

CDTL: YOUR PARTNER IN TEACHING AND LEARNING IN 2010



Associate Professor Chng Huang Hoon
Director, CDTL

Dear colleagues,

Happy New Year! On behalf of the CDTL team, allow me to wish all of you a very good year ahead. May this be the year that we see even more collaborations and exchanges of ideas on the education front!

Eighteen months have gone swiftly by since I assumed the directorship of CDTL in August 2008. During that period, I have been busy doing many things on different fronts. This includes reviewing the details of all existing CDTL programmes, the department's internal processes, and strengthening the CDTL team. I have also spent a sizeable portion of my time working with select colleagues and the Provost's Office on establishing the NUS Teaching Academy and working on the details of a module that we hope to launch at University Town. In addition to receiving external

visitors, I have also spent some time on outreach within NUS, touching base with colleagues from different departments and faculties, through two new series—an informal 'Friday' afternoon Staff Chat Series (not all chats could be scheduled on Fridays, however!) and a CDTL Luncheon Series involving colleagues, Vice Provost (Education) Professor Tan Thiam Soon, Associate Provost (Undergraduate Education) Professor Bernard Tan and Fellows of the NUS Teaching Academy. It has indeed been a very hectic time, but I am very glad to report that they have been extremely productive in more ways than one. The most important achievement, from my personal point of view being the opportunities created to meet and to get to know, interact and exchange ideas with so many colleagues across the faculties, and through them, renewing

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NEWS HIGHLIGHTS / CDTL DIALOGUE SERIES

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old ties, and in some cases, forging new bonds with departments and faculties.

I will continue with more of the above this year, but I have also set the following goals for CDTL in 2010. I had mentioned in my inaugural message in the January 2009 issue of *CDTLink* (Chng, 2009) that I hope to institute a “Visiting Educationist” scheme that will benefit all of us. This platform is designed to facilitate education exchanges—bringing experts from other universities to NUS and allowing our colleagues to do teaching visits abroad. I am happy to report that the groundwork for this has been completed and I hope to get this off to a start this year by bringing in an external visitor to CDTL and NUS at some point in 2010. This visitor will be someone who has worked extensively in education and has a deep commitment to the way in which we operate in tertiary contexts. My hope is to have this visitor come to us and offer us various opportunities for an exchange of ideas on various pedagogical issues. The details of this scheme are being worked out, but once the candidate is confirmed, I will share this with all colleagues.

Another major initiative on which I will be focusing in 2010 is to continue to create platforms for enriching our students’ learning and education experience. To this end, I will be finding ways to expand our student workshop series, and to work with my team on providing short course packages on communication skills for which many of our students have requested. I will also be working with small groups of colleagues to find opportunities for student engagement that will contribute towards a more student-centric university culture. If you have an idea and/or interest in helping in this matter, just contact me. I welcome all the help that we can get!

2010 promises to be another exciting and hectic year, but it will be a good challenge all round. My simple wish is that whatever little we can do from varied platforms to enhance teaching and learning in NUS, we will find ways to do them and do them well. My other wish is to continue to find the time and opportunities to engage with more and more colleagues. I hope that you won’t wait to be invited to come to work with CDTL on any matter that will promote education, enhance teaching and extend our students’ experience in NUS—just drop me a line and we will find time to work through every good idea.

In closing, let me wish all of you “Happy 2010!” again and I look forward to working with you. Take care.

Huang Hoon ■



With Vice-Provost (Education) Professor Tan Thiam Soon and colleagues who attended the first lunch session of the CDTL Luncheon Series.

Standing (left to right):

Mr Aaron Tan (Computer Science), Dr Eric Chan (Pharmacy), Professor Tan, A/P Lakshminarayanan Samavedham (Chemical & Biomolecular Engineering), Dr Lo Mun Hou (USP)

Seated (left to right):

Ms Pansy Kok (CDTL), Ms Chew Moh Leen (CELC), Dr Suzaina bte Abdul Kadir (LKYSPP), Dr Esther Goh (Social Work), A/P Dipti Srinivasan (Electrical & Computer Engineering), A/P Chng Huang Hoon (CDTL)



STUDENT DIALOGUE SERIES:

IN CONVERSATION WITH ASSOCIATE PROVOST (UNDERGRADUATE EDUCATION) PROFESSOR BERNARD TAN

During CDTL's most recent run of the Teaching Assistants' Programme (TAP) in December 2009, the TAs had a chance to engage in dialogue with Associate Provost (Undergraduate Education) Professor Bernard Tan. After the session, *CDTLink* caught up with Professor Tan to find out his thoughts on the issues that were addressed during the session.

Based on what participants shared during the dialogue session, what do you think are the most pressing issues and challenges that our graduate students and TAs currently face?

I think some of the common issues and challenges confronting our graduate students and TAs include time management (e.g. having to cope with the demands of both teaching and research), adapting to a new work environment (e.g. learning about the way things work at NUS) and knowing what resources they can harness (e.g. locating good sources of advice) to maximise their academic experience.

Many of our graduate students and TAs are international students who may be unfamiliar with the local NUS student population's study habits and practices. What sort of advice would you give them to minimise this 'culture shock'?

The TA training programme organised by CDTL provides a good start. Beyond this programme, new TAs or graduate students with no teaching experience may find it useful to attend some tutorial classes to observe the common practices and habits of local students. Given that many existing tutors are international students themselves, it would also be helpful for new TAs to consult them to get a better idea of how they managed to overcome this 'culture shock'.

One of the issues participants raised was the challenge they faced in finding affordable housing.

Would you be able to comment on the sort of support they can find in this regard?

Over the next few years, the completion of University Town should alleviate this housing problem. In the mean time, an effective way in which they can locate affordable housing is to consult their seniors. Many of our current graduate PhD students and TAs rent flats together within the vicinity of NUS. From time to time, they will need to find replacement tenants for those who have graduated. The Graduate Students Society is a good place to make such contacts.

What measures are being planned in NUS to improve the educational experience of graduate students?

Some of the measures we are considering include aligning key activities to our education philosophy to ensure every activity adds value, establishing clearer programme requirements and expectations to help students plan their studies better, providing students with more opportunities to interact with faculty members and eminent visitors, as well as ensuring that students are well prepared to enter the job market once they complete their graduate education.

What advice or words of motivation would you give graduate students and TAs who may have trouble coping with their research and teaching load?

The goal of putting graduate students and TAs through a rigorous academic programme (i.e. with many research and teaching activities) is to prepare them well for a career in academia or industry. Hence, there is a long term payoff that comes with the short term hardship of going through a rigorous PhD or Master's programme. Students need to have discipline and perseverance to do well. They also need to remember that there is a long term payoff to all the effort that they have put in, and that the research and teaching skills they acquire in the process will stand them in good stead when they enter academia or the industry. ■

TEACHING TEACHING ASSISTANTS TO TEACH

Professor Ip Yuen Kwong, Alex
Department of Biological Sciences

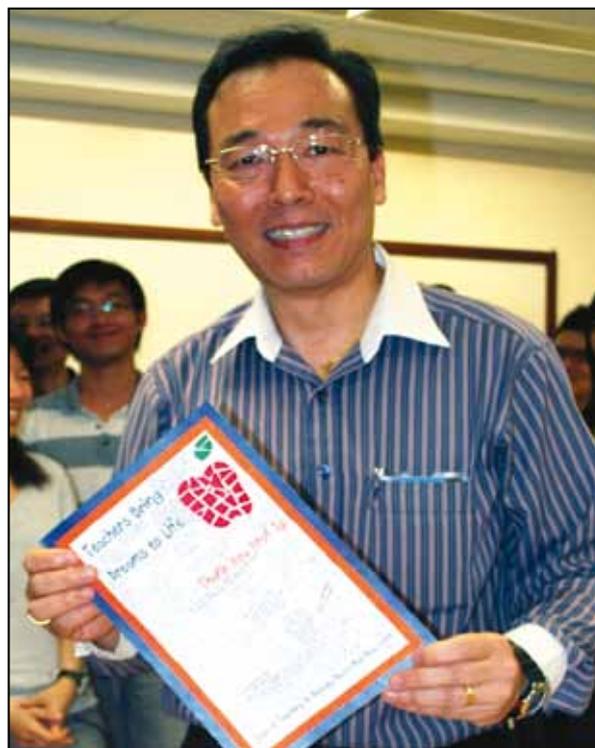
Teaching teaching assistants (TAs) to teach is a noble and essential task of the university. As NUS grows and becomes more research-oriented, some of the key challenges facing many of its departments include increased undergraduate intake and large class sizes for some undergraduate modules.

Amid such challenges, TAs are a valuable resource and are crucial as added reinforcement to the full time teaching staff strength. In some departments, such as the Department of Biological Sciences (DBS), postgraduate student TAs play a vital role teaching undergraduates in small group settings during tutorials and/or practicals. Very often, academic staff rely heavily on their TAs to manage classroom instruction and give student advice. Therefore, there is a great need to focus on the pedagogical development of TAs since the quality of undergraduate education in DBS and other departments depend largely on their teaching effectiveness. Such teaching assistantships also become an important platform for the professional development of postgraduate students as academicians.

In order to achieve the goal of grooming effective TAs, DBS introduced the revamped BL5211 module “Teaching in Biology” in Semester 1, Academic Year 2009/10. BL5211 is designed to help postgraduate students acquire the theories and skills needed to be effective teachers. TAs are given ample opportunities to examine various teaching skills and instructional strategies with many subject-specific examples. BL5211 also emphasises how as TAs, they can best help undergraduates develop cognitive skills (with appropriate affective qualities), which are required at the tertiary level.

BL5211 comprises 14 two-hour lessons and 22 hours of presentations, including:

- Lesson 1, which lays BL5211’s foundations with “What is Teaching?” and “The ‘Wai Gong’ (external strength) and ‘Nei Gong’ (internal strength) of Effective Teaching”
- Lessons 2 to 6, which covers the ‘wai gong’ portion, including building students’ presentation,



The author poses with a gift from his BL5211 students.

explanation and questioning skills, as well as equipping them with skills in using resources and encouraging transfer.

The rest of BL5211 examines the ‘nei gong’ aspects of good teaching, including:

- Lesson 7: Learning Theories and Instructional Design
- Lesson 8: Learning Preferences, Styles (e.g. the 4mat system) and Approaches.
- Lesson 9: Skills in Monitoring, Providing Feedback and Setting Exam Questions,
- Lesson 10: Skills in Motivating Students to Think Critically and Creatively
- Lesson 11: Skills in Using Strategies (e.g. PBL, GBL) to Facilitate Active Learning
- Lesson 12: Skills in Nurturing Junior Scientists with Intelligent Behaviour.

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GRADUATE STUDENTS' PERSPECTIVES OF BL5211

THE 'WAI GONG' OF TEACHING

Mr Ivan Low Cherh Chiet, Mr Kingshuk Poddar & Ms Lee May Yin

NUS Graduate School for Integrative Sciences and Engineering (NGS)

Financial and administrative considerations dictate that current undergraduate education be conducted in huge classes. Hence, modern teaching has to evolve to meet the learning needs of student groups of unprecedented size and cultural diversity. The first half of the lectures for BL5211 "Teaching in Biology" aims to expose graduate students to elements of 'wai gong' (外功 or external strength) in teaching, and how they can be applied to meet the challenges of contemporary classrooms. Broadly, 'wai gong' includes oratory abilities such as presentation, explanation and questioning skills. It also includes complementary and equally important skills such as using resources and encouraging transfer.

Understanding the cultural and academic background of each class is crucial to successful teaching. As

the student enrolment figures of modern classrooms inflate, teaching calls for new, improved and unconventional ways of using the computer to engage students. For example, designing effective PowerPoint slides is an art in itself. A good presentation is often an amalgam of diagrams and icons with short explanatory phrases—"7x7" being the rule-of-thumb for the maximum number of words per slide. This enables easy visualisation and comprehension of its contents. In addition, using graphic organisers to visually represent ideas can assist in organising one's thoughts and promote a better understanding of difficult concepts. Lectures initiated with well designed anticipatory sets (i.e. questions/activities that concisely outline the lesson before actual instruction begins) stimulate students to learn and find out more,

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THE 'NEI GONG' OF TEACHING

Mr Jeffrey Low, Ms Tran Thi Minh Hang & Ms Ng Wei Ling

Department of Biological Sciences

Many presenters focus on 'wai gong' (or external strength) to deliver impressive presentations with well-organised content and stunning graphics. In most instances, it is enough to wow audiences. For teachers and educators, however, mastery of 'wai gong' must be accompanied with the development of 'nei gong' (内功 or internal strength)—an important component of BL5211 "Teaching in Biology".

The science of teaching (or pedagogy) is as complex and demanding as any discipline. Since the module dwells on the human psyche and the mechanics of the mind, much of it is alien to us. Concepts and theorems flowed thick and fast in BL5211, including Maslow's hierarchy of needs, behaviourism, cognitivism, constructivism, Kolb's cycle of learning, the 4mat instructional design system, problem-based learning and more, giving us a glimpse of the subject's depth and complexity. We began to understand that teaching



Graduate students taking BL5211 gather for a group shot with Professor Ip (front row, third from the right).

is not only about transferring and acquiring knowledge but also about facilitating students' learning process. Learning involves the interaction between information, thinking and doing; meaningful learning can produce changes not just in students' knowledge but also their disposition, attitude and behaviours. It is essential for students to develop intelligent behaviours that

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TEACHING PROGRAMMING METHODOLOGY USING MATLAB IN NUS¹

Mr Steven Halim (PhD Candidate)²
Department of Computer Science



Background and Challenges

At NUS, substantial emphasis is placed on the mastery of programming skills for students in the Engineering, Computing and Science faculties. In this article, I want to focus on the chemical engineering (ChemEng) students, who have to use numerical methods (with computer programming) to solve complex ChemEng problems that cannot be resolved analytically.

Before 2007, it was compulsory for students in engineering to take CS1101C “Programming Methodology”, which teaches students the C programming language. It is a ‘one size fits all’ module for the entire batch of engineering students, which resulted in an all-time high enrolment figure of over 700 during one of CS1101C’s offerings—a situation that is clearly not ideal for learning.

Moreover, past ChemEng students had given some negative feedback about CS1101C, such as its heavy

emphasis on specific details in programming language that ChemEng students would never use (e.g. details such as strict variable typing, pointers, pass by value versus by reference). Furthermore, CS1101C did not teach them how to apply such programming knowledge to solve ChemEng problems, like complex Ordinary Differential Equations (ODE) problems or plot experiment data.

Solution: IT1005 “Introduction to Programming with MATLAB”

In 2007, the Department of Chemical and Biomolecular Engineering joined forces with the School of Computing (SoC) to introduce IT1005 “Introduction to Programming with MATLAB”. The module is conducted by a lecturer from SoC and a ChemEng professor to address the issues mentioned earlier. This arrangement ensures that ChemEng students get the best of both worlds—computer programming expertise from SoC and domain-specific knowledge from ChemEng.

The first half of IT1005 consists of a series of lectures on programming methodology, teaching students how to design a program and topics such as basic data structures, basic operations, control flow as well as modularity and functions. The second half covers aspects of MATLAB applications, including linear algebra, symbolic mathematics, root finding, function optimisation, ordinary differential equations and so on. IT1005’s lectures contain rich (chemical) engineering examples, which make students feel that the programming knowledge acquired can be applied to what they learn in their ChemEng modules. This is in stark contrast to CS1101C which focuses only on the



There were 329 ChemEng students (pictured above during a IT1005 lecture) in Semester 1 of AY09/10.

Table 1: Comparison of C versus MATLAB codes to solve a similar problem.

C	MATLAB
<pre>#include<stdio.h> #include<stdlib.h> intmain(){ int i,j; double temp [100][365], sum; for (i=0;i<100; i++) for (j=0;j<365; j++) // 20-40 degrees temp[i][j] = 20 + (int)(rand()* 20 / RAND MAX); for (i=0;i<100;i++){ sum=0; for (j=0;j<365;j++) sum = sum + temp[i][j]; printf("%lf", sum / 365.0); } return 0; }</pre>	<pre>temp=20+rand(100,365)*20; % 20-40 degrees mean(temp, 2) % display mean along 2nd dimension, % and do not suppress output</pre>

intricacies of C language. The weekly lab assignments which utilise relevant ChemEng problems also help to reinforce the concepts taught during lectures.

IT1005 adopted MATLAB as its core teaching tool as it solves various issues related to using C language. MATLAB has a simpler programming language and is more forgiving to novice users. It also has an integrated debugger, data visualisation tools and common scientific functions that are frequently used by chemical engineers. For example, students are assigned this engineering problem: given a two-dimensional array (i.e. a matrix) of daily temperatures in a year (365 columns) of many countries in the world (100 rows), they have to compute the average temperatures of each country. Using C language, the instructor would have to teach them loops and data type beforehand and use C programming code (see Table 1). However, since a matrix is a first class citizen in MATLAB (i.e. it is the most commonly used in MATLAB), students can utilise its many built-in functions to address the same problem (see Table 1). The same problem and its solution can be presented in earlier lectures and can also be presented as an engineering problem.

Starting from Academic Year 2009/10, IT1005 will be offered in Semester 1 of the first year ChemEng syllabus, making IT1005 (and MATLAB) something that ChemEng students will learn from their first day of class.

Results: A Module that is Well Received by ChemEng Students

By December 2009, IT1005 would have been offered for four academic years. By July 2010, the first batch of NUS ChemEng students trained in MATLAB will graduate and the chemical engineering industry will soon feel the positive effects. During these four years, IT1005 has received positive feedback from students. Many felt that the programming and MATLAB knowledge they acquired has helped them tackle more advanced ChemEng modules, including their final year projects. As an instructor, I can also feel the positive effects of using MATLAB in class. Since the MATLAB code is able to provide the programming solution in a shorter time than other programming languages, I can steer my class discussions towards solving the engineering problem itself rather than have to struggle to make my students understand the programming code. Perhaps, there will be more of such successful collaborations in other engineering departments in NUS in the near future.

Endnotes

1. An earlier version of this article was published in the September/October 2009 installment of Techsource, at http://techsource.com.sg/eNews/09_09/academic.html.
2. Information is correct at press time. ■

PROFESSIONAL DEVELOPMENT PROGRAMME (TEACHING)



Professor Andy Hor (left) shares his teaching philosophy and experiences with PDP-T participants during the Academy Chat.

22 colleagues from various faculties including those of Science, Engineering and Dentistry attended the first run of the PDP-T for 2010 on 6-8 January. The programme covered topics which colleagues new to teaching would find helpful, including tips on how to manage large classes, what you need to give a good presentation and how to provide students with good feedback on their assignments and projects. Participants also had the chance to participate in the latest Academy Chat with Professor Andy Hor

from the Department of Chemistry, who is also a Fellow of the NUS Teaching Academy. A range of teaching and learning issues were discussed, including how to effectively balance research and teaching commitments as well as how to engage a classroom with students from different domains and of different capabilities. ■



ViSiTORS TO CDTL

We were pleased to host the following overseas guests who came to CDTL recently to learn more about our educational facilities and to exchange ideas and opinions on best practices in teaching and learning in higher education. ■



December 2009: Dr Kap-Soo Lee (far left) and Dr Ji-Seong Ryu (third from right) from the Samsung Economic Research Institute (SERI), Korea.



January 2010: Educators from the University of Southern Mindanao and Notre Dame University (Cotabato City), Philippines



January 2010: Professor Jouni Valijarvi (left), Director of the Finnish Institute for Educational Research (FIER), Finland

UPCOMING STAFF WORKSHOPS @ CDTL

	Pedagogy-based workshops/seminars
	eLearning workshops

	PDP-T Electives
	IT-based wrokshops/seminars

FEBRUARY 2010

Title	Date/Time	Facilitator
Stimulate Students' Learning by Asking the Right Questions	22 February (Monday) 10.00am - 12.00noon	Dr Grace Wong (Dept of Real Estate)
Improving Student Learning Through Podcasting	23 February (Tuesday) 2.00pm - 5.00pm	Charina Li Ong
Developing Interactive eLearning Courses: Using Adobe Presenter (Breeze)	24 February (Wednesday) 2.00pm - 4.00pm	Kiruthika Ragupathi and Lim Han Leong (CIT)
Tutoring Students in the Virtual Classroom	25 February (Thursday) 10.00am - 12.00noon	Charina Li Ong
Assessment 101	26 February (Friday) 10.00am - 12.00noon	A/P Zubair Amin (Dept of Paediatrics)
Mid-term Course Feedback to Promote Student Learning	26 February (Friday) 3.00pm - 5.00pm	Kiruthika Ragupathi

MARCH 2010

Title	Date/Time	Facilitator
Screencasting for eLearning with Camtasia Relay	2 March (Tuesday) 10.00am - 12.00noon	Charina Li Ong
Electronic Assignments: Providing Quick & Effective Feedback	4 March (Thursday) 10.00am - 12.00noon	Kiruthika Ragupathi
Tutoring Students in the Virtual Classroom	5 March (Friday) 10.00am - 12.00noon	Charina Li Ong
Developing Interactive eLearning Courses: Using Adobe Presenter (Breeze)	9 March (Tuesday) 3.00pm - 5.00pm	Kiruthika Ragupathi and Lim Han Leong (CIT)
Collaborative Learning in Small Groups	12 March (Friday) 9.30am - 12.30pm	Professor Matthew Gwee (Medical Education Unit), A/P Tan Chay Hoon (Dept of Pharmacology) Dr Dujeepa D. Samarasekera (Medical Education Unit)
Student Data Management: Using Formulas & Functions with Excel	19 March (Friday) 3.00pm - 5.00pm	Kiruthika Ragupathi
Interactive PowerPoint Presentations	26 March (Friday) 10.00am - 12.00noon	Kiruthika Ragupathi
IVLE Gradebook	31 March (Wednesday) 2.00pm - 4.00pm	James Low
Providing Good Feedback for Student Assignments	Date & time to be confirm	A/P Brian Farrell (Dept of History)

APRIL 2010

Title	Date/Time	Facilitator
Improving Student Learning Through Podcasting	1 April (Thursday) 9.30am-12.30pm	Charina Li Ong
Techniques for Managing Long Documents	8 April (Thursday) 10.00am - 12.00noon	Kiruthika Ragupathi
Small Group Teaching Strategies	Date & time to be confirm	A/P Seah Kar Heng (Dept of Mechanical Engineering)

- Unless otherwise stated, the workshops' facilitators are from CDTL.
- The information shown is correct at press time. Please go to <http://cdtl.nus.edu.sg/cdtlhome/workshop.htm> for more details about these workshops.

ANNOUNCEMENTS

CDTL would like to congratulate:

- Our team members Ms Aini Jaafar and Ms Doreen Thia on their promotion during the university's 2009 Staff Promotion Exercise, and
- Ms Elsie Lim and Ms Winnie Choy, who received their Long Service Awards in January 2010. Congratulations, ladies and keep up the good work! ■

ENHANCING STUDENT-CENTRED LEARNING IN NUS



*Vice-Provost(Education) Professor
Tan Thiam Soon (right) at the luncheon.*

In October 2009, CDTL had the the pleasure of hosting Vice-Provost(Education) Professor Tan Thiam Soon and colleagues from the various faculties at the inaugural session of the CDTL Luncheon Series. These sessions give faculty members the opportunity to interact with each other across faculties and also to share their ideas, thoughts and concerns regarding education and teaching in NUS.

During the session, the main focus was on what faculty members can do to enrich students' learning experience in NUS. Professor Tan started the ball rolling by sharing his thoughts on providing students with a more personalised education experience and stronger group identity, so that they are stimulated, inspired and are able to learn independently. Faculty members talked about how they currently engaged students in their respective classes. For example, Dr Eric Chan from the Department of Pharmacy related how faculty members in his department read out an Educator's Pledge (which outlines how they will teach students and empower them with skills to be independent learners and thinkers) to freshmen at each year's Freshmen Orientation Week. There were also candid discussions about the challenges they faced in engaging students effectively, particularly in large classes.

In addition, there were suggestions about shaping students' expectations by engaging them on various platforms (eg. the NUS Open House), as well as the the need to increase faculty members' awareness of their role (ie. not just teaching only) and to be more actively involved in interacting with students through the university's existing platforms (e.g. mentoring schemes, orientation programmes, faculty day). The session ended on a positive note, with several faculty members continuing to swap stories and teaching notes beyond the luncheon. ■



*Associate Professor
Lakshminarayanan Samavedham,
Acting Chair of the NUS Teaching Academy
(left) confers with
Dr Eric Chan during the luncheon.*

TEACHING TEACHING ASSISTANTS (TAs) TO TEACH

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The last two lessons equip students with skills in helping students with learning difficulties; they are also introduced to the important concepts of student feedback, scholarly teaching and the scholarship of teaching.

Renowned educational psychologist David C. Berliner proposed a five-stage model for teacher development (i.e. 1–Novice, 2–Advanced Beginner, 3–Competent, 4–Proficient, and 5–Expert) (Berliner, 1988).

Table 1. Assessment Exercises for BL5211

	Assessment Exercise	Percentage of final grade (%)
1	One-page reflection log on a lecture topic, with special emphasis on on past experience and future application	20
2	10-minute presentation with five minutes of Q&A on a selected topic	60
3	One-page reflection log on the 15-minute presentation, which are videotaped and uploaded to the IVLE for peer evaluation.	10
4	An exam question (with marking and grading schemes) related to the presentation topic.	10

There is no textbook for this module. Instead, reading assignments are gleaned from journal articles, reference books and information available on the Internet. A discussion forum has been set up in the IVLE where TAs can share their experiences, express their opinions, exchange ideas with peers, and solicit and/or evaluate other's opinions, views or experiences in relation to a specific topic in BL5211.

Grading BL5211 is based solely on continual assessment which has four components. Since teaching is an intellectual task and metacognition an important aspect of the teaching and learning process, reflection is emphasised throughout all the assessment exercises (see Table 1).

It is hoped that BL5211 would facilitate the development of our TAs as “advanced beginners” (Stage 2) or “competent” (Stage 3) in their teaching duties in NUS. More importantly, it is hoped that they will eventually become “experts” (Stage 5) in teaching when they hold an academic position elsewhere after graduation. When that happens, DBS and NUS can take pride in a job well done in imparting not only content knowledge to our postgraduate students, but also the ‘wai gong’ and ‘nei gong’ of effective teaching.

Reference

Berliner, D. (1988). ‘Implication of studies on expertise in pedagogy for teacher education and evaluation’. *New Direction for Teacher Assessment: Proceedings of the 1988 ETS International Conference*. Princeton, N.J.: Educational Teaching Service. ■

LIGHTING A FIRE: A FRESHMAN SEMINAR CALLED “THE WONDERFULLY WEIRD WORLD OF SOFTWARE”

Dr Damith Chatura Rajapakse
Department of Computer Science

Since Semester 1, Academic Year 2009/10, the School of Computing has been offering a new freshman seminar-type module, FMC1202 “The Wonderfully Weird World of Software”. Officially, the objective of FMC1202 is “to give [freshmen] an ‘outside-in’ look at a number of interesting software phenomena drawn from diverse domains, followed by a ‘sneak peak’ of the subject areas that underpin them.”¹ Unofficially, FMC1202 aims to “light a fire”.²

The motivation behind offering FMC1202 stems from the following observation: students currently learn computer science by starting from the most basic principles before progressively moving to more advanced concepts. After they graduate, some will use this knowledge to build actual software. However, most students go through their courses without a good sense of how the various subject areas they learn relate to an eventual outcome. This can adversely affect their motivation to learn a given subject area as well as their subsequent choice of subjects to study. FMC1202 addresses this situation by introducing to freshmen ‘what lies at the end of the tunnel’ and which subject areas will help them get to where they want to go.

In this course, students will examine a number of real-world software phenomena drawn from diverse domains (e.g. computer viruses, embedded applications, search engines, web applications, computer games, mobile applications, operating systems and virtual reality applications). FMC1202’s mode of delivery consists of instructor-led discussions with preparatory and follow-up exercises. The discussion offers students an ‘outside-in’ look at the respective software, leading to an increased awareness and hopefully an interest in the related subject areas. A faculty member with expertise in that software (and related subject areas) will lead the discussion. Such a discussion will include issues such as why it is considered successful or unsuccessful, how it has evolved to its current state, how it differs from its rivals, what technical challenges the designers/



Small group discussions and assignments form the bulk of FMC1202.

developers faced creating it, how it could be improved and potentially evolve in the future, and what skills are required to build such software.

For example, this overview (in Table 1) of one of the seminars led by my colleague Dr Ooi Wei Tsang covers some of these issues:

Table 1: Example of an overview of a seminar in FMC1202.

Ever wonder how YouTube works?

How does YouTube handle 20 hours of video uploads every minute? How does YouTube deliver 1.2 billion videos daily? How does YouTube sift through billions of videos to detect copyright infringements? How does YouTube recommend a video for you to watch?

Come join us for a peek behind the technology of YouTube and venture into the world of multimedia computing, networked and distributed systems, artificial intelligence as well as other cool computer science topics!

Staying true to the spirit of the ‘freshman seminar’ concept, FMC1202 uses small group learning in an informal setting with emphasis on inquiry, discovery,



Freshmen who took FMC1202 give the course the thumbs up!

and the exchange of ideas between students and lecturers. Students contribute to the class by blogging and giving presentations about what they learnt from the seminars and from their follow-up explorations.

The response to FMC1202 has been very encouraging so far. There was a heavy demand among freshmen to enroll into the module, which received bids as high as 647 bidding points on the university's Central Online Registration System (CORS). During the mid-term student feedback exercise, eight out of the twenty students who took FMC1202 considered it the "best" module while another eleven rated it as being "very good". We look forward to offering FMC1202 to more freshmen in subsequent semesters.

Endnotes

1. This statement is taken from the overview for FMC1202 which appears in the IVLE.
2. To paraphrase the poet W.B. Yeats, "when teaching, do not aim to fill a bucket; aim to light a fire." ■

THE 'WAI GONG' OF TEACHING

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and maximises their attention spans. Lectures should also be punctuated with feedback loops (i.e. through questioning) which allow teachers to monitor students, and for students to gauge the effectiveness of their own learning. Emphasis, nonetheless, should be placed on the meticulous selection of content and how to present them creatively and critically. Lectures laden with details are counter-productive and may encourage rote learning.

A good teacher is also resourceful, employing demonstration tools and visual aids such as videos and animations to tackle difficult concepts. In-class demonstrations, when properly executed, are integral in enhancing a teacher's explanatory skills. Such demonstrations, not only address the 'what', 'how' and 'why' of a problem, but also enhance memory and cognition. The Chinese proverb "Tell me, I forget. Show me, I remember. Involve me, I understand" epitomises the value of in-class demonstrations and practical sessions. They also inject elements of fun and joy into the class. After all, learning should be enjoyable, not torturous.

When it comes to effective learning, particularly in science, the modern teacher must strive to encourage students to apply their knowledge and skills to real life and even hypothetical situations. The appropriate use of verbal cues such as 'imagine' or 'how might you use this' can initiate students' thought processes that will bridge abstractions to reality. More importantly,

students are mentally stimulated and their learning enhanced when they discern the value of their knowledge, especially in applying these abstract concepts, ideas and principles to solve problems which they confront daily. In doing so, the explanatory and predictive power of science is also greatly exemplified.

By uniquely combining teaching strategies and cognitive psychology, BL5211 has given us new insights into the art of modern teaching. Instead of just theoretical concepts, elements of 'wai gong' are brought to life through in-class demonstrations, while mock teaching presentations enable us to sharpen these skills. However, we feel that the module should incorporate obligatory teaching assistant (TA) duties, where we could apply and test the effectiveness and receptiveness of these new teaching approaches. Also, the module did not deal with aspects of curriculum conception or design and the dynamics of co-teaching, both of which form important aspects of university teaching.

Despite this, we find BL5211 comprehensive in its coverage and its objectives. We also benefited tremendously from Professor Ip's personal anecdotes about his teaching experience in the university, as well his experiences as a parent. For those who are new to teaching, this course would provide much food for thought and ignite your passion for it. We strongly recommend BL5211 to all, particularly science graduate students. ■

INCORPORATING PHYSICAL ASSESSMENT INTO UNDERGRADUATE PHARMACY EDUCATION

Dr Alexandre Chan and Dr Joyce Lee
Department of Pharmacy

Over the past decade, there has been a paradigm shift in the pharmacists' responsibilities from distributive roles to being providers of pharmaceutical care. Today, more pharmacists are stepping out from their traditional role behind the pharmacy counter to work collaboratively as part of a healthcare team to offer hands-on clinical services. In different practice settings, simple physical assessment (PA) examinations are often carried out by the pharmacists to monitor for patients' disease progression, drug efficacy, and drug safety. For example, in the pharmacist-managed primary care clinics where pharmacists actively titrate patient medications, the drug titration often depends on the patient's response and tolerability to the medication. Amlodipine, for example, is a commonly used antihypertensive agent that may cause pedal edema (abnormal swelling of the feet due to fluid accumulation). Pharmacists must know how to assess for the severity of pitting edema (i.e. where applying pressure to the swollen area leaves a persistent indentation on the skin) before they make any changes to the patient's drug regimen. In another scenario, physicians in the cancer centres often consult pharmacists to solve drug-related problems. If a physician makes further inquiries as to whether a patient's altered mental status was induced by medication, pharmacists can perform simple neurological examinations to assess the patient's mental state.

These are only a few examples that demonstrate why it is important for pharmacists to possess the knowledge and skills to conduct PA. In the United States, PA is regarded as one of the core learning experiences for pharmacy students. The topic anchors primarily within a pharmacist's ability to competently design, implement, evaluate and modify patient pharmacotherapy based on scientific principles to ensure effective, safe and economical patient care. One published survey (Spray & Parnapy, 2007) indicates



Dr Chan (left) demonstrates how eye exams are performed with a torchlight.

that PA is offered in 45% of pharmacy programmes in the United States, with 65% of these programmes offering the PA module during the third year of the four-year professional degree. At NUS, PA is currently not offered as part of the undergraduate pharmacy curriculum. The pharmacy students are taught on how to design individualised therapeutic plans and monitor strategies based on the patient's disease states, with the lecturers providing subjective and objective information. However, in actual practice, patient information often needs to be sought through patient interviews, clinical documentation and most importantly and conventionally, through PA. Therefore, there exists a learning gap in which the students may have the therapeutic knowledge, but lack the hands-on skills to translate their knowledge into action.

In order to address this learning gap, a pilot session on PA was conducted as part of a core fourth year undergraduate pharmacy module. The goal of this project was to evaluate the feasibility of incorporating PA teaching and practical activity into an undergraduate pharmacy curriculum.

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THE 'NEI GONG' OF TEACHING

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comprise attributes from cognitive, affective and psychomotor domains, so that they can solve problems, make decisions and create ideas. Ultimately, they should become critical and creative thinkers who can learn independently throughout their lives.

How to motivate students to learn? One way is to create an environment in which active learning can take place, as mentioned in Marzano's first dimension of learning (Marzano et al., 1992). Understanding students' learning styles, based for instance on the 4mat system, is another. More importantly, students should be stimulated to switch on their 'search modes' to enquire and question. They should be encouraged to construct knowledge by integrating prior and new knowledge, and to doubt what they have learnt by analysing relevant data and evidence; only then would they achieve a deeper understanding of the subject.

Teachers should also use a variety of strategies and approaches (e.g. problem-, games- or project-based learning) to encourage student participation and facilitate the active learning process. They should also acquire supervision skills since project-based learning is so essential to a science education. In addition, it is important for teachers to monitor their students' learning and provide timely feedback, which helps them assess how much their students have learnt and whether transfer has taken place. Students should also be explicitly taught critical and creative thinking skills with direct application to the subject matter. In relation to that, teachers should assess student learning by setting exam questions that demand higher-order thinking skills or require students to apply their newly acquired knowledge to real-life or hypothetical situations.

The grading in BL5211 involved 100% continuous assessment, and emphasis was placed on using reflection logs to understand and master the teaching process. The idea was to encourage us to practice metacognition (i.e. thinking about thinking). We had to make a presentation on a topic of our choice, which was recorded on video and uploaded to the IVLE. We had to analyse the recorded presentation and write a reflection log on how it can be improved. We also participated in formulating the assessment criteria and evaluating our classmates' presentations. Furthermore, we were challenged to set examination questions and come up with a marking scheme and a set of criteria for grading. This gave us some exposure to the teaching process and the skills acquired would surely be useful to us in our future careers. Along the way, we received detailed and informative feedback on our performance so that we could make changes and improvements, which is the essence of learning.

It is evident that BL5211 has profoundly changed the way we view teaching and learning. It was an eye-opener for many of us, as many of our preconceived ideas and misconceptions about teaching were discussed and debunked. We highly recommend this course to fellow postgraduate students who aim for a future career in teaching and research, as it helped us understand that in nurturing others, we not only become better teachers, but in the process, better individuals.

Reference

Marzano, R.J.; Pickering, D.J.; Arredondo, D.E.; Blackburn, G.J.; Brandt, R.S. & Moffett, C.A. (1992). *Dimensions Learning Teacher's Manual*. Alexandria, V.A.: Association for Supervision & Curriculum Development. ■

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INCORPORATING PHYSICAL ASSESSMENT INTO UNDERGRADUATE PHARMACY EDUCATION

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Students conduct simple neurological exams on one another during the lesson.

The practical activity consisted of :

1. a self-learning assignment which was distributed through IVLE and had to be completed before the practical,
2. a three-hour hands-on workshop, and
3. a class survey to evaluate the practicality and importance of the PA session to the students.

The session started with a brief introduction of the principles of PA and their relevance to pharmacists. This was followed by a series of PA techniques demonstrated in the order of different anatomical sites. With the lecturers' supervision, students were asked to practice PA on each other in pairs or as a group, depending on the nature of the assessment.

Table 1: Physical Assessment (PA) Survey (1=least agree; 10=most agree)

QUESTIONS	Score* (n=92)
After this session, you have gained a better understanding on PA skills.	8.2
Knowing PA skills makes me a better pharmacist (inpatient/out-patient).	8.4
All pharmacy students should demonstrate competency on performing basic PA skills before graduation.	7.6
Emphasis is sufficient within Pharmacotherapy modules on how PA skills can apply to the monitoring of drug therapy.	6.3
There is sufficient time to learn all the PA skills today.	5.4

* The score for each question was out of 10.



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editorial information

Guest Writers Chng Huang Hoon; Bernard Tan; Alex Ip; Alexandre Chan; Joyce Lee; Damith C. Rajapakse; Steven Halim; Ivan Low, Kingshuk Poddar, Lee May Yin, Jeffrey Low, Tran Minh Hang, Ng Wei Ling, Pansy Kok.

Advisor Chng Huang Hoon

Editors Liew Shin Dee; Teo Siok Tuan

Graphic Design Ma Lin Lin

Photography Ma Lin Lin (unless provided by authors)

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Contributions on teaching and learning topics, as well as feedback on this issue, are welcome and should be addressed to:

The Editor, *CDTLink*

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

Tel: (65) 6516-3052 • Fax: (65) 6777-0342

Email: cdtpost@nus.edu.sg

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

Overall, the implementation of this pilot PA session was a success. Not only did the students enjoy the session and wished for it to be taught beyond the allocated three hours, there was also a strong consensus among the students on the importance of gaining PA skills to facilitate their understanding of patient care (see Table 1). From this experience, it was worthwhile designing and implementing an elective course on fundamental physical assessment techniques at NUS, as we believe we need to provide our students with a more effective learning experience in order to better prepare them for the evolving role of pharmacists in Singapore.

Reference

Spray, J.W. & Parnapy, S.A. (2007). 'Teaching patient assessment skills to Doctor of Pharmacy students: The TOPAS study'. *American Journal of Pharmaceutical Education*, Vol. 71, No. 4, pp.1-4. ■