilled independent learners is of utmost importance. Strong conviction to the cause, commitment, dedication and much enthusiasm are required to ensure the successful implementation of PBL. The Dean's unstinting support and clear vision has played a pivotal role in this respect. Conducting training for staff and students *in-house*, instead of using external expertise, greatly reduced implementation costs.

Our faculty formed a PBL Committee in January 1999 with the following as members: Matthew Gwee (Chairman), P. Balasubramaniam, Rethy Chhem, Khoo Hoon Eng and Kuldip Singh. The Committee organised the first full day PBL Workshop on 27 February 1999 with the theme: *Let's Work Together*. A pre-workshop meeting was held for pre-assigned tutors to view a videotape illustrating a PBL session in action. At this workshop mainly for Year I teachers, some members of the Committee spoke on Promoting Active Learning, The PBL Process, The Role of the Tutor and The Use of Resources for PBL. A practice session followed with some teachers taking on the role of tutors and others as learners working through a non-medical problem ('How to design a poets' corner in NUS?') in a typical PBL small group tutorial session.

At the end of the practice session, group 'scribes' presented the *learning issues/goals* identified by the respective groups and also responded to the following questions: 'Was peer instruction and interaction good? Was discussion focused? Did you need a 'content expert' to facilitate the discussion? Was there any 'silent introvert' in the group? Was the session enjoyable? Was the facilitator more dominant than group members? Can you apply the process to a student group?' The overall consensus to all the questions posed was highly positive, clearly indicating that group functioning proceeded well during the learning period. A more formal feedback was carried out with encouraging responses from participants: 21 rated the workshop from '*good*' to '*very good*'; 4 considered it '*fun*' while 23 considered it '*useful*' to '*useful and enjoyable*'.

A second half-day workshop for Year I teachers was held on 12 April 1999. A different group of teachers was selected as 'tutors'. An important feature of this workshop was that thirty Year II students were invited to participate as three groups of 'learners' together with six groups of teachers. The problem ('The Claw Hand') selected dealt with a medical case written by Professor Balasubramaniam. A pre-workshop briefing was again arranged for the selected tutors. The feedback from teachers (28) was again very positive: the practice session was considered by the respondents as 'useful' (14), '*useful and enjoyable*' (9), '*great fun*' (1) and '*blur*' (1); the overall evaluation for the workshop was '*satisfactory*' (6) and '*good*' (18). Student responses (19) to the same items were 5, 11, 1 and 2, respectively, and 4 and 8 for the overall evaluation. Students also responded to the following items:

PBL vs. Classroom Lecture	Yes	No
1. Is PBL session more enjoyable?	16	3
2. Do you learn better in a PBL session?*	12	6
3. Is PBL more demanding and more stressful?	13	6
4. Would you like to have a few PBL tutorials, in addition to your normal classroom lecture?	16	3

* 1 student mentioned that he thinks better during the PBL session, but he's not sure about learning.

Problem-based Learning
in the Faculty of Dentistry

by Associate Professor Grace Ong
Faculty of Dentistry

One challenge that educators face is to impart to students the skills to cope with the rapid expansion of knowledge and technology. Passing on knowledge is no longer critical because this information becomes obsolete too soon. Therefore imparting learning skills and processes that will facilitate the student to become independent lifelong learners is now more important.

The Faculty of Dentistry introduced problem-based learning (PBL) in 1996. PBL is student-centred learning where the teacher acts as a facilitator, rather than a resource person. In PBL, a 'case' is used to develop an effective reasoning process, self-directed learning skills, motivation for further learning as well as interpersonal and communication skills. Cases can be written to link different subjects and used to show the student the usefulness of such cross-disciplinary information.

Our Experiences With PBL

We wanted students to benefit from the PBL process as quickly as possible rather than wait until a complete curriculum overhaul allowed full PBL implementation. So PBL tutorials were conducted along with traditional lectures and tutorials. Within the constraints of the existing timetable, Year III and IV students attend one PBL session per week. Ideally, in a full PBL curriculum, there are normally two PBL sessions per week with afternoons as reading time.

Teacher Training

The facilitators must be properly trained. A change in mindset is essential, but training gives the facilitator the skill to 'withhold' teaching and be a listener and guide. Originally, 8 tutors were trained. We later ran our own training sessions and now we have a pool of 16 tutors. Only staff who were interested participated and taught PBL in addition to their normal workload.

Facilities

PBL tutorials are structured such that all the small groups (6-8 students each) run simultaneously. This meant that the existing number of tutorial rooms was inadequate. We had to re-designate some spaces to meet this demand. The other important facility is a well-equipped library because all the students will be searching for similar information simultaneously. This sometimes caused problems as articles or journals were unavailable.

Cases

Starting from scratch, writing new cases takes a tremendous amount of time. Tutors have to meet frequently not only to write cases, but also briefings (before starting new cases) and evaluations (of both cases and students).

Feedback

Staff: All the PBL tutors will agree that this process is demanding on our time; however, all are enjoying the sessions. Some have found tutoring 'quiet' groups very trying; but generally once the students learn what is expected of them, they deliver at later sessions. So far, staff who are involved are still enthusiastic.
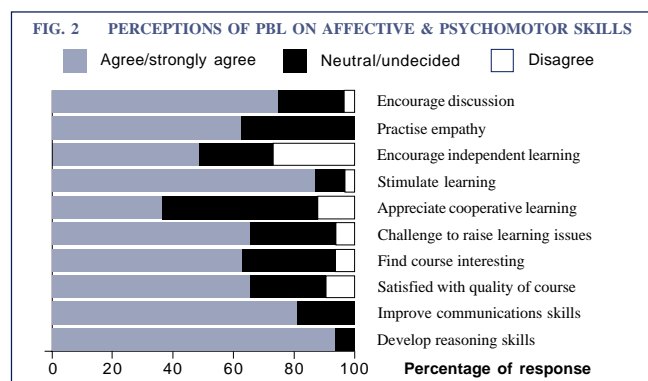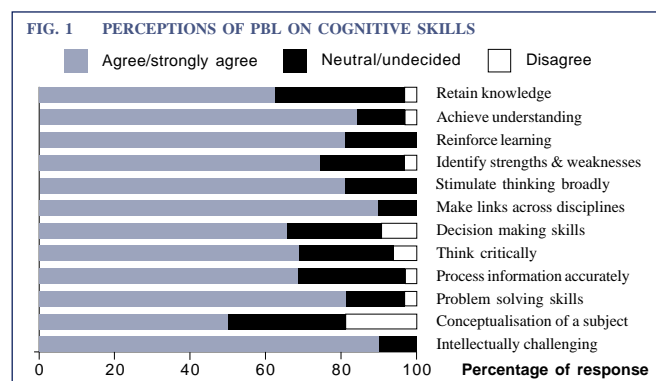
Students: Student feedback carried out in 1997 showed that they generally enjoy the 'non-threatening' atmosphere of the tutorials. One complaint was that there was not enough reading time. *(See Figs. 1 and 2 below for student responses.)*

Our Plans

We are still evaluating the effects of PBL on student learning. From our little exposure with PBL, both staff and students seem to enjoy the sessions. So we hope to expand PBL by changing more traditional tutorials into the PBL format. However, we have no plans to go fully PBL, because we cannot sacrifice the training of clinical skills vital to a dental surgeon within the constraints of the four-year curriculum. Thus, the Faculty will opt for a PBL/competency-based hybrid curriculum.

Conclusion

The PBL process enhances student thinking and fosters independent learning. Nevertheless, PBL demands for resources are very high. There are definite benefits of this method of teaching but more long-term evaluations should be carried out. ■

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FIG. 1   PERCEPTIONS OF PBL ON COGNITIVE SKILLS

Legend: Agree/strongly agree | Neutral/undecided | Disagree

- Retain knowledge
- Achieve understanding
- Reinforce learning
- Identify strengths & weaknesses
- Stimulate thinking broadly
- Make links across disciplines
- Decision making skills
- Think critically
- Process information accurately
- Problem solving skills
- Conceptualisation of a subject
- Intellectually challenging

0 20 40 60 80 100 **Percentage of response**

FIG. 2   PERCEPTIONS OF PBL ON AFFECTIVE & PSYCHOMOTOR SKILLS

Legend: Agree/strongly agree | Neutral/undecided | Disagree

- Encourage discussion
- Practise empathy
- Encourage independent learning
- Stimulate learning
- Appreciate cooperative learning
- Challenge to raise learning issues
- Find course interesting
- Satisfied with quality of course
- Improve communications skills
- Develop reasoning skills

0 20 40 60 80 100 **Percentage of response**

Problem-based Learning
in the Faculty of Law through
Small Group Discussion

by Associate Professor Jeffrey Pinsler
Faculty of Law

The small group discussion, which normally takes the form of a tutorial or seminar, is a primary method for teaching/training law students. While lectures and the reading of assigned materials are the essential means for communicating the relevant information to the student, it is the small group discussion which presents him with the opportunity for articulating his thoughts and fomenting his views. These attributes are highly prioritised by the Faculty because they lead to the student's mental development and are essential to his future role as a lawyer.

The need for small group discussion assumes that the topic under consideration is sufficiently complex or uncertain to raise a variety of views or approaches to the problem. Law students learn, for example, that principles are often not straightforward; that their circumscription may limit them to particular circumstances or that their flexibility may call for the extension of their immediate scope of operation; that certain situations are devoid of governing rules and call out for new law; that the rulings of judges may be in conflict or inconsistent with each other; that statutory provisions may be ambiguous because of imprecise drafting or inappropriate because they are outdated; that there may be various means of interpreting the law to achieve different objectives; that policy or the wider public interest can play a crucial role even to the extent of overriding private rights; that certain 'higher' laws may override others. The student is expected to critically consider the problems or questions raised in the problem/question sheet, which is given to him well in advance of the tutorial or seminar to ensure adequate preparation for his participation in class. Ideally, the tutorial should encourage and motivate the student to engage in further personal study of the issues raised thereby enhancing his research skills and his understanding of the law. Thus, the student should receive adequate feedback on his performance in class (directly from the tutor and indirectly from the class discussion) so that he is able to re-evaluate his views and approach to the problem raised.

The achievement of these objectives depends largely on the student's preparation and his attitude. In this respect, it is vital that the student understands what is expected of him and that his priorities are clear. The tutor must be able to encourage the student to think critically and originally, and to avoid the inertia which may result if students 'pressurise' the tutor to 'spoon-feed' them. 'Spoon-feeding' is likely to result when the tutor limits his teaching to testing the students' absorption of knowledge and filling gaps in that knowledge. A tutor who merely repeats what was stated in the lectures would destroy the student's inclination and opportunity to apply his analytical skills in class. Moreover, in such a situation, students would come to class without having adequately prepared their work in the hope that the tutor would supply the missing knowledge. It is the tutor who must control the class, not the students. The tutor may have to deal with 'difficult' students. These may be students who will not participate, who are unprepared, or who, being less able than the others, hold up the class. The tutor should pay special attention to such a student outside the class so that he is not left behind, and the progress of the class is not obstructed. The development of such a student through personal attention and supervision can be the most satisfying reward for a teacher.

The student's priorities and the University's modes of assessment are also crucial factors. If the student believes that his final grades will depend on his written examination, which consists of open-ended questions testing the amount of information the student has grasped in the course of the term or year, then the student will ensure that he has accummulated all that information, even at the expense of ignoring the higher goal of developing his analytical skills. In these circumstances, he would not be encouraged to exercise his critical faculties because the effort he would need to make to attain this level would not be necessary for the purpose of obtaining the desired examination results. The answer here is to ensure that examination questions do test the student's critical thinking skills. This should be made clear to the student from the commencement of the course so that he is in no doubt about the standard he is expected to attain in the examination, and so that he can learn how to achieve and exercise those skills in his tutorials.

Although the development of analytical skills must be a vital priority, this objective must be viewed in the broader context. It is fundamental that the student has a clear perspective of the subject which he is studying and not merely the isolated principles about which he is asked to think critically. His understanding of the subject as a whole (such as its structure and the inter-linking of sub-topics) will enhance his ability to focus on the principles. Moreover, as the student is being prepared for professional life, it is crucial that he is shown how the subject relates to practice in the world beyond tertiary education. In the subject of law, for example, students would not only be required to think critically about the policies behind the disclosure of evidence or the availability of some procedure; they would also have to be aware of the practical realities of these matters in an actual court case. ■

A Reflection on Continuing Education

by Dr Danny C.C. Poo
School of Computing &
Information Technology Programme Director,
Office for Continuing Education

The term, 'continuing education', describes the process and opportunity to learn new skills and acquire knowledge beyond what is taught in our formal schooling years. Many take part in continuing education to enhance their knowledge base and/or employability in the workplace.

Increasingly, more and more people see the importance of continuing education. What most of us learn in our formal years of education are basic skills that are sufficient to help us start working, but insufficient to lead us on (given the rapid changes in technology and demands arising from the growing sophistication of the workplace). As Singapore enters into the new millennium and the call for her to become a knowledge-based economy gets louder, the need for her people to learn, adapt and apply knowledge on a lifelong basis becomes even more pronounced.

As a Programme Director (Information Technology) at the Office for Continuing Education (OCE) and a faculty staff at the School of Computing in NUS, I have the privilege of teaching students with rather distinct needs. Most of our undergraduates, if not all, are full-time students whose sole responsibility is to ensure they make the grade and graduate from the university. Consequently, they do not experience the kind of stress often associated with working personnel. Students in continuing education, however, are mostly working professionals who seek to enhance their intellectual capability while still in employment. As their time is divided between full-time work and studies, they therefore have to be highly motivated to succeed.

One characteristic that differentiates students in continuing education from full-time undergraduates is the tendency of the former to relate class lessons to their work experience. Instructors should have the appropriate practical experience to be able to address the concerns of these students. Students in continuing education are also very selective in the courses they wish to enrol, choosing courses that have direct relevance or benefit in their employment. The challenge in teaching continuing education courses thus lies in knowing the needs of the students and tailoring the courses to satisfy these needs. The courses must be carefully surveyed to ensure relevancy and demand for them.

More and more adults are also looking at continuing education that leads to formal qualifications to provide them a sense of closure to an area of study as well as pride of accomplishment in the courses. Offering a faster, less expensive and more focused means of achieving personal or career objectives, these credentials can be cited on resumes and presented in the workplace as evidence of the participants' professional studies.

In this connection, I was involved in the proposal and implementation of a new Certificate programme—Certificate in Object-Oriented Software Development—to be offered in the second half of 1999 by OCE. This programme recognises the importance of Object Technology, a growing trend in the computing industry. Participants will be taught object-oriented programming using Java, analysis and design techniques and enterprise level implementation of object technology over a four-month period on a part-time basis. To ensure proficiency, participants are required to complete a practical project as partial requirement for the award of the Certificate.

The Certificate in Object-Oriented Software Development programme is an example of a course for continuing education as it is a highly specialised course designed in response to the growing demand for Object-Oriented software developers, arising from the adoption of Object Technology in the workplace. In addition to this Certificate programme, OCE is constantly studying market requirements in new and emerging areas to respond to the needs of continuing education in Singapore and the region.

With the rapid development of information technology, continuing education will not be limited by physical space. Distance and multimedia learning through interactive media will form part and parcel of the overall framework for continuing education. The Internet will play a major role in the delivery of course materials to participants. A virtual campus aimed at extending one's mind and knowledge beyond the formal years of education will become a reality in the not-too-distant future when continuing education takes off as an auxiliary service of the overall education system. The challenge then for the continuing education supplier is to be able to integrate its programmes into cyberspace and deliver the same quality education to its recipients as it would in the traditional way. How far can continuing education go? We shall see. ∎

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The Asia-Pacific Executive Master of Business Administration Program

by Associate Professor Jean Lee & Dr Rajam Chandrasekaran
Graduate School of Business
Faculty of Business Administration

The Program

The Asia-Pacific Executive Master of Business Administration Program (APEX-MBA) has been offered since January 1997 by NUS' Graduate School of Business. The program is designed primarily to provide busy senior executives with the opportunity to sharpen their management skills and improve their ability to thrive in the rapidly changing international business environment. The School has also earned the distinct honour of being one of the first in the region to offer an Executive MBA in Chinese. The topics covered in the program include leadership, corporate strategy, economics, corporate finance, marketing, human resource management, as well as statistics for decision-making and operations management.

The Format

The APEX-MBA Program is conducted in six 2-weeks full-time residential segments. Typically, a class of 20-25 students is admitted to the program. The group follows a rigorous preset course of study lasting 18 months. All students take classes at the same time and the schedule of residential study is pre-determined by the School.

Each segment lasts 2 weeks, during which classes are held for 10 hours daily. The curriculum consists of 12 modules of study, each module lasting a week and including lectures, case studies, simulation, group work and/or individual preparation.
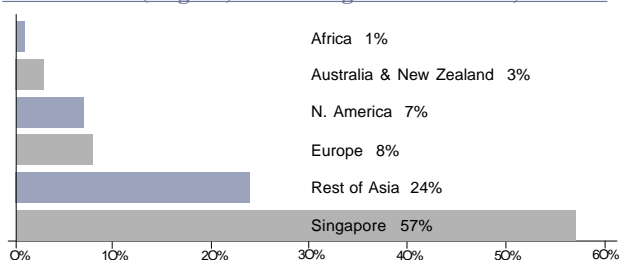
Students must be able to balance the stringent requirements of the curriculum and their work-related commitments. The integration of their education with their professional careers allows each to bring their experience from their workplace to the classroom and the new knowledge acquired can be immediately applied upon returning to work. Support of employers, namely, by releasing candidates from their professional duties during the residential segment, is also vital to the success of an APEX-MBA candidate.
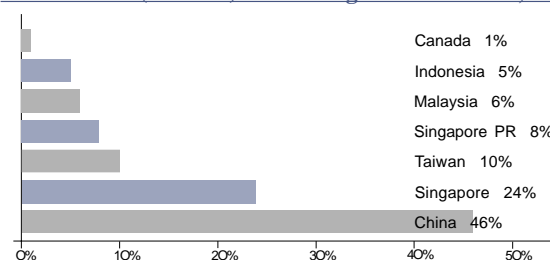
Candidates' Profile

The APEX-MBA Program brings together an elite group of like-minded, goal-oriented professionals from all around the world, each with at least a decade of full-time work experience after a first degree or its equivalent, and all of whom represent a wide spectrum of professional experience.

APEX-MBA (English): Percentage of Enrolment, 1997-99

Region	Percentage
Africa	1%
Australia & New Zealand	3%
N. America	7%
Europe	8%
Rest of Asia	24%
Singapore	57%

APEX-MBA (Chinese): Percentage of Enrolment, 1997-99

Region	Percentage
Canada	1%
Indonesia	5%
Malaysia	6%
Singapore PR	8%
Taiwan	10%
Singapore	24%
China	46%

Overseas Campus Design

One of the unique features of the APEX-MBA program is its overseas campus design. Both the English and Chinese programs bring their students across Asia. Some of the sessions are taught in:

For APEX-MBA (English)

- Bangalore
- Jakarta
- Mumbai
- Bangkok
- Kuala Lumpur
- Penang
- Beijing
- Manila
- Shanghai

For APEX-MBA (Chinese)

- Dalian
- Nanjing
- Wuxi
- Hainan City
- Penang
- Xian
- Jakarta
- Shanghai
- Zhu Hai City
- Kuala Lumpur
- Suzhou

During such overseas sessions, the classroom discussions are further complemented by guest speakers from the local business community and visits to carefully selected companies.

Challenges

Though the program is still in its infancy, the number of applications has grown steadily over the past 3 years. With the Government expanding its efforts to develop Singapore into an educational hub in the region, the School faces increasing competition from other universities that will be setting up campuses locally. Thus, there is a greater need to create awareness of the program internationally. To achieve this, a series of promotional briefings in China, India, Philippines, Thailand, Malaysia and Hong Kong has been organised for the rest of 1999.

Graduate Education:
A Personal Reflection

by Ms Mala Sundram
Teacher, Nanyang Girls' High School

On 14 September 1994, I became a NUS Research Scholar to do a Master of Arts degree in English Literature. It was, admittedly, a rather daunting initiation into graduate education because I faced the prospect of two years of independent study, at the end of which I was to produce a 40,000-word dissertation. I was excited at the prospect of fleshing out my sketchy thesis proposal into a critical study that would leave its mark (albeit small) in the world of academia. But I knew I would miss the camaraderie shared with my counterparts during our Honours year, that gave us the licence to lull into collective ignorance, embrace unorthodox revision strategies, embark on fantastical improvisations and resort to whinny excuses when reproached for being tardy. I realised that for the first time in my academic life, I was going to be on my own.

I was, however, pleasantly surprised to find that there were quite a number of postgraduate research scholars in the English Department. Although we had no formal classes together, we interacted quite enthusiastically whenever we met. Most of us were from different batches, and we were all at various stages of our graduate education. What drew us together was our common interest in books, the performing arts, movies, poetry, and anything literary. The informal discussions about our research also proved insightful and valuable. We attended all department seminars and presented parts of our thesis at postgraduate workshops—an enriching experience that could have been carried out more frequently. While some students prefer to be left alone to do their research, I think most will appreciate a certain amount of academic bonding that can exercise their mental faculties, provide some critical feedback and prevent their degeneration into a state of inertia. Perhaps a regular programme can be designed for research scholars, that requires them to participate in a seminar or workshop once a week, so that they can maintain the rigorous academic interaction they are used to in their undergraduate days.

My postgraduate experience was greatly enhanced by my supervisor who patiently guided me through every stage of my thesis in the course of the two years. She managed successfully to maintain the intricate balance between giving me time and space to do my research and writing, and monitoring my progress regularly. I feel that this is extremely important for research scholars as we have a time frame within which we have to complete our thesis. Giving postgraduate students too much independence can sometimes have its adverse repercussions, resulting in incomplete dissertations, extended deadlines, and rushed, last minute work that sacrifices on quality.

Although the current postgraduate programme at NUS is quite effective, I feel that it can be improved in two areas. Firstly, research scholars could be given the opportunity to interact with other graduate students from overseas universities and perhaps participate in short exchange programmes abroad, in the form of workshops or research presentations. This will increase the credibility of the postgraduate programme, give the students a broader perspective and foster better ties between postgraduate students from various universities. Secondly, I feel that MA students could be given the option to take a viva, if needed, in order to defend their thesis. A verbal defence can benefit both the students and the examiners because it gives students an opportunity to answer questions about their thesis and defend their findings, while giving examiners an added insight into the credibility of the researchers and their thesis.

On a more personal note, I have definitely benefited from the graduate experience I had at NUS. I am now a full-time teacher at Nanyang Girls High, teaching English Literature, English Language and Speech Training. My graduate experience taught me the value of discipline and time management because I had to seek motivation from within myself to complete my dissertation, revise it, edit it and prepare it for submission within the two-year period. The research component also honed my critical thinking abilities and made me an independent learner. I find these qualities especially useful in the teaching profession because I am able to encourage my students to think critically and become independent learners—qualities that are increasingly being valued in the young. My graduate experience also fuelled my passion for Literature, convinced me that I would be most happy in a teaching environment and encouraged me to constantly improve myself, with respect to both knowledge and skills. In essence, my postgraduate degree has given me an upper hand in my job, enhanced my work ethics and prepared me to face challenges and uncertainty in the future. It is an accomplishment and an experience that I will always look back on with pride and satisfaction. ■

The APEX-MBA Program

While the APEX-MBA curriculum is comparable to the best MBA programs, where appropriate, modules have been designed to adapt Western business concepts to meet managerial challenges in Asia. This new model of management education has been well received by our past and present students. To meet the needs of senior executives for the latest management concepts, the professors in the program are leading researchers in their areas of interest and consultants highly demanded in the region. They are able to bring their expertise and the most current proven management practices to the classroom.

The intensive period of learning during the residential segments allows students and instructors to share and discuss their thoughts, insights into management and best practices. This often creates opportunities for instructors to develop Asian case studies. In addition, after working closely during the residential segments, the candidates and instructors have forged close bonds that are expected to form a strong and vibrant alumni community. ■

CDTL *Staff Changes:*
Shake Up & Shake Out!

CDTL Directors

1. A/P Daphne Pan
2. A/Prof Grace Ong
3. A/Prof Tan Cheng Han
4. A/Prof Wang Chien Ming
5. Dr Chee Yam San
6. Dr William Koh
7. Dr Alice Christudason
8. A/Prof K. P. Mohanan
9. A/Prof Matthew Gwee
10. A/Prof Alex Ip Yuen Kwong

Exciting major changes have been taking place at CDTL in recent months. As of 1 January 1999, the multimedia and video conferencing functions of CDTL, along with certain sections of Computer Centre, were transferred to the newly set-up Centre for Instructional Technology. (*For more information about CIT, please refer to pages 10 & 11.*) Consequently, we are now able to focus primarily on pedagogical practice and theory through the workshops, seminars, publications and research that we conduct.

To facilitate the expansion of our teaching and learning programmes, we are pleased to announce that we now have additional staff. As of 1 February 1999, A/Prof K. P. Mohanan (Faculty of Arts & Social Sciences) was appointed Deputy Director. At the same time, the following NUS academic staff were assigned to CDTL as Associate Directors: Dr Alice Christudason (Faculty of Architecture, Building & Real Estate), Dr William Koh (Faculty of Business Administration), A/Prof Grace Ong (Faculty of Dentistry), A/Prof Wang Chien Ming (Faculty of Engineering), A/Prof Tan Cheng Han (Faculty of Law), A/Prof Matthew Gwee (Faculty of Medicine), A/Prof Alex Ip Yuen Kwong (Faculty of Science), and Dr Chee Yam San (School of Computing). As CDTL's main liaison with the various faculties, the new directors will not only bring the perspective of each faculty into the planning of CDTL programmes, but also function as a CDTL representative in each faculty for any teaching staff to consult.

Some of the new activities being implemented include organising CDTL's first symposium on teaching and learning, training graduate teaching assistants, surveys on teaching and learning practices in NUS, academic orientation talks for students and many others. To find out more and keep yourself updated, please ▪heck our web site regularly: http://

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TLHE
Symposium

First   Symposium   on Teaching   and Learning   in   Higher   Education
6 - 7 July 2000

First Announcement and Call for Papers

CDTL is organising its 1st Symposium on Teaching and Learning in Higher Education on the theme of *Facilitating Lifelong Learning: Issues and Challenges*. This two-day symposium, to be held on 6 and 7 July 2000 in NUS, will provide a forum for teachers to interact with one another and exchange ideas. Pedagogical philosophy and pedagogical theory in recent years have become specialised disciplines. This symposium will approach them from the standpoint of practising educators who reflect on their practice. We encourage teachers to forge a philosophy and theory on the basis of their own experience of teaching and learning, with the hope that this activity will yield more productive curricula and teaching strategies. Our ultimate goal is the increased awareness of pedagogical issues that result in enhanced teaching and learning.

Topics to be explored will include: active learning; interactive teaching; student-centred teaching; collaborative learning; problem-based learning; project-based learning; small group teaching; student assessment; distance learning; learning modes; IT in enhancing teaching & learning; facilitating independent & critical thinking; and promoting creativity.

Call for Papers

Three copies of abstracts (not exceeding 300 words) should be sent to the Symposium Secretariat by email, fax or post to the address given below. Abstracts should clearly indicate corresponding author's mailing address, telephone and fax numbers, as well as email address. The official language of the symposium is English.

Deadlines

Submission of abstracts	1 December 1999
Preliminary acceptance	20 December 1999
Submission of final manuscripts (3 hard copies and 1 soft copy)	1 April 2000
Notification of final acceptance	1 May 2000
Early registration	1 June 2000

Symposium Secretariat

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SGT Workshop:
Collaborating with Engineering Faculty

Opening Address by Prof Low Teck Seng, Dean of Engineering Faculty

Small group teaching (SGT) has been a buzz word in the University for some time now. On 13 May 1999, the Teaching Methodology, Evaluation and Examination Committee (TMEEC) of the Faculty of Engineering and CDTL jointly organised a full-day workshop on SGT for Engineering Faculty, with the aims of defining, discussing and sharing of ideas and experiences, and obtaining feedback on SGT in the faculty. Topics include the what, why and how of SGT, SGT in the Faculty of Engineering, strategies and teachers' experiences, as well as alternative modes of active learning.

The workshop was a fruitful session. It began with the defining of concepts by CDTL's Deputy Director A/Prof K. P. Mohanan and Associate Director A/Prof Wang Chien Ming and followed by discussion of experiences

Avid discussion session

and strategies by A/Prof Lee Jim Yang, A/Prof David Chua, A/Prof Yeo Swee Ping and A/Prof Winston Seah representing the various departments in the Engineering Faculty. The workshop then proceeded with the sharing of alternative modes of learning by two CDTL Associate Directors, A/Prof Matthew Gwee (Faculty of Medicine), and A/Prof Tan Cheng Han (Faculty of Law).

Later in small groups, workshop participants discussed key questions concerning the implementation and effectiveness of SGT in the Faculty. Whether SGT significantly improves students' communication skills, whether SGT promotes active and interactive learning, whether SGT conflicts with independent learning, the problems faced by the teacher conducting interactive teaching/learning and the form of SGT in the Engineering Faculty—these were issues addressed in the various small groups.

Teaching Teachers:
Educational Training Course for Graduate Teaching Assistants

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22 June 1999 witnessed the inauguration of the first Educational Training Course for Graduate Teaching Assistants at CDTL. Scheduled for 61 participants, the course was conducted over a 5-day period from 9 am to 12.30 pm daily. With the primary aim of preparing Graduate Teaching Assistants (GTAs) for teaching assignments, the course focused on teaching and learning principles and concepts, with emphasis on hands-on learning through workshop sessions.

Addressing the participants and describing them as "intelligent young people, willing to learn", Professor Shih Choon Fong, Deputy Vice-Chancellor said, "Thirty years ago I was a teaching assistant in an American university; I would have benefited if there had been a programme like this."

Led by the team of Deputy Director and Associate Directors from CDTL, the course focused on the themes: Teaching and Learning, Small Group Teaching, Presentation Skills, Student Monitoring and Feedback, Assessment and the NUS Integrated Virtual Learning Environment (IVLE).

Particularly noteworthy were the GTAs' enthusiasm to learn and their willingness to speak their minds. In response to A/Prof K. P. Mohanan's discussion on encouraging students to ask questions in class, one participant voiced his observation about the difficulty of accomplishing this goal as students are

Opening address by DVC Shih Choon Fong

not accustomed to such a culture. He also noted that students here are too exam-oriented. On another occasion, a participant volunteered that it would be even more beneficial if the course were conducted on a full-day basis. Judging from these participants' response, it seems that this group of 'intelligent young people' has what it takes to train critical minds, being critical thinkers themselves.

The same course was also scheduled for another group of over 60 GTAs from 29 June to 3 July. As DVC Prof Shih said, "This 5-day programme is only the beginning; improvement in teaching is an on-going lifelong task," we wish every GTA great success in this path of improvement and lifelong learning.

Workshop in progress

The Future of Classroom Experience

http://www.cit.nus.edu.sg

The NUS Global Campus IT Strategic Plan identified the thrust of intensifying the use of Information Technology (IT) in teaching and learning for NUS. As part of the implementation of this strategic thrust, a coordinated effort to accelerate and enhance the infrastructure to support IT in teaching and learning was needed. The Centre for Instructional Technology (CIT) was born out of this pursuit. It embodies the effective use of technology to improve the teaching and learning processes. It also recognizes the importance of adequate support to be made available to academic staff in order to overcome the seemingly ominous task of building online courseware.

The mission of CIT is to provide a robust and supportive environment for the exploration, development and application of digital technologies to promote teaching and learning. This involves:

· Creating a greater awareness of the potential of IT in enhancing education,

· Supporting lecturers with the means to incorporate new media in their courses effectively,

· Encouraging the creation of digital content and development of new teaching and learning applications, as well as

· Defining and developing new services central to instructional technology efforts.

CIT is sub-divided into the following function

INTEGRATED VIRTUAL LEARNING ENVIRONMENT (IVLE)

http://ivle.nus.edu.sg

The IVLE, launched in November 1998, is part of the Global Campus initiative to facilitate the use of IT in teaching and learning. Spearheaded by Computer Centre, the development of IVLE was taken over by CIT to promote and accelerate the deployment of this environment. The development of IVLE within CIT also provides better synergy with the other sub-units, thereby enabling CIT to fulfill its goal.

Within IVLE, lecturers can:

· Supplement the classroom experience by providing online materials (e.g. course outlines, references, assessment, etc.) for students,

· Make use of the wide array of web-based tools and the Digital Media Gallery to digitise their course materials,

· Communicate with students by linking up to class discussion forums, chat rooms, class distribution lists, quizzes and workbins, as well as

COURSEWARE DEVELOPMENT
sure by providing links to overseas courseware resources.

The CIT Courseware Development group supports lecturers in the generation of online courseware. Activities range from basic course outlines to complex multimedia courseware productions, tapping on the diverse skills of CIT support staff.

We work with NUS academic staff to provide:

· Assistance in developing a plan for the effective use of IT in your courses,

· Workshops and forums on a wide range of educational topics and multimedia authoring,

· Media conversion services to digitise your text, images, sound, and video for instructional and teaching purposes, and

· A Smart Classroom that uses sophisticated digital technologies for teaching.

The Courseware Development group also oversees the management of the Student IT Assistance Scheme where student IT assistants will be suitably trained with the requisite skills and assigned to help staff in courseware development. The assistantship is a complimentary service designed to assist academic staff in publishing of web-based course materials. This will enable staff to focus on course content and let the student assistants deal with the technical task of building such online courseware for the Web.

The Student IT Assistant can:

· Help you create your detailed courseware on the Web based on your design specifications,

· Mount the detailed courseware into your web course directory in your pres-

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MULTIMEDIA PRODUCTION AND CONFERENCING

CIT currently provides various services in the area of video production, photography, audio-visual duplication and multimedia conferencing. Much of these services are expanding from their current analog bases to more digital ones. This translates to a wider array of services that will encompass commonly used digital and analog formats for the University community.
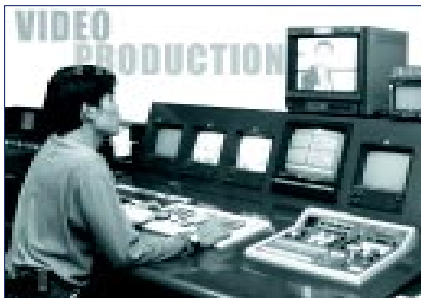
Multimedia production covers video programme integration and video recording in two analog formats (Beta SP and SVHS) and, in the near future, digital based video integration and recording as well as digital audio recording. Video programme production covers corporate, informational and instructional varieties. High priority is given to video programmes that would be used for multimedia integration on CD-ROM or in web-based teaching and learning. CIT's professional crew also assists NUScast in multi-camera recordings for the purpose of Intranet or Internet broadcasts. Video recording is done at various levels of sophistication and ranges from diverse on-site and studio-based configurations as well as interactive video. CIT is currently refining its non-linear video post-production set-up to accommodate innovative and effective formation of instructional video programmes.
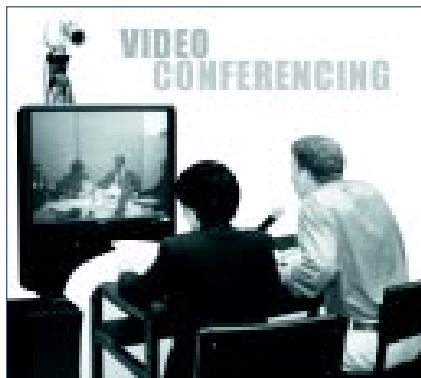
This advancement in infrastructure thereby promotes the deployment of digital media for teaching and learning applications.

Video conferencing, which NUS pioneered among the tertiary institutions in Singapore seven years ago, is fast expanding to 'multimedia' conferencing as CIT upgrades from the standard of H.320 to H.323 for Intranet and Internet delivery. Multimedia conferencing is more versatile as it incorporates audio, video and data communication on the digital platform. Currently, CIT is leading a local and regional effort to configure and test the use of H.320 codecs for H.323 applications. CIT has also recognised that basic audio-visual applications are different between video production recordings and those for multimedia conferencing. 'Line of sight' and 'sense of presence' are vital for the latter. The Computer Centre Auditorium is currently being refurbished with sophisticated equipment for the delivery of proficient multimedia conferencing.

Another service from the Multimedia Production group is photography, including analog and digital formats for on-site shootings, studio-based camera capture and slide making. Video duplication services cater to most conventional video formats. CIT aims to extend this service to cross platform transfers between analog and digital formats. Audio duplication is available for cas-

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NUSCAST

NUScast is a network TV application available on the NUS Intranet. NUScast was launched in November 1998 to provide a channel to broadcast educational and entertainment programmes within NUS*. The entertainment and news programmes include CNN, BBC and Discovery Channel that are licensed from Singapore Cable Vision and Channel News Asia. A radio channel produced and managed by NUSSU (NUS Student Union) is also available on NUScast. With informational and news broadcast at your figure tips, you can expand your repertoire of knowledge simply by clicking your mouse.

NUSLive is another service under NUScast. As the name suggests, NUSLive screens live lectures, talks, conferences and seminars conducted within NUS. Not only can students watch their lectures live on the Intranet, they can also view the lecture materials that are in PowerPoint simultaneously. NUSLive further enriches the classroom experience by having broadcast lectures archived in a Multimedia-on-Demand (MoD) server.

Students can refer to the based documents material. We are targeting pace from their desktop at a more comfortable pace. Another benefit of NUSLive is that it alleviates the resources required to hold repeated lectures for modules with large enrolment.

Pilot broadcasts of lectures through NUSLive were held from January to March 1999. More than 40 lectures/seminars were aired during the pilot trial and the feedback gained was positive and constructive. The pilot broadcasts were archived in the MoD server and are now accessible from the NUS Intranet web site at URL http://mod.nus.edu.sg/. Implementation of the live broadcast on a larger scale is scheduled in July 1999. We aim to broadcast the lectures of an entire module/course through NUSLive.

CIT is committed to maintaining the leadership role in multimedia conferencing and production technology and will undertake to exploit available expertise to the fullest.

For more information our NUScast services, visit our Web page at: https://online.nus.edu.sg/nettv/.

*The network TV application is configured using the Microsoft NetShow software on NT platform. The TV programmes are fed into the Netshow Encoder PC equipped with a Intel Smart Video Encoder card into Advanced Streaming Format (ASF) for multicast on NUSNET. Client PCs access the programmes through a web interface using the MS Media Player software. The

TEACHING & LEARNING high-lights

Faculty of Architecture, Building & Real Estate

Using Games as a Supplementary Teaching Tool

The Teaching Development Committee of the School of Building and Real Estate recently organised a Teaching Seminar entitled, 'Using Games as a Supplementary Teaching Tool' on 24 January 1999. Dr Ong Seow Eng and Mr Cheng Fook Jam conducted the session, explaining how they had successfully used this method in teaching *The Effect of Experimental Economics*. Real-world conditions were simulated in which students role-played as developers and investors in a Development and Investment Game, thereby testing various theories the students had been introduced to earlier in their module. Students' performance was graded and counted towards their final examination mark as part of continual assessment; students appreciated the exercise and found the experience valuable. The seminar presenters then shared some points on how this 'game' method could be utilised for maximum benefit. For example, students must first be briefed adequately, provided with 'pre-game' material and taught fundamental principles related to the topic. Staff were encouraged to adapt such a 'game' for teaching use to make their subjects more interesting and create varied learning experiences for students. ■

Faculty of Arts & Social Sciences

Video Conferencing: EN 4205 Postmodernism & Postcoloniality

The Department of English Language and Literature organised a series of eight video conferences in collaboration with the Department of English Literature at the University of Western Australia (Perth) from 23 July to 15 October 1998. Twenty-six NUS Honours students and over a dozen students from Perth participated in these sessions that were initiated when NUS' A/Prof Ban Kah Choon met A/Prof Dennis Haskell from UWA who was visiting Singapore. Along with A/Prof Rajeev S. Patke, also from NUS, they worked out a syllabus comprising shared texts dealing with postcolonial and postmodern cultural issues in the Asia-Pacific region. Each session lasted for one hour. Six sessions were devoted to student presentations on a variety of topics and regional texts, followed by energetic discussion from both sides. Two sessions were reserved for live interviews with local authors. In the first, poet Edwin Thumboo fielded questions about his poetry, Singaporean literary culture, and the prospects for new writing in the region. In another, novelist Philip Jeyaretnam talked about the genesis of his recent novel, *Abraham's*

English Dept video conference held on 15 Oct

Promise. The Australian side thus gained a better idea of literary culture in Singapore, while also giving local authors and students a detailed sense of how Australians look at Singaporean literary issues. Local students became clearer about the Australian literary scene. The video format enabled hands-on discussions about and across cultures that our students found invaluable. As one of the participating students, Eddie Tay, reported, "The video conferences are for me a learning experience that extends beyond the scope of the syllabus. I now realise that academia is not only about research, essays and presentations, but also about being able to convey and discuss ideas via verbal discourse." ■

Faculty of Engineering

Web-based Virtual Laboratories with Real-Time Video Capture Go Online for 1000 Engineering Students
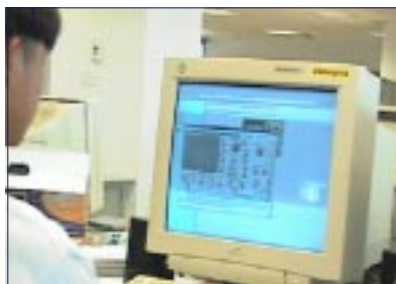
Student conducting a virtual experiment

Users of virtual laboratories are able to conduct actual experiments from remote computers anywhere in the world 24 hours a day, as if they were working in actual laboratories. A virtual laboratory consists of a cluster of programmable instruments interfaced with a set of Internet-linked personal computer systems and servers. With the ability to configure instruments and data analysis remotely through a web browser, virtual laboratories facilitate the sharing of expensive instruments and equipment, thereby making laboratory education more flexible as well as promoting distance learning.

A group of researchers, led by A/Prof C.C. Ko and Dr Ben M. Chen from the Department of Electrical Engineering, has developed a set of web-based virtual laboratories (http://vlab.ee.nus.edu.sg/vlab/) on a first year oscilloscope experiment. When students log onto the web site, they can control both the computer and the equipment, and also observe the whole experimental process through real-time image sequence captured by a video camera set up in the physical laboratory located in the Electrical Engineering Department. These virtual laboratories provide: a) distance learning for part-time and remote students; b) pre-experiment 'hands-on' experience for students before they go to the actual laboratory; and c) easily captured data and images for students to write laboratory reports online. ■

Faculty of Business Administration
Students Publish Their Project Work on the Web

Over the past year, students in *Asia-Pacific Business*, a third-year FBA module, have been required to publish their term project work on the Web to create a repository for their work. Besides increasing the transparency of assessment, the web sites allowed students to access each other's work. From the experiment, we (Drs Douglas Sikorski, Cho Kang Rae, Rachel Davis and Chandru Rajam) learnt a few lessons. First, with the explosion of information of varying quality on the Internet, instructors using such projects must ensure that students develop the capability to judge the quality and credibility of their sources of information. This may include cross checking facts and figures against reputable sources, conducting background checks on the authors (based on publicly available information) etc. This process of validating what they find is an excellent vehicle for teaching critical inquiry skills. Second, all bibliographic references must appear close to where they are cited for easy verification so that the instructor can check if students have synthesised the material garnered from various sources. Otherwise, such term-projects (web-based or submitted on paper) may become massive cut-and-paste exercises. On the whole, the experiment produced some good work that demonstrated comprehensiveness of search, synthesis, critical thinking, clarity and creativity of presentation and project-management skills. ■

Faculty of Science
Innovative IT-based Education Programs for Undergraduate & JC Students

The Centre for Information Technology and Applications (CITA) was established recently to meet the challenge of putting IT to effective use in teaching, learning, research and administration. It has three divisions: Education, Science Online and Service Support. The Centre currently offers a *Computer Programming and Applications* (CPA) program in the Science Faculty. Since its inception, the CPA program has been continually refined to prepare the students for the diverse areas of IT applications, and to underpin the ability of lifelong pursuit of rapid-changing technology. The program has received overwhelming response from cross-faculty students and exchange students with over 2000 students in an academic year. A new minor in Scientific Computation and Communication will be offered in July to better prepare students for the information age and cultivate in them the ability to adapt to the ever-changing trends in technology.

As a continual effort to enhance IT awareness in Science Faculty, CITA also offers workshops for both students and staff members. To date, two short courses on multimedia and web development have been conducted. These courses will be re-packaged for school teachers and students during the June and December school holidays. To help our staff and students use IT more effectively in their teaching, learning and administration,

Science students attending the hands-on session in computing

CITA will conduct other workshops and short courses on a more regular basis. In collaboration with Stanford University, CITA will also introduce a pilot distance learning program, *Education Program for Gifted Youth* (NUS-EPGY) for JC students. In the initial phase, the NUS-EPGY programme will offer four Mathematics courses and four Physics courses. With minimal disruption to their school activities, these participants can study at their own pace through our computer-based learning programs. They can also discuss problems with the tutors by email. For some advanced courses, the students can earn credits, which can be used for advanced placement at NUS and Stanford. ■

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Food for Thought: teaching resources within your reach
1) Selected Online Forums, Journals, & Other Web Sites on Teaching/Learning

- **The National Teaching & Learning Forum**: sharing new ways of helping students reach the highest levels of learning — http://www.ntlf.com/

- **Deliberations On Teaching & Learning in Higher Education**: a resource for educational developers, librarians & academics, with material arranged by discipline & educational issue — http://www.lgu.ac.uk/deliberations/

- **Journal of College Science Teaching**: a refereed journal published by the US National Science Teachers Association to communicate innovative, effective techniques to improve interdisciplinary teaching strategies for instructing science majors and non-majors — http://www.nsta.org/pubs/jcst/

- **Horizon**: informing educators about the challenges they will face in a changing world and steps they can take to meet these challenges — http://horizon.unc.edu/main.asp

- **The NODE Learning Technologies Network**: a not-for-profit electronic network facilitating information and resource-sharing, collaboration and research in the field of learning technologies for post-secondary education & training — http://node.on.ca/

- **Cause/Effect**: a practioner's journal about managing & using information resources on college & university campuses — http://www.educause.edu/pub/ce/cause-effect.html

■

2) Books in the NUS Library System

Title   : *Teaching Tips: Strategies, Research, & Theory for College & University Teachers* (9th Edition)
Author   : Wilbert J. McKeachie
Publisher : D.C. Heath & Company, Massachusetts & Toronto, 1994
Pages   : 444 pp (Paperback)
Source   : CDTL Library
Call No.   : LB 1738 Mcke

A highly acclaimed book, *Teaching Tips* was initially written as a guide for new college teachers and teaching assistants. However, it has been found useful by both novices and experienced teachers alike since its first edition in 1951. The content is divided into six parts: 1) Getting Started; 2) Basic Skills: Leading Discussions, Lecturing, Testing, and Grading; 3) Teaching Techniques, Tools, and Methods; 4) Teaching Large Classes (and Small Ones Too); 5) A Potpourri of Practical and Theoretical Topics; 6) Teaching for Lifetime Outcomes.

Written with the underlying philosophy that "anyone with ability enough to get a job as a college teacher can be a good teacher" (p. 4), *Teaching Tips* discusses situations commonly faced by teachers and offers practical solutions that have been successfully implemented. It is also written with a sense of humour, as seen in the phrasing of the title of one of the sub-sections: *How to Lose Friends and Alienate Students*. Each chapter ends with a supplementary reading section, recommending additional references on the topics discussed.

Title   : *Assess Your Own Teaching Quality*
Authors   : Sally Brown & Phil Race
Publisher : Kogan Page, London, 1995
Pages   : 139 pp (Paperback)
Source   : CDTL/CL Main Shelves
Call No.   : LB 2333 Bro

Part of *the Teaching and Learning in Higher Education Series*, this relatively thin paperback presents 55 checklists for college/university teachers to assess the quality of their teaching. However, the reader is advised not to complete every single checklist in the book with the intention of obtaining a 100% score. Clear instructions and intentions of the authors are presented in the introduction of the book. It could be used as a personal appraisal device, a team resource, an informal peer feedback resource, a problem-identification resource, a framework for formal appraisal, a teacher quality assessment guide, a discussion-

Title   : *500 Tips for Tutors*
Authors   : Sally Brown & Phil Race
Publisher : Kogan Page, London, 1993
Pages   : 129 pp (Paperback)
Source   : CDTL/CL MainShelves/HL Main Shelves
Call No.   : LB 2331 Rac

First in the *Teaching and Learning in Higher Education Series*, *500 Tips for Tutors* is written for college/university tutors—the new as well as the experienced. As a dip-in resource, one for planning new courses and updating existing ones, this book has a strong emphasis on learner-centred teaching. It offers practical suggestions on dealing with six broad areas: 1) General Study Skills; 2) Starting Off and Working Together; 3) Lectures and Written Work; 4) Learning Resources; 5) Various Kinds of Assessment; 6) Life Skills. Each of these areas discusses various sub-topics such as 'Helping learners prepare to start your course', 'Helping learners tell you what they already know', 'Helping learners benefit from your tutorial', 'Handling other people's bad teaching', and 'Designing assessment criteria and performance indication'. Each of these sub-topics comes with a list of ten practical tips. *500 Tips for Tutors* is not so much a 'teaching tips' book but more a book of practical suggestions for ways to help learners adopt more active approaches to their learning, and to help learners develop study skills and life skills.

starter for staff development, or an instrument in preparing one's portfolio.

Assess Your Own Teaching Quality consists of five chapters with an average of eleven checklists in each chapter. The chapters deal with the following topics: 1) Teaching and Learning in Large Groups; 2) Designing and Using Resources for Teaching and Learning; 3) Independent Study Tasks, Feedback, Group Work and Assessment; 4) Helping Learners Individually; 5) Personal and Professional Qualities and Skills. Each checklist comes with a page divided into rows and columns that readers can just check as they move down the list. There is also a column for readers to note their action plans or comments at the end of each row.

This book is current; it even contains checklists for assessing the use of email and computer conferencing, and the use of multimedia and hypertext. It is also good for assessing the use of conventional teaching methods and materials such as the design of handouts, transparencies and study guides, the use of libraries and information sources, as well as the setting of independent study tasks for learners.

3) UK's Top 10 Universities

The Times Of London recently published its 1999 ranking of UK Universities. Reprinted below are the scores of the top 10 universities. Full details are located at http://www.the-times.co.uk/gug.

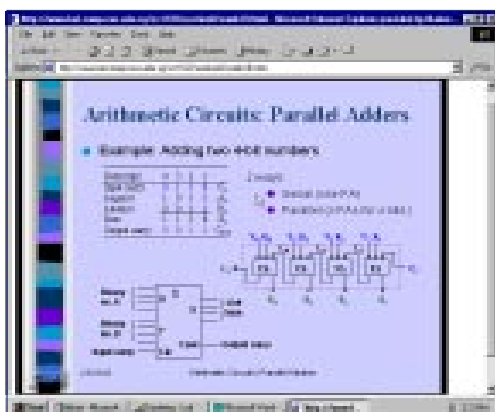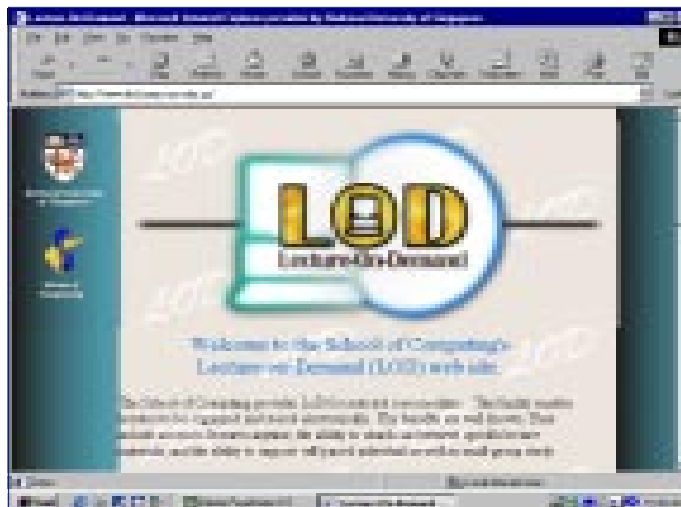| 1999 Rank	Institution	Teaching assessments (weight 2.5)	Research (weight 1.5)	Entry standards (weight 1)	Staff-student ratios (weight 1)	Library & computer spending (weight 1)	Facilities spending (weight 1)	Firsts & 2:1s (weight 1)	Graduate Destinations (weight 1)	1999 Score (max. 1,000)
1	Cambridge	100	100	100	79	85	69	100	95	929
2	Imperial	100	85	92	100	82	100	71	91	914
3	Oxford	95	96	97	70	97	65	91	93	893
4	LSE	93	96	92	77	100	82	77	87	892
5	UCL	91	84	79	95	80	75	80	83	845
6	SOAS	95	72	66	93	100	77	78	81	841
7	Warwick	96	85	85	60	72	75	79	94	832
8	Edinburgh	90	79	87	57	76	80	86	93	823
9	Bristol	88	72	86	64	69	93	86	96	823
10	St Andrews	94	72	81	51	68	74	92	98	807

1 4

Lecture-on-Demand in the School of Computing

by Dr Chee Yam San, School of Computing

In January 1999, the School of Computing introduced computer-based Lecture-On-Demand (LoD) for selected core curriculum modules. These modules are CS1102 *Data Structures and Algorithms*, CS1103 *Digital Logic Design*, and CS1301 *Discrete Mathematics*.

LoD allows lectures to be organised and stored electronically. With this facility, students can gain access to lectures from any networked personal computer or campus-wide secure plug-and-play point at anytime. LoD also allows students to search and retrieve specific lecture materials depending on their need, and to support self-paced individual as well as small group study.

The electronic content of LoD comprises two parts. First, MPEG videos are used to present preambles to key sections of a course. Second, animated PowerPoint lectures are delivered using screen capture and streaming technol-

Diagrammatic illustration within a LoD course

ogy from Lotus Development Corp. Students can view the lecture content either using a standard web browser *(illustrated above)* as well as from a CD-ROM.

In lieu of live lectures, students are given the option of attending recitations instead. Recitations are classes of approximately 20 to 25 students. The purpose of recitations is to 'interpret' or explain the lecture material, with a focus on more difficult concepts. Recitations thus represent the essential human element of LoD, and they are critical to the overall LoD philosophy. The recitation classes are conducted by lecturers and tutors. The small class size is intended to facilitate a higher level of interaction between students and tutors. Under the LoD scheme, tutorials are conducted as usual, and their purpose remains unchanged.

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Taking Medical Education in the New Millennium

Moving On Together

Several more PBL workshops for staff and students have been planned, so that learners and teachers can optimise their respective roles and reap the maximum educational benefits from the change in educational strategy. In mid-July, a staff workshop will be held to focus on 'Session II' of the PBL process, so that participants would have to complete their 'homework' (Session 1) before attending the workshop. Four medical problems, representing different modular teaching themes, will be used for this practice session.

Three practice workshops for students have also been scheduled in July before the official PBL classes begin. The main emphasis in these workshops is to explain to students the expectations of their active role and their responsibility to one another in PBL. A *PBL Users' Guide* for students is under preparation and will be given to students before the workshops are held.

Selecting, Designing and Writing Medical Problems and Tutor Guides

Medical problems used for PBL must reflect the appropriate level of learning expected (as specified in the educational objectives), ensure integration of basic science knowledge

relevant to the understanding of the problem and represent commonly encountered problems in medical practice. Different teams of 'experts', each with its own team leader, and consisting of clinical and non-clinical teachers, have been appointed for this task. The written problems will be reviewed by the Curriculum and PBL Committees, field-tested (at the staff workshops), and then used by students in the PBL sessions. Problem (case) writers must also prepare '*Tutor Guides*' for use with the associated problems by tutors to guide students to achieve their learning goals.

Concluding Remarks

Our Faculty has accepted the challenge to enhance the educational environment for our students. Steadfast in purpose, we have started on a long and difficult journey aimed at reaching our goal in implementing PBL as an innovative educational pathway to promote independent and self-directed learning skills in our students. We teachers need to ensure that the quality of medical education we provide in the new millennium will guarantee that our students will graduate as doctors with sound knowledge, comprehension, and the ability to critically apply, analyse, synthesise and evaluate knowledge and information for the ultimate benefit of their patients. ■

Chart 1

Q10. Overall, my satisfaction level with the introduction of LoD in this course is:
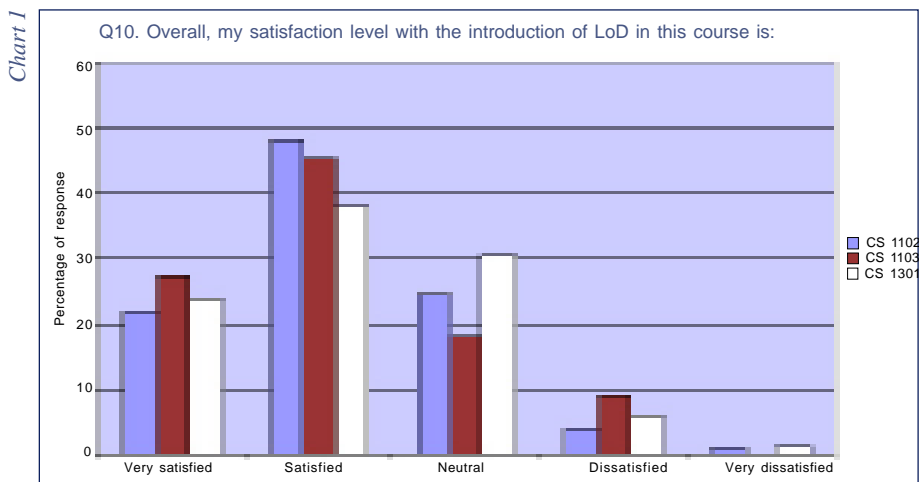
In order to gather student feedback on their experience with LoD, an electronic survey was conducted in April 1999. Four surveys were conducted. One survey dealt with LoD in general; the remaining three surveys related to each of the LoD courses. A good response rate, averaging 64% for the four surveys, was obtained. Overall, there was a high degree of satisfaction with the introduction of LoD as reflected in Chart 1 *(above)*.

Students who made use of the LoD CD-ROM generally agreed that use of the CD-ROM significantly improved the quality of their learning. This result is depicted in Chart 2 *(below)*.

MPEG video preamble to a LoD course

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A total of 49% of students who responded to the survey felt that LoD with recitations was better or much better than live lectures for the purpose of teaching course content; 15% felt that there was no significant difference. One positive comment read: *"I sincerely wish that the LoD and recitation combo will be implemented for almost all the modules in NUS. It is the way of the future and it is also highly effective. Furthermore, the need to travel to school which is very far away from my home is cut; thus I actually save a lot of time from travelling. On top of that, I can learn the lectures at my own pace and thus skip chapters that I already understand or go through the chapters that I have problems with repeatedly. Well done pioneers of LoD. I give my heartiest congrats."*

In view of the overall positive response, the School of Computing intends to continue pioneering the use of Lecture-on-Demand in the delivery of its courses. It will also make more extensive use of IT in the conduct of its courses. ■

Chart 2

Q9. My use of the LoD CD-ROM in this course has significantly improved the quality of my learning.
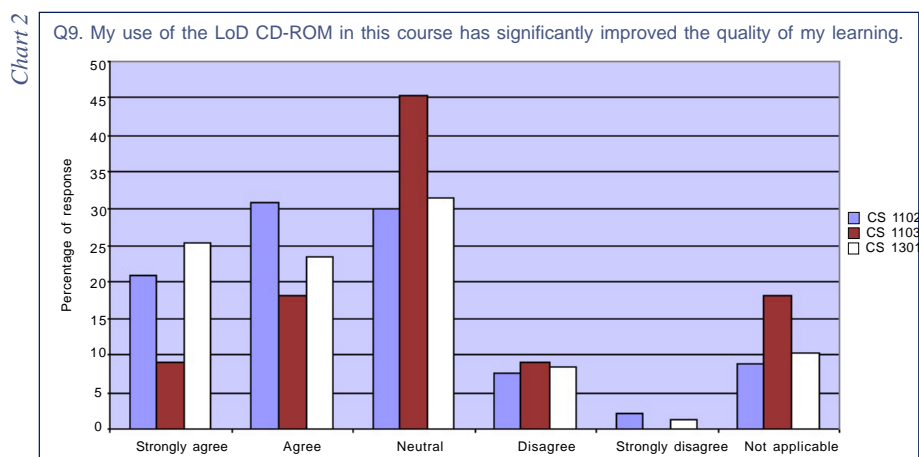
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