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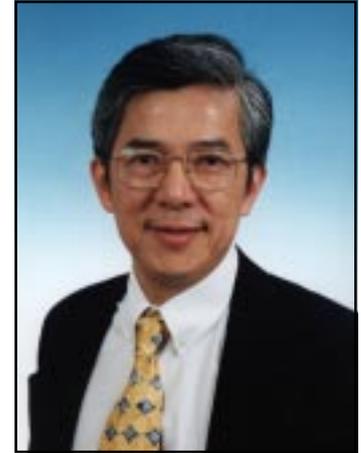
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## The NUS core curriculum: A community of scholars

Professor Shih Choon Fong, Deputy Vice-Chancellor



In July 1999, the first phase of the core curriculum will be in place at NUS. The core curriculum is a set of multidisciplinary courses designed to broaden our undergraduates' knowledge, skills and habits of thought in areas beyond their academic specialisation.

We hope that requiring students to read core curriculum modules together with a major or concentration in one or more subjects will produce graduates with the cultural and intellectual capability to manage complexity, uncertainty and change. We want our students to acquire the maturity and understanding to form enduring relationships that support interdependence in an increasingly interconnected world community.

How will the core curriculum influence the form, content and style of teaching and learning at NUS? I believe the answer lies in the people. NUS is a community of scholars comprising faculty and students. To thrive, its members must feel they can communicate effectively with each other and this is where the core curriculum has a pivotal role to play: to provide a platform for dialogue that transcends the boundaries of age, position and discipline.

When the dean of Harvard's Faculty of Arts and Science, Professor Jeremy R. Knowles, visited NUS in August 1997, he made the comment that: "The core curriculum is an attempt to create a common discourse about society [and] how we might wish society to change."

This is the essence of what we hope to accomplish with the core curriculum. Singapore is on the threshold of becoming a knowledge society and economy.

I am convinced that NUS can contribute significantly to nurturing diverse talents for leadership in a knowledge society, and that the core curriculum is one way we can do this.

Currently, we plan to mount five modules in the next academic year: writing, history, biology, human relations, and scientific thinking and methodology. Other areas under consideration are social and economic analysis, science literacy, literature and the arts, moral reasoning, and culture and contemporary societies. The core curriculum will constitute one-fourth of the total undergraduate curriculum.

The writing module will promote critical thinking and the effective communication of complex issues. The biology module will prepare students for the biomolecular revolution taking place now. The scientific thinking and methodology module will inculcate the ability to think quantitatively, logically and imaginatively on real-world data. Modules on history and human relations will help students acquire contextual knowledge and skills to better understand and anticipate changes in the next century.

The core curriculum will be a quality programme for students with high aspirations, taught by the best teachers at NUS. It will introduce innovative content, promote innovative teaching and pioneer innovative assessment that expands the frontiers of learning and develops inquiring minds. Faculties and students will provide the diversity, vitality and vibrancy that prevails in a distinguished community of scholars that remains closely connected to society and public life. This is our challenge. ■

Many thanks to all the teachers, students and alumni who shared their views on the characteristics of good students that deserve more attention. We hope the following pages will help make a difference in teaching and learning at NUS.

## Teachers on good students

The overriding quality of a good student is that he/she should be motivated by the subject matter, not primarily by examination results.

—*Leung Hing Man, FBA*

Good students are active rather than passive. They try to understand in class rather than just taking notes in class and leaving understanding for later. They are curious and ask questions. Lecturers often only give one way to solve a problem; good students look for alternative ways to solve it. When they don't understand something, they get it clarified as soon as possible, rather than leaving it for the day before the exam. They don't try to concentrate on "important" topics but read everything. They don't study for exams, but for knowledge. In the long run, they find that this pays off even for scoring in exams.

—*Sanjay Jain, SOC*

A good student displays strong interest in the subject; without enthusiasm, he/she will not become the best in any field. Good students also set short-term and long-term goals and try to achieve them step by step.

—*Su Jui-lung, FASS*

We all like smart students, but smart students are not necessarily good students. Good students have a learning mind-set: i.e., an eagerness and willingness to question and to contribute or share their opinions, experiences and views. They are willing to argue with others and yet are not offended if their own ideas are not accepted. They nourish or enable their fellow students to be better people.

—*Shu Moo Yoong, FBA*

Good students are pathologically curious. They will not accept everything they are told at face value and constantly search for the best answers (the eternal quest for truth). They demand more of themselves than of their teachers and they have great initiative. They do not expect to be told the basics. If they want to know or learn something, they will take the first step and try to find out as much as they can themselves before engaging their teachers in further discussion.

—*Kevin Tan, LAW*

Good students ask questions which other students wish they dared to ask.

—*Tang Loon Ching, ENG*

Good students are proactive and prepared. In a tutorial, for example, the student who is prepared will benefit far more than the student who sits back and waits for information and is unable to take part in any meaningful discussion.

—*Alice Christudason, FABRE*

One of my expectations of a good student is one that Confucius described: "When given one example, return with three more." A good student should have the ability and initiative to read up or think of three more examples to support or counter the one taught by the teacher. I also expect good students to have the ability to analyse and re-synthesise what is taught, and to present or communicate the knowledge in alternate forms. It is a re-creation process that requires the student to have a good understanding of the subject. Creativity from the student is also manifested this way.

—*Lim Tit Meng, SCI*

A good student is willing to follow her/his passions in academics, and is open-minded in learning. He/she is willing to make mistakes; in particular, this means asking frank questions in class when she/he cannot follow something. This also means that he/she doesn't judge fellow students when they ask questions that seem "stupid". Overall, this should lead to a lively learning environment that is by no means a monologue by the lecturer.

—*Anonymous*

A good student has a critical mind and likes to challenge the lecturer. He/she is vocal during tutorial sessions, rather than sitting quietly waiting for answers from the tutor.

—*Anonymous*

A good student: comes to NUS to learn as well as to achieve a paper qualification; is open-minded in expecting that at least some learning will be exciting; accepts that learning involves some hard work and that education is not a branch of the entertainment industry; looks at learning in a systems context, not as a series of info-bytes; seeks out ways to grow as a whole person.

—*Ann Wee, FASS*

What makes good students good? The differentiation lies in the intention. Good students work towards gaining a firm foundation of the basics with the intention of applying such information to applications which are of service to the nation, organization, etc. Smart students do so for the sake of scoring well in exams so that there will be short cuts to success. The educational system must work to close the loopholes which allow the "smart" student to appear to outperform the "good" student.

—*Ng Tuck Wah, ENG*

A good student has an inquiring mind and thinks through issues raised during lectures and tutorials.

—*Janet Lim, CELC*

A good student will attempt to directly solve problems assigned as homework and will not “hunt around” for solutions from seniors. Focused, consistent and unrelenting hard work are indispensable for a student who wishes to perform well in exams as well as master the subject matter.

—*Belal E. Baaquie, SCI*

I appreciate students with the courage to admit they’re confused; a quiz-zical look from a student during lecture can be a significant contribution to its final clarity. In general, strong students seem to be mentally active during lecture. Instead of just absorbing the material at face value, they are considering alternative solutions and otherwise questioning what is being presented. I also enjoy cases where students put a little extra into their work, bypassing the straightforward solution to find a more elegant or efficient one.

—*Phil Long, SOC*

Good students are responsive and show enthusiasm for their subjects. They take initiative in learning and clarifying any doubts with the lecturer. They regard doing presentations and speaking in class and tutorials as a precious opportunity to practice one’s communication skills, not as something that one is forced to do.

—*Ni Yibin, FASS*

A good student never lets the lecturer get away with an unclear explanation.

—*Marcelo H. Ang Jr., ENG*

A good student is: more interested in understanding than knowing; will not accept an unsupported statement as fact but probe its basis, exploring alternatives and their consequences; spends more effort listening and thinking about what is being said than copying notes; is not afraid to voice a question or objection; wonders how a theory, model, issue or problem can be viewed or constructed in a different way; is less worried about passing an exam than in failing to see how the pieces fit together.

—*John R. Potter, ENG*

What makes good students good? Of course some inborn intelligence is needed, but this needs to be used in the right way; some use their cleverness to minimize the amount of work needed to get a good grade. Good students have a combination of intellectual curiosity and persistence that makes them try to understand things and work them out for themselves, no matter how long it takes.

—*Anonymous*

Good students are students who read. They read the relevant chapters in the text, they read the material in the reading list, they read any extra relevant material they can get their hands on. Only when they read will they learn—and they will be learning on their own, without being hand-held by their lecturers. This is infinitely more rewarding.

Good students ask questions. Teachers clarify concepts and facts which the students are unsure of, but students must ask questions. Reading ensures that they ask challenging ones.

Good students are good listeners; they pay attention in class, instead of talking or daydreaming. This is a chicken and egg issue. Sometimes students don’t listen because the teachers aren’t good and can’t capture their attention. Still, I place the burden on the students to pay attention in class. If they find lectures boring or even useless, they shouldn’t attend rather than turning up, talking in class and disturbing other students.

Good students talk to other students; this helps clarify their ideas and makes learning fun.

—*William Koh Loh Kiang, FBA*

Good students are willing to unravel the why, not just the how of things. They pursue knowledge for its own sake rather than just wanting to pass.

—*Norman N. Lim, ENG*

Good students have fortitude and do not easily succumb to failure. They confront hurdles of learning with great determination and have the courage to learn from problems and try again.

—*Winston Lee Piak Nam, FBA*

Some advice for students.

1. Love the subject. Notice the extent to which people pursue a beloved interest? Treat the subject of your study as your most cherished hobby.

2. Learn to organize data mentally.

3. Speak well. Learn to expound on any subject with panache, style and confidence. Be convincing. Learn to present what you know impressively even though it may not be much.

4. Be disciplined in study. Set and achieve daily objectives. Never cram at the last minute.

5. Exams are a game which one must learn to play and enjoy. Learn to be exam orientated and focused when you study. Always play to win and score, not just to pass.

6. Be competitive; not necessarily violently so. Enjoy surpassing your colleagues.

7. Think laterally, be innovative, take short cuts and do the unconventional. Who dares—wins!

—*Peter Goh, MED*

Good students treat each class as a learning experience. They look forward to class and prepare themselves to learn (e.g., sleep well so they won’t be tired; avoid distractions such as getting a page during class). They feel responsible for contributing to the learning experience. In discussion, they flow along with the thought process of the class, ask relevant questions and challenge possible flaws in logic so that everyone will gain. Good students are polite to fellow students and the instructors. Learning can only take place if there is mutual respect.

—*Lau Geok Theng, FBA*

Regardless of their year of study, good students behave like professionals. They realise that when they get out of university, the only difference between them and others is not so much the fact that one has a better grade point average than the other, but that one acts as a professional. We must make sure that university education takes the student away from “kiasuism” and into professionalism.

—*Gambhir Bhatta, FASS*

# Students and alumni on good students

We were all students more than once in our lives. However, a good student will know that he/she will probably be a student all their lives.

—Jonathan Tan, '92 DEN

Balance. A good student balances his grades with his social life; his wants and needs with the needs of the community; his fun time with work time; his sense of the world and the impact he can make with the smallness of his being; the sciences and the humanities; reality and his philosophy.

—Oscar Lee, FASS '94

A good student is usually inquisitive and never fails to ask questions that sometimes pose difficulties for the teacher.

—Dominic Leung, DEN '75

A good student is one who puts thought into assignments and exams and shows a willingness to critically apply concepts to real-life situations. He/she wants to know where they went wrong in their exams.

—Eugenia Peck, FASS '89

A good student has a positive attitude and strives for betterment, integrity, etc. Academic excellence is not the only measure of a good student but is part and parcel of it; it may be the result of a positive attitude.

—Sim Meng Hoe, SCI '93

What makes good students good? Clear priorities and values. Time management. Understanding, not memorising. Explaining concepts to friends who don't understand; this reinforces your understanding. A support/study group, if it helps. A positive attitude: make yourself think you like the subject, lecturer, your performance and most importantly yourself.

—Lim Kien Hwa, ENG '91

Good students can see relationships and links between subjects that form their coursework; a more holistic view enables them to make inferences and gain new insights.

—Anonymous (alum)

In the "real world", one of the critical "x" factors is the ability to make good decisions based on limited information. An under-emphasised aspect of education is the student's ability to give an answer—any answer. Students should try to give the best answer possible based on available information rather than trying for the "right" answer. The teacher's ability to cultivate an atmosphere which supports this is priceless.

—Edmund Tan, FASS '88

A good student is one who has a "burning desire" to learn and excel.

—Pallavi Ganotra, ENG

Good students treat failure as a key to the next success.

—Koh Meng Hong, ENG

University education is really about training the mind; being quiet during tutorials and nonchalant on issues around us defeats the purpose of "testing the ground". People are so afraid to give the wrong answer. There's more to life than always agreeing and copying down everything the lecturers say.

—Joe Lim, FASS

A good student has good integrity (no cheating, no lying, no breaking sensible rules), a vision for his/her future and competence in his/her subject.

—Dije, ENG

A student is good only when he uses his brains when listening, talking, reading, etc.

—Kam Yuli Agnes, FASS

Are most Singaporean students slogging through school to attain flying colours or to get an education? Consider the ultimate rationale and desired outcome of your study. What does it achieve? Is it important after all?

—Wong Kok Leong, FBA

It is unfortunate that learning has been conflated with studying. Learning is a process of becoming, an experience of discovery that you must want.

—Alfred Pang, FASS

It is better for students not to be compared.

—Li Rongqing, ENG

Good students never cease to wonder. They accept that better answers may exist and that there may not be a correct answer.

—Anonymous (student)

Many NUS students regard university education as a means to obtain a degree which serves as a passport to getting a well-paid job. They take a very functional view towards university education. As a result, they seldom seize opportunities available to them on campus—opportunities that do not contribute to better grades but definitely to a broadened horizon.

—Wong Wai Quen, FBA

A good student should be simple, not have so many intricacies in the mind to profit himself by hurting others. He should be responsible, considerate and open-minded. In order to make a good society for us and others, we need to be cooperative and put more concentration on conscience, morality and mutual understanding.

—Tan Mingran, FASS

A good student seeks the truth by exercising his/her freedom with personal responsibility; strives to have good values/morals; strives to excel in his/her field of study; is a good communicator and user of communications media; serves all through good works and knows how to plan for the future to be of maximum benefit to all.

—Javier Calero Cuervo, FABRE

I found group effort extremely conducive for learning (e.g., students getting together to talk about a subject, presenting (sometimes conflicting) views, attempting to persuade others, appealing to rational standards for justification, etc.). This is a very *active* form of learning, more than just absorbing what others have to say, it is articulating and defending beliefs in the common pursuit of learning. Much depends on being in an environment where this kind of student interaction is encouraged. For instance, departments will have to be less worried about students "copying" from each other, or that students might come to share similar ideas in their work.

—Loy Hui Chieh, FASS

Good students show respect towards their lecturers/tutors in all circumstances, irrespective of whether a teacher is boring or interesting, and regardless of the teacher's personality. They pay attention when the teacher is speaking and turn off all pagers and handphones as an act of courtesy.

—Anonymous (student)

A good student considers a teacher as a guide who can show him/her the path to obtain knowledge but not as a "pundit" who knows everything.

—Harsha S. Kumarawadu, FASS

A good science student is one who knows the fundamentals in his subjects well (one can do very well in exams even with very shaky fundamentals). Good students are also articulate, especially during discussions in class. A good learning environment is one where information and ideas, instead of being kept individually, are shared and everybody learns together.

—Chin Yuen Yeen, ENG

The one "eye-catching" characteristic of good students is not very honourable. They tend to keep to themselves more than one would like. Should a weaker student who is not their close friend approach them for help, they will not aid them with enthusiasm. It's like the poor getting poorer and the rich getting richer as the poorer students have to turn to each other or lecturers (seldom) in order to get some much needed help.

—Hoo Wah Kwei, ENG

It is unfortunate that learning has been conflated with studying. Learning is a process of becoming, an experience of discovery that you must want.

—Alfred Pang, FASS

A good student is self-motivated, energetic and looks for work instead of being chased by it.

—Ouyang Xiuzhang, FBA

Because our educational system focuses on grades, the best students in secondary and JC levels try to outdo each other by throwing more facts into their exams. They carry this mentality to NUS where their essays are flooded with facts and they seem very pleased with themselves. No wonder the rest, and even the teaching staff, find the phrase 'good students' beyond comprehension.

—Anonymous (student)

A good student can get As even if no attention is given to him. He can sleep in lectures, miss tutorials, go on a date during exams. There are no mundane methods of being a good student....they are born with it.

—Lim Teck Cheng, ENG

When a good student learns something, he/she is able to figure out the feeling of discovering it.

—Wang Shiqiang, ENG

A good student is not afraid of admitting that he/she is ignorant of many things. The trend here is that students are often afraid to say "I don't know but can you please tell me" because they think that they are expected to know a lot of things.

—Anonymous (student)

Good students manage to do well in their studies without neglecting other aspects of their lives such as their social, spiritual and physical (health and fitness) spheres. Such people are a rarity and should be recognized for being well-rounded individuals!

—Phang Yin Pin Francis, FASS

A good student has an honest desire to excel in his endeavours, not for prestige, fame or fortune, but simply to be true to himself and his parents. Good students strive for what they believe in, work hard to achieve their goals and to succeed, through sheer determination and, of course, a wee bit of luck.

—Elias Michelle Anne, FASS

A good student is willing to share knowledge and smart observations *in time* (i.e., ask original Qs during courses as implication for others) with other classmates; able to initiate others in discussions, leading to a creative atmosphere; an exemplar of an aider to other classmates without prejudice; has the courage to raise counterpart issues on well-accepted ideas.

—Du Jian, ENG

Good students do consistent work. They read before lectures and do tutorials conscientiously. They contribute constructively in class and ask questions when in doubt. They do their share in project work and are willing to lend a helping hand to friends who are not coping well.

—Tim Ngiap Chen, FBA

Here is my frank opinion of the various definitions of a "good" student.

1. Good as in dean's list material. In my faculty, once you mug like hell and remember all tutorial solutions, straight As is almost a certainty.

2. Good as in eager learners. These are people who don't usually get to the dean's list because they aren't obsessed with grades. They read widely and have a impressive the amount of knowledge. People in categories 1 and 2 are usually mutually exclusive.

3. Good as in ECA overachievers. Some of them train very hard to be great athletes, that's their secret. But not all these people are mutually exclusive with category 1.

4. Good as in wanton learners but don't have the luck to excel in grades. They study, practice hard and know their stuff, but it's against their principles to memorise tutorials, so when it comes to exams they are always one or two tutorial questions behind. They are often from category 2 and don't think much about people in category 1.

—Anonymous (student)

Is a student good because he is able to answer questions? Or is a student good because he is able to pose questions? Some students are able to juggle an all "A" revue of results with an active ECA/hall life and a romantic life as well. Others find it hard even to achieve an "A" in any course. The question then might be: Are good students made or born?

—Anonymous (student)

To good students, the known is not taken for granted and the unknown is a chance for a breakthrough.

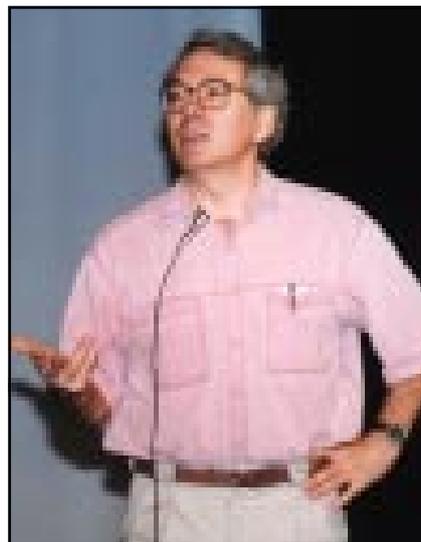
—Tok Kiat Siong, ENG

Good students believe that "knowledge is power" and "life is a continual learning process". They are open-minded and constantly review (and update and relearn when necessary) what they know and believe. They understand the importance and purpose of examinations, but are not overwhelmed by them. They believe in the importance of camaraderie among fellow students and the need for cooperation. They are concerned about issues and happenings and are ready to research, discuss, evaluate and make objective deductions.

—Leong Saw Wei, ENG

## Teaching for creativity in science: An example

Last semester, Associate Professor Lee Gass was a visiting professor at NUS in the Department of Biological Sciences, Faculty of Science. He led a CDTL seminar on "Teaching for Creativity in Science and Other Disciplines" and wrote this article for *CDTLink*.



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In my first year of teaching high school biology I discovered a large pile of scientific magazines. I hired students to examine, cross-index and enter hundreds of articles into a simple system of punched cards. By running a knitting needle through a hole representing a topic of interest, and lifting, cards on the topic fell out. Sorting on other criteria reduced the set, and information on the cards helped students select articles to read. (A computer-based system would be easy to develop now, but summarizing articles would remain labour-intensive.)

I developed the system that year and used it the next year in my tenth grade survey course and my eleventh and twelfth grade research course. Each week, the tenth graders read and reported on any article in addition to their other work, and the research students read and reported on two. The system was fast, easy and ran by itself with no supervision from me. Once we began, students filed their reports each week without reminding, and they enjoyed it.

The research course was very successful. I rarely lectured and used few structured exercises after the first month, yet there were always many kinds of activities in the classroom. I helped when necessary, but tried to stay out of the students' way and let them do their research. Sometimes they spent several days in succession without interacting directly with me at all. All teams did excellent original research, several got publishable results and one student later com-

pleted a PhD on the project he began in the eleventh grade. Later I learned that not only were the research students not disadvantaged by their year of research, but they enjoyed strong advantages as undergraduates, even in traditional courses.

**SOUND CONDUCTION.** One day, two research students sat in a corner, talking. Periodically they argued, but they were fully engaged and I didn't disturb them. The next day they asked to go to the nurse's office; they needed a quiet place to do an experiment. Without probing, I let them go. On the third day they approached me again. They had read an article on the conduction of sound by bone, and after designing and performing their own experiment to test the main point of the article, they decided that the article was wrong.

The article contended that sound reaches the nerve endings in our inner ears not only through our ears, but through our bones as well. It offered a demonstration. Hum quietly and listen. Then plug your ears with your fingers and hum again: it should be louder.

The boys agreed with the result, but disagreed that it proves bone conducts sound to our ears. It was consistent with that interpretation, they argued, but it was also consistent with the null hypothesis that bone does not conduct sound. They concluded that the demonstration was inconclusive, and met that night to design an experiment that they performed in the nurse's office the second day.

In their experiment, a "hummer" plugged a "listener's" ears and then hummed. They reasoned that if sound is conducted by bone, then it would grow as loud under this condition as it had in the other experiment. Alternatively, if it grew quieter this would refute the hypothesis.

In the nurse's office they repeated both conditions many times, taking careful notes. In every case, the sound grew louder under the first condition and quieter under the second. Correctly, given a hidden, implicit and incorrect assumption they had made in reading the article, they concluded incorrectly that the authors' interpretation was wrong and sound is not conducted by bone.

The boys' conclusion was wrong. But there was something right about what they did to reach it. Most of their deductive logic was solid, and their experimental design, the care that they took in executing it and their interpretation of their data were flawless.

Unfortunately or not, they made a mistake in one of the most difficult things that scientists must learn to do in their work: to know when we assume things. They assumed that the authors meant that our shoulder, arm and finger bones conduct sound to our ears when we plug them, and their experiment indeed refuted that, but the authors were writing about *skull* bones! But for that critical assumption in a critical place, the boys were impeccable creative scientists and I was proud of them.

When they realized their hidden assumption, they reinterpreted the data and had a good laugh with no loss of face. The next day they proudly presented the story to the rest of their class, to my other research class and to a tenth grade class. Then they wrote it up as a scientific investigation. Everyone had a good time: the boys gained fame and prestige for their courage and creativity, and everyone learned important things about science (including that it is an exciting and dangerous enterprise), language and assumptions. I think we spent the time well.

### CREATIVE PROBLEM SOLVING.

The example illustrates a way of teaching and learning that must become common in Singaporean schools and universities, in my view, if students are to become the creative problem solvers that the national policy envisions. What does it illustrate?

➤ *We learn to work creatively by confronting real problems that matter to us personally.* This a profound truth expressed throughout the vast literature on creativity. We can help in many ways, but we cannot supply the imagination that humans are born with, imagination that our families and teachers traditionally suppress. In this case the boys discovered the problem for themselves—“forced” by the weekly reading assignment—and worked independently to solve it. My only input was to help them uncover their hidden assumption and gain rather than lose face from their error.

There are many ways to organize experiences like this for students, so the lesson is not that they must work independently at all stages. But it must be *their* research whether they discover it or not. They must own it emotionally, become engaged in it actively, and work—without interference from more experienced people—either independently or cooperatively with other students during the creative stages of logical development, experimental design and execution, and interpretation.

The key is to encourage process over product in the short term, but insist on high standards of product in the end. For many reasons this is a major challenge for most teachers, but the payoff is deeper, longer-lasting learning.

➤ *Teachers must make it safe to make mistakes, and encourage high standards.* These are not in conflict in principle, but often are in practice. Traditional ways of teaching, especially in universities, sacrifice the freedom to err for high standards, paradoxically inhibiting development of creative problem-solving skills. In terms of the dynamics of human development, the core issue is emotional, not directly intellectual, and it is the single most critical issue that I identified at NUS.

Science students at NUS do not trust their teachers enough to risk thinking critically in class. They understand that to think creatively is to risk error, and they’d rather not. However, most of them were happy to risk with a safe, gentle stranger who knew what he was doing. Your students’ minds are fine, although they are not practiced in thinking with them. Until they feel safe enough to do it with you, there will be something seriously wrong with their learning environment and you will be unable to help them learn to think effectively. Trust and respect are central in education; they far overshadow nearly everything else.

Students don’t merely feel unsafe; they are unsafe—sometimes inexcusably so. I saw NUS professors interrupt students aggressively to correct incorrect assumptions, in one case embarrassing them severely. The professor gained great face (although not in my eyes), and the students lost more. Professors everywhere and at every level must stop actively discouraging their students from thinking. We are right to insist on high standards, but absolutely wrong in failing to encourage processes that generate mistakes.

➤ *Mistakes are worth bragging about.* 3M Corporation advertises throughout the company the most magnificent failures of its employees; it rewards them financially and with time released from normal duties to try new things. This is a way to encourage creative imagination, and it works.

Last term I asked a group of NUS undergraduates whether it could work in Singapore to make heroes of students who fail in creative efforts. They found the idea intriguing, and concluded that the peer recognition would be an important factor. They cautioned, however, that both parents and teachers would have to be brainwashed to understand the value of the idea, or they would torpedo it.

➤ *A teacher’s job is not to teach. A teacher’s responsibility is for students to learn.* These are not the same. I have come to believe that for professors to shift from thinking of themselves as conveyors of information to facilitators of learning is the single most important shift they can make.

This story illustrates one of many approaches to teaching for creativity in science. Simply, this approach minimizes my direct interference with students’ learning, while at the same time providing rich opportunities for them to discover. It does not preclude guiding students when necessary, but is not based on that presumption.

Perhaps most importantly, the story reminds me that although I am responsible for everything that occurs in my classroom, I do not and cannot plan all of it in detail. I planned the reading/writing assignment believing that “good things would result”, but I had no clear expectations. The specific keys to this and many other examples are to provide freedom for students to discover things, to respect their efforts and to protect them from suffering loss of face, either at my hands or those of their peers. ■

*Lee Gass is an associate professor in the Department of Zoology at the University of British Columbia. He can be reached at gass@zoology.ubc.ca.*

## New facilities to serve you better

# We've moved!

CDTL's new premises are more spacious and better equipped. Spread over the sixth and seventh levels of the new Central Library Annexe, our new set-up includes

- a video recording studio (with chromakey capabilities used to create 3D effects, the TV weather report and more),



**Top:** CDTL staff showing off our new studio—à la chromakey.

**Left:** Our main entrance is on Kent Ridge Road.

**Bottom:** The first workshop in the new computer cluster.



- a post-production studio,
- a document viewing room with equipment for cross-format transferring of tapes (VHS, SVHS, Beta and U-matic) and video (PAL, SECAM and NTSC–Japan and US),
- a SVHS editing room,
- a VHS editing room for staff and student access,
- a multimedia/graphics room with binding and lettering equipment for staff access,
- a computer cluster (with 20 computers),
- a comfortable seminar room (seats 80), and
- last but not least: our very own rest rooms!!



So, no more excuses. Our facilities are waiting, and our staff are ready to assist. Consult us on your *video conferencing project*, the design of your *instructional materials* or placing your *course materials on the Internet*. Register for a CDTL seminar or workshop. Call us for more info on our services or just stop by to say hi and get a brochure or a tour! ■

## CDTL's video productions

# Vids to celebrate and educate

Video productions are a big part of what we do. Below are some examples of our recent work or current work in progress.

- 👏 An informational video for the *Institute of Materials Research and Engineering (IMRE)* to be used in staff recruitment.
- 👏 An informational video on *IT at NUS*, highlighting the use of IT in teaching, learning and research.
- 👏 A corporate video for the *Department of Community, Occupational and Family Medicine (COFM)*, in celebration of their 50th anniversary.

👏 A celebratory video for *Convocation*, congratulating graduates on their achievements and helping them cultivate a common bond.

👏 A series of videotaped and digitized lectures (called *Lecture on Demand or LoD*) for a new form of teaching at the *School of Computing*.

If your department is planning to make a video, please call us. Whether your goal is a video that recruits, promotes, celebrates or educates, we are happy to advise you and work with you. ■

# VOICES AND CHOICES

CDTL organises on-going workshops and seminars on educational issues. Last semester's workshop on presentation skills was particularly well received, and the presenter, Mr Alan Maley, until recently a senior fellow in the Department of English Language and Literature, wrote this follow-up article for *CDTLink*.

As teachers, we use our voices more than most other professions. Our voices are arguably our single most valuable asset in communicating with our students. Yet we receive no training in the use or maintenance of our voices. It is an irony that most of us spend more on maintaining our cars, which are replaceable, than on our voices, which are not.

Because of overuse (most teachers talk far too much!) and misuse (it is common for teachers to strain their voices, especially in noisy environments), teachers frequently experience problems with their voices. Such problems include vocal tiredness, the loss of power and expressivity, a scratchy throat, a chronic sore throat and even feelings of dislike for their own voice.

The effects of poor vocal use on our students is equally unfortunate. Students make rapid judgements of us based on the way we sound. A tired voice, however interesting the content of the message, is poorly received by students. A voice lacking in variety rapidly turns them off. A voice which does not reach the back of the room is simply not heard. In a word, we are our voices, and all too often we literally condemn ourselves out of our own mouths.

What can we do about this in the absence of proper voice training facilities? We can become aware, make a first effort and maintain the momentum.

- **Awareness.** Most of us are simply not aware of the way we sound to others. Until we become aware that there may be a problem, no solution is possible. How to become aware? Check out one of the many, very accessible books on the subject. I suggest starting with *Is Your Voice Telling on You?* (see below). Among other things, this

book contains a diagnostic check for "placing" your voice characteristics. You may also wish to record one of your lectures for critical post-mortem analysis. A close friend or partner can also give you useful information on how your voice is perceived by others.

- **Effort.** Being aware is no use unless you are prepared to do something about it. Concentrate on: relaxation (tension blocks free breathing), improving your posture (which directly impacts breathing), breathing (no air supply, no voice), articulation (especially final consonants) and variety (of volume, pace, pitch, mood, texture, etc.).

The exercises recommended in *The Tao of Voice* are excellent for relaxation, posture and breathing. *Clear Speech* and *The Voice Book* contain helpful suggestions on articulation. For variety, check out *The Voice Book* and *The Voice Resource Book*. It takes relatively little effort to adopt a simple set of daily exercises. You may also wish to practice varying your delivery, preferably in the space in which you usually teach. Recording your practice sessions can also help.

- **Maintenance.** Monitoring your voice is relatively simple. Notice when it gets tired or underperforms. Ask yourself what has caused this. The best remedy is rest. Try to talk less and find some time during the day when you can be alone and can relax quietly. Avoid speaking in noisy environments. Drink warm rather than iced drinks. Avoid smoking, alcohol and other drying agents such as antihistamines. Even throat lozenges usually contain menthol which is a drying agent; try fruit pastilles instead.

I recognise that advice on behavioural change is easy to give, difficult to apply. Nonetheless, I hope these observations spark an interest in your biggest non-renewable asset: your voice. ■

## SUGGESTED READING

- Boone, Daniel. 1991. *Is Your Voice Telling on You?* Whurr Pubs.
- Chun Tao Cheng, Stephen. 1990. *The Tao of Voice*. Destiny Books.
- Linklater, Kristin. 1989. *Freeing the Natural Voice*. Drama Book Publishers, New York.
- Martin, Stephanie and Darnley, Lyn. 1992. *The Voice Source Book*. Winslow Press, Oxford.
- Morrison, Malcolm. 1989. *Clear Speech*. A & C Black, London.

The Engineering and Law courses described in the following two articles used desktop video conferencing. Desktop conferencing is a cheaper, more portable alternative to boardroom video conferencing (described in the January 1998 issue of CDTLink), which needs more sophisticated equipment and costly ISDN lines to deliver better quality audio and video. Both the Computer Centre and CDTL were consulted on these projects and all enquiries are welcome.

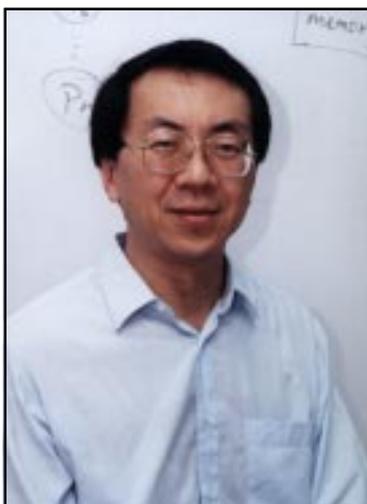
## Remote lectures over Singapore ONE

Associate Professor Kenneth Ong, Department of Electrical Engineering

Remote or distance learning programmes are rapidly developing in many universities around the world. Designed for students who are in a location remote from the teacher, the programmes range from ready-made multimedia courses to real-time lectures with a complement of online features to facilitate class interaction. In the latter, several modes of interaction are possible (e.g., lecturer with students, between students, students using dynamic electronic media), all of which can occur at any place or time.

NUS encourages the use of IT in teaching, including giving lecturers the opportunity to reengineer their courses for a distance learning programme or for teaching on the Web. In a recent distance learning exercise, I conducted a series of three synchronous lectures over Singapore ONE (the national high speed information network) and have learnt much from that experience that I would like to share.

Last semester, I taught a course at Motorola for a group of employees who are also part-time postgraduate students in the Department of Electrical Engineering. Lectures were held at the company after normal working hours and, though the company is only 23 km away from campus, it took me more than half an hour



just to get to class when there was heavy traffic. With a good excuse, Motorola's and NUS's blessings and our own curiosity, we held three of the lectures remotely via desktop video conferencing.

Using Microsoft NetMeeting, email and tools, students were able to electronically view lecture notes, receive assignments and submit reports. The course content (real time systems) also required the use of diagrams to illustrate the concepts of building real-time systems and concurrent programming. We experimented with

NetMeeting's whiteboard for this purpose but found that, since my lecture materials were prepared with Word 97, it was simpler to use Word's drawing tools so the diagrams could be placed next to the lecture material. Several animation clips were also presented to students remotely.

The students shared a microphone and could ask questions at any time during the lecture. Their initial reluctance to talk via video soon gave way to lively discussions; this was made easier by the rapport we had established during previous lectures held in the classroom. After-class follow-up questions were sent by email, as were their reports.

There were several obstacles we had to overcome or contend with.

- Delays in the transmission of my voice and its audible echo from the remote site. This required conscious adjustment and compensation on my part and slowed the pace of teaching initially.
- Limited screen space, requiring a trade-off between space for the lecture material and for the video (i.e., windows for the host and remote sites).
- Visual difficulties. We had to dim the seminar room at the remote site so students would be able to see the video projection of the host site, making it difficult for me to see them. The problem can be resolved with better lighting and a brighter projector.



Remote learning classroom at Motorola

➤ **Multitasking.** In addition to delivering the lecture, I had to operate the keyboard to scroll the lecture notes, type additional material (analogous to writing on the blackboard) and make adjustments for better video and audio quality. This requires a mental balancing act but is quickly learnt.

This series of lectures provided valuable lessons on the use of distance learning resources that are constrained by availability, transmission bandwidth, and budget. Each site was responsible for providing the equipment and facilities needed. Except for the adjustments mentioned, students felt that the remote lectures were not that different from traditional ones. We believe that enriching experiences can be achieved through judicious use of available computer and communication technology—experiences that will pave the way for a brave new world where the university transcends the boundaries of its campus. ■

*The author would like to thank Associate Professor Lawrence Wong, Assistant Director, Computer Centre, for his contributions to this project, and the technical staff of the Computer Centre for their untiring efforts in the set-up, testing and broadcast of the remote lectures.*



## Environmental law course goes global via the Internet

*Associate Professor Lye Lin Heng,  
Faculty of Law*

Every Tuesday morning from 9–11 am last semester, Professor Koh Kheng Lian and I were linked to the Pace University Law School in White Plains, New York by the Internet, as guest professors for a course on comparative environmental law. Together with Pace Professor Nicolas Robinson, who is also head of the International Union for the Conservation of Nature and Natural Resources (IUCN) Environmental Law Commission, we taught and interacted with eight graduate students at Pace as well as with our former student Ms Katrine Skaaland. Ms Skaaland studied environmental law with us at NUS. Now, back in Norway, she was an enthusiastic participant in this Internet course, even though it was held from 2–4 am Norwegian time (8–10 pm in New York)!

Pace University has one of the best programmes in environmental law in the US. Through Professor Robinson's involvement in IUCN, an excellent partnership has developed over the years between Pace and NUS's Asia-Pacific Centre for Environmental Law (APCEL), of which Professor Koh is Director.

Our joint course is believed to be the first taught via the Internet internationally by any law school. "For the cost of a local phone call, we are connecting [three] worlds," said Robinson. This was made possible by our use

*...continued on back page*

## Engineering's desktop video conferencing set-up

### I. Hardware

Each site required a PC workstation with large capacity memory and storage, video camera and sound card. In addition, the NUS site used a high performance headset and the remote site used a microphone and overhead projector.

### II. Connection

The instructor's workstation (at the Computer Centre) was connected to Singapore ONE via an ATM link. The remote classroom was linked to Singapore ONE via an Asymmetrical Digital Subscriber Line (ADSL) modem. The uplink bandwidth on ADSL slowed the transmission speed to about 200 kbits/sec but both video and audio were transmitted at a rate fast enough to maintain a continuous broadcast (i.e., no delays or interruptions).

### III. Software

To share information, we used Microsoft NetMeeting with its whiteboard, application sharing and file transfer utilities. Lecture material (prepared using Word 97) was sent to the students electronically and displayed as a shared application. Animation clips were created with commonly available graphics software, converted into animated GIF images and displayed in Netscape.

# Teaching & Learning

## HIGHLIGHTS



*Architectural design comes to life in the form of portable shelters.*

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### FACULTY OF ARCHITECTURE, BUILDING & REAL ESTATE NUS CAMPUS TURNED SAFARI

Last semester, some forty portable life-sized shelters were on display at NUS. They were the works of more than one hundred first-year Architecture students who, for the first time, were required to construct life-sized structures as one of their four projects for assessment; previously, they needed only to build scaled models. Portable shelters were chosen for their relevance to our tropical climate. The structures had to be functional, aesthetically pleasing and in keeping with an assigned theme such as “Night Safari” or “Earth Day”. Earth Day shelters had to be made from eco-friendly materials and Night Safari shelters had to be functional yet comfortable for occupants to view wildlife outside while protected from the elements. Students worked in groups, putting their knowledge and technical skills to practice: the results proved the buildability of their designs. ■

### FACULTY OF ARTS & SOCIAL SCIENCES MPP'S CASE METHOD DEVELOPS SUBSTANCE AND SKILLS

The case method is a discussion method used in the Master in Public Policy (MPP) classroom to actively engage students in analytical and critical thinking. Public policy cases—narratives depicting real policy or management problems faced by public officials—are used to stimulate discussion. Students consider what decisions are needed to address a problem and how to justify those decisions given particular social, economic and political conditions. Public policy education requires students to have a strong foundation in theoretical knowledge and yet be cognisant of the real-world so that they can adequately and effectively respond to a dynamic situation. When we think of the case method, words such as enquiry, analysis, critical thinking, risk taking, innovation, motivation and interesting come to mind. So too does hard work because it requires more preparation from both students and lecturers. ■



*Real-world problems challenge MPP students.*

### FACULTY OF DENTISTRY STATE YOUR CASE...IN TREATMENT PLANNING SEMINARS

Treatment planning seminars in the faculty have three main objectives: case presentations by students, critique of the treatment plans, and multidisciplinary discussion of each case for comprehensive patient care. Using a multimedia presentation of his/her choice, each student must present at least one clinical case to the entire class and four to five academic staff from various disciplines. After each presentation, students and staff join in the discussion of the case; students soon learn the importance of an evidence-based treatment plan (or face the firing squad!), and multidisciplinary input from the specialists helps them understand a case comprehensively. In the process, students develop not only knowledge but also self-confidence and communication skills—important qualities for examinations and professional practise. ■

## FACULTY OF ENGINEERING

### CROSS-FACULTY MODULE ON CREATIVE PROBLEM SOLVING

The faculty recently introduced a cross-faculty module aimed at stimulating students to approach engineering and science problems in a more creative, and sometimes unconventional, manner. We considered two approaches for arriving at such solutions: conventional and unconventional. In the former, we presumed that there is always a "current solution" for any problem and made no explicit attempt to change the concepts therein. We described the desired state and listed the components of the solution together with their functional links in order to express the essential logical requirements. We focused attention on conflicting requirements as the choices or schemes that can resolve such conflicts often lead to creative solutions. The second approach involved finding ways to break away from conventional lines of thinking to generate ideas (e.g., brainstorming, coordinated thinking, provocation, challenging) and explore possibilities (e.g., unification, elimination, changing scale, substitution, rearrangement). As a hands-on activity each student had to identify an irritation of his/her choice, work towards a creative solution and finally make a presentation. ■



*S-module students sign on for more work, tougher standards.*

## SCHOOL OF COMPUTING

### S-MODULES FOR ENHANCED LEARNING

Last year, we introduced special S-modules into our curriculum. A fast-track alternative to the regular introductory programming sequence (IC1101/2), the S-module versions (IC1101S/2S) featured a different programming language, more challenging assignments and greater emphasis on independent reading. The S-modules were more demanding but promised an enhanced learning environment and longer-term benefits for students. We started with proper resources and strongly motivated teachers. With advertisements, briefings, encouragement and interviews, we recruited about sixty motivated students. Both staff and students felt a sense of adventure and the smaller class size helped us quickly build group rapport. A recent survey of participants drew many favourable responses on the S-module learning experience. With this initial success, we hope to incorporate the concept into our Talent Development Programme and our new four-year Bachelor of Computing programmes. ■



*Discussion with Mr John A Boyd, Senior Counsel in the Asian Development Bank.*

## FACULTY OF LAW

### ENVIRONMENTAL LAW—TRAINING THE TRAINERS PROGRAMME

For the second year running, the Asia-Pacific Centre for Environmental Law (APCEL) teamed up with the Commission on Environmental Law of the World Conservation Union and the United Nations Environment Programme to conduct a Training the Trainers Programme for environmental law processes in the Asia-Pacific region. This intensive four-week training course brought together thirty participants from fifteen countries in the Asia-Pacific and over forty resource people from the region and around the world. Funded by the Asian Development Bank and NUS, the goal is to help developing countries in the region build their capacity to introduce, prepare and teach courses in environmental law. Highlights from the training included role plays, mock trials, alternative dispute resolution, research on the Internet, panel discussions, luncheon and dinner talks by experts like Prof Tommy Koh, and site visits to the Ministry for the Environment, CRISP, Pure Chemical Industries and the Bedok Reservoir and Treatment Plant. ■

## FACULTY OF SCIENCE

### STAR<sup>★</sup>: QUALITY CONTROL IN TEACHING

The faculty recently established a STAR<sup>★</sup> (for Science Teaching Assurance Review) task force to review all teaching and learning activities in the faculty. Comprised of resourceful teachers with outstanding track records in teaching, the group's mandate is to review present practices, identify strengths and weaknesses, formulate strategies to meet challenges facing the faculty and make recommendations for implementation. Areas under review include: environment and infrastructure; manpower and workload; teaching evaluation and recognition; promotion of creativity and critical thinking; quality of teaching programmes; teaching methodologies and course assessment. The goal is to ensure that the faculty offers quality programmes of sufficient rigour and intellectual content and that courses are taught by quality staff in an environment that promotes creative thoughts and stimulating ideas. The committee is looking for ways to improve the learning environment and welcomes your ideas. ■

# Writing to learn

Judith Kalman and Calvin Kalman, Concordia University

It is important for the university through its instructors, particularly in introductory courses, to teach its students to critically examine their view of the world. Students frequently hold views different from or alternative to those to which they will be exposed in their courses. This discovery about students has roots in Piaget's early studies of the way children explain natural phenomena (1929). Moreover, as Pintrich, Marx and Boyle (1993) point out, the modern theory of conceptual change assumes that bringing about changes in an individual student is analogous to the nature of change in scientific paradigms proposed by philosophers of science, particularly Kuhn and Lakatos. A good discussion of this idea is found in Duschl and Gitomer (1991).

With these theoretical underpinnings, conceptual change models have become the norm for research on learning in physical and social science and mathematics. Thus, for example, in the in-depth analyses of student attitudes in physics undertaken by Halloun and Hestenes (1985a, 1985b) it is shown that students enter introductory courses with viewpoints differing significantly from paradigms that will be taught them; and, as they progress through the courses, these same students go to great lengths to maintain their original viewpoints. What is required is for students to understand the conceptual framework underlying the course. Helping students to do this involves initiating a growth process which can easily span the entire course.

**CONCEPTUAL CHANGE.** How do we produce conceptual change? These sorts of insights are arrived at in a learning environment that encourages an interplay of learning models: "In order for reflection to occur, the oral and written forms of language must pass back and forth between persons who both speak and listen or read and write-sharing, expanding and reflecting on each other's experiences" (Belenkey, 1986). Writing to learn, with its emphasis on free writing and peer feedback, can be a large part of our technique in teaching our students these vital conceptual skills. As James Britton frames the problem: "In every kind of writing, defining the nature of the operation, devising ways of tackling it, and explaining its meaning and implication to oneself are essential stages that the mind engages" (Britton, Burgess, Martin, McLeod, & Rosen, 1975 p. 90).

Writing in courses allows students to mediate their own "knowledge" with the new knowledge which the course presents to them. Writing to learn and learning to write allows exploration of the student's own doubts, gaps in knowledge, and gropings for the answer. Pre-writing, drafting, and rewriting are integral to any successful piece of writing; what is so often not taken into account is that we never can "get it right" the first time that we put pen to paper.

**THE PROCESS OF WRITING.** Peter Elbow (1973) explains the process in this way: "Just write and keep writing...It will probably come in waves. After a flurry, stop and take a brief rest. But don't stop too long. Don't think about what you are writing or what you have written or else you will overload the circuit again" (p. 61).

As Elbow demonstrates, writing is a recursive process, one that goes backward and forward and backward again, from jotting down initial conceptions to drafting the work to generating new ideas and new formats. When students are writing within their discipline, opportunities to discuss work with instructors and peers, and occasions to re-evaluate and rewrite their initial work are crucial to the success of the project and to the development of students' sense of themselves as both writers and members of their disciplinary communities. In many ways, this parallels the process of reflection in which a writer engages when confronted with the referees' comments on an article submitted for publication.

Elbow rejects the notion that a writer must move from the beginning of a piece of writing to the end in a linear fashion. Instead, he looks at writing as holistic. One goes through successive drafts of a piece of writing, moving from an imprecise picture through progressively complex, lucid, unified, and coherent interpretations. Out of the interaction of the various components of the piece, the student achieves a convincing piece of work (pp. 29–30).

The student is looking, throughout this process of writing, for the unfolding of a focus or a theme. The student reaches for that point at which chaos gives way to a centred focus: "What this means in practice is that in a piece of writing you must force yourself to

keep getting some center of gravity or summing-up to occur. Let the early ones be terrible. They will distort your material by exaggerating some aspects and ignoring others" (Elbow, 1973, p. 36).

**ADAPTING WRITING TO LEARN.** Writing to learn, a technique which is not new and has proven adaptable to different learning styles and situations, is adaptable to all disciplines. It is a method that ensures students' awareness of the concepts underlying the topics being discussed and discourages the viewing of material as an agglomeration of disembodied facts and formulae to be learned.

Before the class students freewrite in their journals about material in order to be able to analyze it not only by developing questions, but also by answering these questions before the class. They might be asked to analyze a text covered in class, to connect it to other reading they have done and to their own experience, and to formulate a possible general statement from these writings. Students can also produce a presummary of the material to be covered in the next class, based on the ideas they develop in their reading of course material and their freewriting as well as write a postsummary based on the concepts they have come to understand after the week's classes. In smaller, higher level courses, the full recursive and interactive approach to writing can be employed by means of a course dossier in which students develop an overview of the course with the assistance of two student reviewers. They can address such questions as what the main concepts of this course are, how they fit together, and what the implications of these concepts are for the development of the general principles of the discipline? (For more details see Kalman and Kalman, 1996.)

Exciting as the idea of writing to learn may be, one of the concerns expressed by teachers in all faculties is the need for a balance between our desire to enhance teaching effectiveness by using techniques other than the lecture and our responsibility to cover obligatory course material. Yet writing to learn activities can be incorporated within the course structure without losing a significant amount of teaching time. As little as ten minutes of class time on a regular basis will add significantly to the students' ability to assimilate and think critically about the concepts introduced in class. Some writing can be incorporated into the course in the form of outside assignments, such as journals.

By expending some time in writing to learn techniques both inside and outside the classroom, we actually save time. The interval spent answering students' questions will be more meaningful as the students write their way into a more sophisticated understanding of the course material. Writing will often avert the "dead space" of fear, those times when students' anxiety blocks their ability to think in an exam situation, to produce a reasoned and competently written paper,

or to solve problems efficiently and creatively. Writing to learn reduces the paralysis of apprehension and leads students into the discovery of their own questions and solutions.

**CONCLUSION.** With this technique we can circumvent the attempt by students to regurgitate lecture material and can discourage them from simply manipulating the prevailing models and formulae of their disciplines. It enables students to achieve necessary critical thinking skills as well. With writing to learn, students can write their way into an understanding of difficult concepts which they have not grasped before. ■

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*A multipoint video conference between Singapore, New York and Norway using CUSeeMe, which supports audio, video and text chat.*

## LAW'S DESKTOP CONFERRING SET-UP\*

### I. Hardware

We used a PC configured with a 200 mhz Pentium, 32 MB RAM, multimedia capability (e.g., sound card, microphone, speakers) and Windows 95.

### II. NUS connection

We used a shared Internet connection of about 2–4 Mbps.

### III. Remote connection

Katrine Skaaland from Norway used PPP (Point-to-Point Protocol) to enable her computer to make a TCP/IP connection using a modem and telephone line.

### IV. Software

We used the CuSeeMe Version 3.1 full demo, downloaded from the developer's homepage at [www.cu-seeme.com](http://www.cu-seeme.com).

### V. Digital video camera

We used CDTL's Connectix Colour QuickCam camera. The QuickCam does not need a video card and can be used on any PC with a parallel port. We later bought our own QuickCam VC (a new video conferencing model) for \$300.

\*Contributed by Alfian Bin Ahmad, Analyst Programmer, Faculty of Law

of CUSeeMe video conferencing software which can accommodate up to eight sites at one time. The classroom at Pace was configured with boardroom video conferencing equipment, a laptop computer and two cameras (one for Professor Robinson and one for the students). Professor Koh and I connected to Pace and Norway using a digital camera and the computer in my office; Ms Skaaland connected from her home.

Although the technology is new and we had to iron out kinks along the way, it was workable. There were limitations, such as only one person could speak at a time. Also, our reception was not very good with our Pentium 75 PC and we had to freeze the picture at our end to save bandwidth for better quality sound. However, our reception improved markedly with our new Pentium 200 PC and the last few classes went without a hitch.

The Law Faculty is presently building a new wing with plans for a classroom with boardroom video conferencing facilities and Internet connections. We hope that, with the new facilities, NUS law students will be able to participate in a second Internet course with Pace University in the coming year. ■

CDTL

The Centre for Development of Teaching and Learning (CDTL) provides a wide range of services and facilities to support the teaching, learning and research programmes of the National University of Singapore.

These include: teaching and learning support, research on educational development issues, instructional design and development, instructional media, video conferencing and computer imaging.

## Editorial Information

### Guest Writers

Lee Gass, Calvin Kalman, Judith Kalman, Lye Lin Heng, Alan Maley, Kenneth Ong and Shih Choon Fong

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