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A Competency-based Curriculum for the Dental Undergraduate Programme

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Traditional dental education

Traditional dental education is an apprenticeship model and mainly discipline-based. In the early days of dental education, perhaps this model had worked well. But today, it has led to a 'bloated curriculum' and predisposed students to mechanical approaches to learning and clinical decisions. Discipline-based curriculum offers no help in drawing the line between what is necessary to know and what is merely 'nice' to know. It is not true that greater didactic knowledge or practice reflect a higher level of learning.

In assessing learning outcomes, better performance means having the ability to perform in a wider range of circumstances and to respond appropriately to the situation. The traditional dental curriculum cannot produce this consistently.

Novice to expert

If we look at the novice to expert curve, there is no difference between the beginner, the competent performer or expert if we only look at the end product (i.e. the technical aspect). The significant difference lies in the steps taken, use of feedback, definition of task and adaptation to environmental conditions prior to reaching the end-point.

The process of moving from novice to competence is therefore a journey of independence.

Education is a path—not a destination and not the accumulation of nuggets of knowledge or a repertoire of skills. Curriculum design, for too long, has focused on what should be learned and not who is responsible for that learning. A competency-based education assumes that learning to become a professional is a progression through stages and competency represents the point along this path where the learner understands the foundations of his/her skills and has internalised appropriate professional values to work independently in normal settings and manage his/her own continued growth. The definition of a competent graduate should be one who will be able to combine the appropriate supporting knowledge and professional attitudes and perform skills reliably without assistance.

Competency-based curriculum

Each stage of development from novice to competence requires different educational strategies:

1. Novices need structure, clarity of goals, single, and clearly explained approaches.

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2. The experience for producing competence is different:
   - the structure must be withdrawn systematically;
   - students should be given opportunities for applications where multiple approaches exist;
   - students should be able to evaluate their own work; and
   - students should be able to articulate reasons for their decisions.

In the field of dentistry, those involved in curriculum review and implementation should bear in mind that competencies are skills essential for beginning the practice of general dentistry and not specialist practices. Competencies combine the appropriate supporting knowledge and professional attitudes, both of which are performed reliably without assistance.

The first step in a competency-based curriculum is the development of a set of competency statements to define what knowledge, skills and attitudes the new dental graduate should possess. This set of competency statements will then provide a standard for identifying the core content of the curriculum and allowing the assessment of outcomes of the curriculum. Competencies in the curriculum should be reviewed and modified to be responsive and reflective of the educational needs of the students, disease patterns, community demands and changes in clinical practices.

At the outset, other learning experiences should be differentiated from core competencies. These are desirable clinical and behavioural knowledge, skills and attitudes that students should experience, learn or be exposed to without the expectation of reaching competency. To avoid bloating the core curriculum, these 'nice-to know' elements can be included as enrichment modules or electives.

Organisation of competency statements

Domains: Domains represent the broad categories of professional activities and concerns that occur in the general practice of dentistry. The concept of domains is to encourage an eventual structure and process in the undergraduate curriculum that is more interdisciplinary and less sectional.

Major competencies: Major competencies within each domain are identified as relating to that domain's activity or concern. A major competency is the ability to perform or provide a particular, but complex, task or service (e.g. 'the new dentist must be able to perform an examination that collects biological and psychosocial information needed to evaluate the medical and oral condition for patients of all ages'). The complexity of this service suggests that multiple and more specific abilities are required to support the performance of this major competency.

Supporting competencies: Supporting competencies are more specific abilities and could be considered as sub-divisions of a major competency. The achievement of a major competency requires the acquisition and demonstration of all supporting competencies related to that particular service or task (e.g. 'the ability to identify the chief complaint' is a supporting competency). While less complex than a major competency, a supporting competency requires more specific abilities that are termed *foundation abilities*.

Foundation abilities: Foundation ability is the product of didactic and laboratory instruction that imparts information and experiences that are pre-requisite for satisfactory attainment of supporting competencies. Foundation ability encompasses knowledge, skill and attitudes.

Foundation knowledge is the ability to use information and correctly answer specific questions (e.g. in an examination). Foundation skills are the ability to follow rules in specific situations to produce acceptable results in a standardised situation (e.g. an operative procedure on a typodont). Foundation attitudes are positive intellectual and behavioural actions (e.g. treatment planning according to patients' needs and not the student's need).

The inclusion of any foundation ability in the curriculum should be based on its direct support of one or more of the major and supporting competencies.

Conclusion

The competency-based curriculum was implemented in 1997. In 2001, we saw the first batch of students who had undergone the competency-based curriculum graduate. It is still a bit too early to comment on the learning outcomes but some significant observations were made during the last four years. The learning environment has changed from an apprenticeship model and passive learning to one that integrates learning strategies with outcomes. With competency outcomes as our guide, the curriculum is more dynamic. Staff are more reflective and many reviewed and changed their teaching strategies. With these positive changes, we hope that the dental school will produce graduates who will be better prepared to face the challenges of the future.

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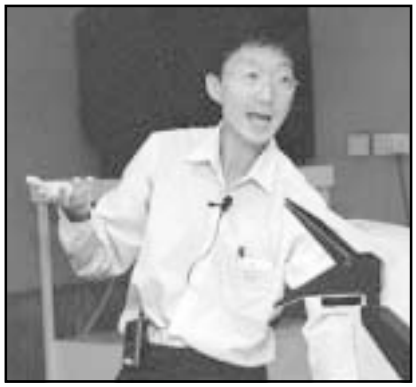
Student Expectations & the New Teaching Paradigm



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Introduction

What does a student expect from a lecturer in this day and age? Having once been a student myself and being a teacher at present puts me in a very strategic position to look at teaching from the standpoint of the student as well as from that of the teacher. A typical student perceives of a teacher as someone who is paid a salary to do just that—teach. Since the student is the one paying school fees, the more the teacher teaches, the more the student thinks he is getting his money's worth. This is understandable since in the commercial world, this is the way with consumer products. On top of simply teaching the basic concepts of the subject and covering the entire syllabus as laid out in the subject synopsis, the student also expects the teacher to run certain errands for him, in the same way as a travel agent makes life easier for the busy traveller, such as checking and recommending flight connections, booking tickets, preparing visas, settling the airport tax, re-confirming the return flight, and so on.

In this hectic society, students tend to favour one-stop-shopping, expecting the teacher to do all the groundwork for them, such as compiling easy-to-read notes, photocopying relevant sections of recommended reading material for them, and giving out tutorial questions that have user-friendly definitive answers (the less open-ended the better). A 'Santa Claus' lecturer who is able to fulfil these requirements would certainly live up to their expectations. Such a notion is obviously flawed, according to the new teaching paradigm.

From the teacher's viewpoint, however, if he has caught on the new vision of what good teaching is all about and what he ought to do, he will probably act as a mentor and a guide to the student, leaving plenty of room for the latter to explore the subject further and to realise the fact that there is no end to true learning in spite of the confines of the syllabus. The teacher would have understood the import behind the famous adage, "If you give a man a fish, he will have fish to eat for just that one day; but if you teach a man to fish, he will have fish to eat for the rest of his life."

Under the present circumstances, a truly good teacher, namely one who is able to excite the students to life-long learning on the subject that he is teaching, will probably not get the good evaluation he deserves. In contrast, a teacher who panders to the students' demands for a user-friendly type of teaching will probably score high marks in the students' feedback. It is therefore imperative that we change our students' mindset on teaching.

Educating students on the new teaching paradigm

1. The most convenient way to educate students on the new teaching paradigm is to publicise it as much as possible, thereby creating a general awareness of this new concept among the students. This can be done through the Internet, websites, email, notices, etc. However, experience has shown that such methods have not proved to be effective because students do not usually pay much attention to email messages that have been mass mailed or any of the other means mentioned above. Nevertheless, such mass-media methods could be of some efficacy if employed in conjunction with one or more of the methods listed below.
2. Another method, which may be more effective, is to conduct seminars for the students in the same way as we do for staff for the primary purpose of inculcating in them a thorough understanding of this new teaching paradigm. During such seminars, one can at least capture the attention and imagination of the students concerning this burning issue. In addition, through the various workshops and discussion or buzz groups, the new paradigm can be further reinforced in their minds. One can also get feedback from the students on how they feel and whether they are adapting to the new paradigm.
3. Another solution to this problem, which has been suggested before in some departments on campus, is to conduct student feedback only after they have left the university. After our students have worked in the real world for a few years, it would be quite enlightening to find out from them whether a particular lecturer had indeed done a good job in imparting skills and interest in the subject that enable the graduate to continue learning and exploring further in that particular subject.
4. Since the lecturer is the one who has most contact with the students, it might be effective to entrust him with the task of educating the students on the new teaching paradigm. The lecturer can explain right from the start of his first lecture how he intends to teach, what he intends to do in class, and the rationale for doing so.

Conclusion

Although the new paradigm has already been introduced and is here to stay, most of our students are still functioning under the old mindset. This is obvious from the present situation in which students tend to give very high marks to lecturers who are teaching easy-to-grasp subjects and very poor evaluation to those who are teaching subjects whose concepts are difficult to grasp or that involve much self-study. Such a trend shows that students still evaluate lecturers based on how easy it is to score in exams or to sail through the module instead of basing their evaluation on how successful the teacher has been in inculcating in them a burning passion for the subject and guiding them in the life-long process of self-study. Hopefully, our students will soon realise that it is actually much more important for them to 'learn how to learn' than for the lecturer to 'learn how to teach'. After all, the latter is but a passing phase in the student's life whereas the former is a permanent and invaluable asset which will belong to him/her for the rest of his/her life. ■

Designing a Learning Environment that Alleviates Anxiety

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Introduction

In introductory statistics courses, anxious students and complex subject matter combine to create a difficult environment in which to teach successfully. Often in these courses that are mandatory in many disciplines, few students look forward to the content and many students approach the material with dread. To be effective in such a situation, an instructor needs to design a learning environment that addresses the problems created by anxiety.

Students are anxious because they are afraid of failure and, if they experience failure in the classroom, their confidence is undermined and their anxiety increases. By creating a dynamic, active learning environment, instructors can facilitate success for their students. My experience has taught me that there are four key areas instructors can exploit to decrease student anxiety.

Accommodating learning styles: Getting students to focus on the material

For many students, the traditional lecture/note-taking model does not work when there are complex concepts to be internalised. Instead, for each class I provide students with a set of lecture notes containing the material that will be covered in class. There is room on the sheets for notes and problem-solving exercises to be completed in class. This allows me to present information easily in several different ways to accommodate different learning styles. I also supplement the lecture notes with visual demonstrations.

The table below indicates some of the ways I accommodate various learning styles:

Type of Learner	Method of Accommodation
Active	Lecture notes provide a place to interact with the material.
Reflective	Notes provide a framework around which they can contemplate and internalise concepts.
Sequential	Notes lay out concepts in steps.
Global	Notes provide an overview of how concepts addressed at a particular moment fit with what has come before and what will follow.
Visual & Intuitive	Visual props and PowerPoint presentations illustrate concepts and provide solutions to problems.

By meeting their learning needs, the instructor turns the focus to the material itself and does not give students the opportunity to feel anxious.

Overcoming students' passive approach: Meeting the material halfway

Once the attention of an anxious student is directed toward the material, the next step is to encourage active interaction with it. My practice includes two general strategies: simulations of statistical concepts and group interaction. The simulation capability of easily created Java applets (web-based interactive simulations/demonstrations) enables students to have hands-on practice, a method of self-assessment, and visual reinforcement of the concepts outside of class. The frequent formation of discussion groups during class, for problem solving and responding to open-ended questions, encourages students to move beyond listening to ask questions and think critically. Group-project assignments based on real-life research examples get students to engage with the statistical concepts.

Creating a sense of competence: Building upon success

Frequent success is the best way to begin building a sense of competence. If a student succeeds in following along and participating in class, then the student is going to begin believing that mastery is possible. I emphasise to my students that mistakes are an inevitable part of learning; and therefore, I give them opportunities to correct them to gain confidence. I also choose evaluation methods that provide frequent feedback because success is more likely on small units and because it allows misunderstandings to be addressed prior to evaluation on larger units.

Inspiring Students: Enthusiasm is contagious

I am not afraid to allow my passion and enthusiasm for statistics and for teaching to show in the classroom. I find that it inspires students to draw upon all their energy and talents and overcome their anxieties. I also empathise openly with students who are learning the material for the first time. By putting myself in their places and acknowledging their struggles, I can remember to listen carefully, to encourage their questions and to respond to them enthusiastically. I attempt to establish a solid student-teacher relationship by keeping in mind the dictum: "Nobody cares what you know until they know that you care."

Conclusion

By designing a dynamic learning environment that accommodates different types of learners, an instructor can significantly reduce the amount of anxiety that students experience. Once the students begin having success with the material, it is up to the instructor to create an environment that encourages accomplishments and inspires students. Lowering the levels of anxiety will lead to better learning outcomes and more success. For another discussion about my teaching method, please see 'Improving Student Performance by Reducing Anxiety'[1].

Footnotes

1. Chan, Elsie. 'Improving Student Performance by Reducing Anxiety'. *Positive Pedagogy: Successful and Innovative Practices in Higher Education* . Vol. 1, No. 3, September 2001. *http://www.mcmaster.ca/learning/posped/Sep01/chan901.html*. ■

Interactive Teaching & Learning in Large Classes

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When I first started conducting lectures to large classes of a few hundred students, I constantly fretted about how to move the lecture session away from a monologue to a dialogue between the students and myself. I often wondered how I could keep the class intellectually engaged and maintain the students' attention. I was particularly concerned with preventing the focus of certain class members from drifting away, and with addressing the problem of disengaged 'backbenchers' (i.e. the students occupying the back rows in the lecture theatre who chattered incessantly and seemed totally indifferent towards the lecture). Over the years, I have tried a number of classroom strategies which have helped me transform my lectures into much more interactive sessions. I would like to share these strategies with you, and hope you will find some of these ideas useful.

For the lecture to be conducted effectively as an interactive session, I always find it useful to share my expectations with the students. A good time to do this is during the first lecture of the semester (although I find it a good idea to remind the students of my expectations every few weeks). So, what are some of these expectations? First, I remind the students that their learning is not solely my responsibility, and that they are to share that responsibility. Next, I emphasise the importance of listening, thinking and responding in an interactive lecture session. In addition, I stress that the lecture only highlights key ideas and concepts; therefore, students need to read further on their own.

Besides sharing my expectations with the students, I also attempt to raise their level of motivation. For instance, I try to arouse their interest by indicating the relevance of the lecture to their personal (e.g. self-developmental or career) goals. I provide specific motivational cues (e.g. I tell the students that the material to be covered in the lecture is important and that it will be included in the mid-term or final examination). I make the objectives of the lecture explicit at the start of the lecture session.

Once I have addressed the issues of my expectations and students' motivation, I move on to specific strategies of fostering interaction during the lecture. One set of strategies focuses on personalising the large class (which can be challenging if one is looking at a class size of a few hundred individuals). Some helpful methods are as follows:

- arriving at the lecture theatre five to ten minutes before the scheduled time, and chatting informally with students before the lecture;
- personally distributing the lecture handouts to students;
- moving around during the lecture;
- learning the names of as many students as possible;
- moving closer to a particular student when he/she speaks up;
- inviting students' feedback at the end of the lecture (e.g. students are asked to submit a one-minute paper; i.e. they take a minute to jot down their feedback or questions on pieces of paper, and then submit them to me);
- staying back after the lecture to talk to students and to answer their questions.

A second set of strategies involves the use of stories during the lecture, such as personal anecdotes (e.g. childhood experiences, family stories, work experiences, vacation stories), headline news, and interesting stories about celebrated scholars within the discipline. I have discovered that stories can make lecture concepts vivid and clear by illustrating them. The stories enliven the lecture materials for the students, and therefore help them feel more personally connected to the subject matter.

A third set of strategies encourages students to ask questions during the lecture. I have found the following methods effective:

- telling the students that their questions are always appropriate;
- reminding the students that I welcome their questions;
- responding to students' questions as thoroughly as possible (to show that I appreciate their inquiries);
- requesting the names of the students asking the questions (to show that I value their participation);

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Facilitation:
A Different Pedagogy?

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Nowadays, we are often exhorted "to facilitate students' learning" and one of the most talked about skills is the ability to facilitate. This article aims to discuss the meaning and levels of facilitation, and the efforts required to facilitate classroom learning.

Meaning & levels of facilitation

According to the Webster's and Random House dictionaries, to facilitate is "to make it easier or less difficult", or "to help forward". In other words, to facilitate refers to the process of making something easier or less difficult in order to further a goal. Given this meaning, facilitation can be used in any setting, for instance on a one-to-one level in terms of simple academic/personal counselling, or more commonly (in our work as university teachers) at a group level—be it in meetings or in the classroom—to make discussions more fruitful.

The matter is not so simple. For personal counselling work, the facilitation skill by itself is essential but not sufficient. For group facilitation, the role of the facilitator can differ based on what Schwarz (1994) terms as 'basic' or 'developmental' group facilitation. In basic facilitation, a facilitator works with a group at a specific time to solve a substantive problem; the facilitator can temporarily improve the group process in order to solve the problem, but the long-term effectiveness of how the group functions may not be affected. In developmental facilitation, a facilitator consciously works to help the group not only work together to solve the existing substantive problem, but also improve how it manages its own processes for it to function more efficiently and effectively in the future.

Within the teaching context, to facilitate is to conduct the class so that students will be better able to think through and digest the concepts taught. A well-facilitated class will generate a greater volume of discussion or debate so that students not only examine or re-examine their own thoughts and beliefs on the subject, but also are possibly inspired to explore further. Consequently, it is through basic facilitation—whereby students are given opportunities to question and be questioned about the subject matter (rather than merely acquire information via the typical lecture format)—that they learn how to understand, analyse and integrate the subject matter into their existing assumptions or body of knowledge. Hence, what is taught (the course content) becomes of less importance than how it is taught (the process of learning). And for individuals to survive in a knowledge economy, it is vital that they learn via facilitation how to share and learn from each other's viewpoints.

From my experience, such a learning mindset can be achieved only if the faculty member exercises basic facilitation skills and the lesson is conducted in small groups rather than in large lecture classes. So assuming that the lessons are conducted in small groups of about 30 students over 1½ to 3-hour segments, what basic facilitation skills are required?

Basic facilitation of a small group

From my experience, there are a few key areas to be considered if one is to facilitate well.

1. **Address students' current mode of thinking and learning in class**

   Faculty members may feel that it is hard to facilitate learning during a lesson when students do not speak up in class. However, I have observed that some students are conditioned by their past educational experience, and may believe that he/she is supposed:

   - to have the right answers;
   - to meet explicit or implicit expectations of authority figures;
   - not to ask questions or share information;
   - not to experiment or to make mistakes; and/or
   - not to challenge the status quo.

   With this mindset, it is not surprising that these students do not wish to reveal that they do not have the answers for fear of retribution/ridicule, or of being evaluated as less intelligent/effective than other students.

   Hence to facilitate well, such students' *fears* (real or otherwise) need to be addressed. I have found that the first introductory lesson of a semester is the most appropriate time to confront the above issues and set a suitable learning climate for the class. Sharing my expectations with the students at that point in time helps to make them less afraid and to promote greater interaction during future lessons.

2. **Manage class dynamics**

   As a facilitator, a faculty member will have to balance the following sets of opposing factors that influence how a class should be conducted:

   - *Structure*: How rigidly or flexibly should the lesson be run?
   - *Pacing*: How rapidly or leisurely should the group be pushed to achieve learning?
   - *Group Interaction*: How do group members relate to the facilitator and to each other?
   - *Focus*: Which is more important to impart, all course content as planned or the process of learning?
   - *Concern*: Should energy be directed at individual or group needs?

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Enhancing Student Questioning

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Active learning through questioning

Compared to passive learners, students who are actively engaged in the classroom process the material more deeply, retain it longer and are more likely to apply the knowledge. *Questioning* is an active learning strategy for processing information profoundly and assimilating it as knowledge. Questions can emerge for a variety of reasons—gaps in comprehension, anticipation of issues slated for future discussion by the instructor, disagreement with ideas presented, and analysis of facts and concepts from novel perspectives. Besides benefiting the learner, student questioning is intellectually challenging and enthusiastic students motivate instructors.

The norm of silence

In the typical lecture, one observes very little participation from students. Few students spontaneously raise questions and comments on lecture material are rare. Is it plausible that most students are in passive mode? I believe that there are, in fact, many students who are actively thinking about the content, but are very reluctant to speak up in class because of the following reasons:

- There is social pressure to avoid causing disruption to the flow of the lecture. The class may not be in tune with the specific questions or comments voiced by an individual. The resulting one-to-one interaction between questioner and instructor puts the rest of the class in the periphery and could be resented by the class as a needless digression.
- Public speaking arouses anxiety and effectively deters question asking.
- Verbal articulation can also be cognitively very demanding: few individuals are adept at fluidly expressing thoughts as they come to mind.

Instructors attempt to redress this situation by encouraging questions outside the classroom through face-to-face contact in the office, web-based discussion forums and email. However, experience reveals that only a small number of students use these channels to supplement their understanding of the material, particularly if there is no credit given for 'participation'.

A question-enhancing strategy

I will now describe a question-enhancing strategy that I employed in a class of 42 undergraduates. During each lecture from the second week of the course onwards, each student was given a plastic name tag which they wore during the lecture; they were also given a small piece of paper to jot down questions and comments as and when they came to mind. At the end of the lecture, students would insert their pieces of paper into their respective name tags and return the tags to the instructor. *There was no credit awarded for question/comment submissions*. Through this procedure, over a third of the class would provide at the end of each lecture some comment or question, many of which were thought provoking and well articulated. After the lecture, I would put a 'smiley' sticker on each name tag; those students who wrote questions received an additional 'good job' sticker. I typed out the student questions with my responses and posted them on the Web. (To view the questions, comments, and responses, please see *http://www1.swk.nus.edu.sg/swk/pl3208/comments.doc*.)

Why did such a low-tech strategy prove more effective than high-tech email lists or discussion forums? When students are each handed a name tag and a piece of paper, instructor expectations are made very clear. In addition, at 'significant' moments in the lecture, the instructor can reinforce this expectation by raising an issue that is relevant to a specific topic and reminding students to write down their reactions. Most importantly, students have the opportunity to engage with the material *when it is still fresh in their mind*. Students are more likely to be able to ask searching questions when they are in the lecture hall; an hour later, it may be too late as they are engaged in other activities and they would have forgotten significant chunks of the material.

Problems & solutions

Are there problems in implementing this strategy? Yes; but in my view, they are surmountable. The process of collecting and distributing plastic name cards is awkward and time consuming; perhaps a suitably designed contraption with slots for cards can address this problem. The process of transcribing questions, typing out answers, and putting stickers is laborious, but appropriate IT and tutor assistance can address the large volume of questions. Students can also SMS their questions to a server that organises them in a convenient fashion for instructor/tutors to respond by text or voice.

Finally, does handing out name tags and bits of paper guarantee significant student question asking? For four weeks, students submitted weekly assignments that were graded and handed back to them at the beginning of the lecture. During this period, the number of questions asked was very much greater (by a factor of three) than towards the latter part of the course when students did not submit weekly assignments. Why was this so? I speculate that providing graded feedback at the beginning of a class increased students' awareness of their subject-related competencies and enhanced their engagement during the subsequent session. In particular, they were motivated to present themselves in the best possible light as making a comment or question is a clear way to manage the impression one creates on the instructor. While the effort was not designed as a formal experiment, it appeared that graded feedback at the beginning of a class had a significant impact on active learning and question asking behaviour. ■

Feedback— From Teacher to Student

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As a language and communication tutor, the need to evaluate written pieces in the draft and final stages is always there. There is the inevitable rush to grade the assignments and then to provide students with as much feedback as possible so that they can address errors in an informed way.

Though there is a debate on the extent to which teacher feedback is helpful in improving the grades of final drafts (Ferris, 2001), a study during 1998/99 amongst a group of English language students in NUS has re-emphasised the importance that these students place on feedback. The study was aimed at tracing the writing development of English language students who were required to write term essays in their selected modules. 79 out of 88 students rated the feedback from tutors as 'very important'. Though this study was done in the context of a subject that requires much writing, I believe that it is natural for students in other settings to want feedback on assignments done just as much. In the educational setting, feedback is very important as it is meant to be highly evaluative of the person's performance and capabilities displayed in a piece of work.

In students' written assignments, feedback generally comes in the form of a grade and where time permits, comments along the margin to provide the students with a better idea of the rationale behind acceptable and not so acceptable answers. Given the many constraints of this evaluative process, it is inevitable that sometimes some students are not satisfied with perhaps insufficient feedback given or the lack of it. In the above-mentioned survey, students were also forthcoming with their suggestions on how feedback can be made more effective. Suggestions include a shorter interval between handing up assignments and getting the teacher's feedback, more regular consultation sessions, more comments along the margin and using email as another channel of feedback.

These suggestions are not something that tutors do not already know. It would be ideal to consult with each student regularly. However, given the many other demands of the teaching process, besides marking and evaluation, it is not difficult to lapse into negligence in the provision of comprehensive feedback.

Different settings will require different sets of strategies in the management of this problem. However, I have found some of the following methods effective in enhancing the feedback process, though they may still fall short in some ways.

Common mistakes

In any one assignment, there are usually sets of mistakes that are more prevalent amongst students. These may involve the interpretation of question or erroneous conceptualisation of certain subject matter. These common mistakes that require detailed clarification can be dealt with during tutorial sessions where there is opportunity for interaction and discussion. For those who have not committed these errors, it is perhaps a good opportunity to re-confirm that they are right in their understanding of things. Such discussion of common errors would then have provided useful feedback to a good proportion of the students. Also, with the strong support given for the use of NUS' Integrated Virtual Learning Environment, even the less IT-inclined tutor can use the technology in appropriate ways. For instance, feedback notes can be posted on course websites or even dealt with during chat sessions at stipulated times.

There are also errors which may be common but require less explanation as they may involve violation of rather standard requirements expected of all students in the course (e.g. reference systems). In this instance, it may be helpful to provide as clear guidelines as possible in the initial stages of the course as to the expectations set. Comments along the margin can then quickly refer them to respective portions of such guidelines.

It may be interesting to know that in the study mentioned above, there were no clear majority answers from students surveyed when asked about the effectiveness of such guidelines. For example, some students found that the guidelines provided useful information in the specification of word lengths, while others found them too restrictive (Allison & Wu, 2001). However, what is important is that if clear guidelines were given, there would then be a quick reference for a set of common errors that teachers can refer students to, especially students who have neglected these guidelines for various reasons. Another very important reason for such guidelines concerns the expectations of both learners and markers (Lea & Street, 1999). In many courses, different markers mark students' essays and expectations differ from marker to marker. Such guidelines represent an effort towards matching the expectations of learners and markers and among the markers themselves to a certain extent, thus minimising the factor of variability in expectations.

Less common mistakes

In many instances, the most satisfactory way to deal with assignment errors is to see each student individually. To get the most out of a time-consuming and tedious process, students should perhaps be given prompts to think about why certain aspects of their answers are unacceptable. The consultation time would then be one where there is two-way communication in the process of trying to understand where the student has gone wrong. For instance, besides the underlining of errors in an essay for a writing course, a weightage can be put beside the error to indicate whether it is in the category of just 'grammatical error', 'grammar + logic

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Employers' Feedback:
A Source of Information on Students' Learning Outcome

Ms Chandrama Acharya
Research Assistant, CDTL

Quality learning takes place when students are able to improve their mental abilities and change their mindsets and habits. Students' learning outcome can be identified by the attainment of certain skills such as creativity, willingness to learn, desire for future learning, teamwork, oral and written communication, work planning, problem solving, analysis and conceptualisation, flexibility and adaptability, self-confidence, independent judgement, self and peer evaluation, implementation of change, ethical awareness, cultural understanding, etc.—important qualities expected from university graduates.

Universities generally conduct various student assessment methods to judge whether students have achieved certain learning objectives before they leave their respective universities. Unfortunately, these assessment techniques, developed within the university system, sometimes do not allow educators to see the definitive learning outcomes of graduates in the workplace. Consequently, employers' feedback can be very constructive in indicating how graduates demonstrate their learning outcomes by how they perform in the workplace. Moreover, since a display of significant student learning is considered a prima facie demonstration that teaching has been effective, employers' feedback is extremely important to support a teacher's claim of good teaching. It provides the evidence of successful imparting of knowledge, development of abilities and changing of mindset to think critically and act accordingly with self-confidence.

This paper introduces the concept of employers' feedback as an important tool for understanding the degree of achievement of learning outcomes and discusses briefly the items to be included in designing an employer feedback form.

The concept

Employers can provide information about whether they are satisfied with the skills and knowledge levels displayed by recent graduates. In designing an employer feedback form, first establish a broad outline of the desired outcomes of a particular module. The actual outcomes may vary according to the types of students (e.g. students who took the module on a major or minor, full-time or part-time basis, etc.). In spite of such expected variation, the preparation of a set of learning outcomes for a module is important, as it will serve as the baseline for the survey.

Next, consider the time frame of the survey to specify when the survey should be conducted (i.e. within a year of graduation or a sizeable number of years after graduation), depending on the scope of what learning outcomes have to be demonstrated. For example, it may be sensible to delay the survey for a few years to see the learning outcomes for the modules that teach leadership practice or the practice of medicine.

Finally, include a detailed outline of the curriculum in the employers' feedback form so as to determine the insufficiencies of the curriculum in achieving certain learning outcomes. For example if students do not achieve a particular outcome, this may be the result of curricular problems rather than deficiencies in teaching skills. Employers may then give feedback on how to modify the curriculum so that the required learning outcome can be achieved in future.

The items

The learning outcomes can be measured in three broad areas of students' achievements: (a) demonstration of familiarity with the body of knowledge; (b) demonstration of abilities and mental capacities to apply familiar information and knowledge to various situations and problems; and (c) demonstration of analytical mindset and habit of thoughts while working with controversial issues and concepts[1]. Accordingly, the feedback form may address the following items:

A. Knowledge
- Familiarity with the body of knowledge

B. Abilities
- Ability to apply knowledge
- Capacity for independent learning and problem solving
- Ability to discover and construct knowledge (e.g. ability to conduct independent research)
- Capacity for critical thinking and creativity
- Capacity for independent inquiry/intellectual curiosity and ability to employ the modes appropriate to a given question or problem
- Ability to communicate effectively at the work place
- Ability to work in a team as well as independently

C. Analytical mindset and thought habits
- Willingness and readiness to question established views and theories
- Willingness to learn more

D. Curriculum
- Sufficiency of curriculum in achieving all the learning outcomes mentioned above

Employers' feedback on all the above points is invaluable in the development of quality teaching. It will also help faculty members to support their claim of good teaching in summative teaching evaluation. An example of an employer survey form can be found on the West Texas A&M University's website[2].

Continued on page 15...

New Student Workshops

CDTL is proud to start 2002 by resuming its *Successful Learning* series of student workshops. Aimed at improving how NUS students learn, these workshops cover communication, thinking, study and interpersonal skills as well as offer students opportunities for personal development. For the first half of 2002, the schedule of workshops and list of workshop facilitators are as follows:

Above: Photos of 'Making the Most of Working in Groups' Workshop on 8 Feb 2002

• 2 Feb	Effective Strategies for Coherent Writing	by Ms Christina Low
• 8 Feb	Making the Most Out of Working in Groups	by Mr Glen Keith O'Grady
• 4 Mar	Making Exam Stress Work for You	by Ms Jeannie Koh
• 6 Mar	Letting Go: Physical Relaxation Techniques	by Ms Verena Tay
• 13 Mar	Reading for Understanding & Retention	by Ms Lydia Tan
• 15 Mar	Using the Internet: A Workshop for Undergraduate Research	by Dr John Whalen-Bridge
• 20 Mar	Writing Winning Email	by Ms Lee Gek Ling

To continue raising the teaching effectiveness of NUS academic staff, CDTL conducted the first set of its biannual programmes: the Orientation Programme for new staff on 26 January and the intensive Professional Development Programme (Teaching) during 26–28 February for staff with less than 3 years of full-time teaching experience in higher education.

Raising Teaching Standards

Above & left (slanted): Orientation for new staff on 26 Jan 2002

Below: Professional Development Programme (Teaching) during 26–28 Feb 2002

Teaching Tips at Your Finger Tips

In October 2001, CDTL proudly released campus-wide the 4th and latest edition of the NUS teaching handbook, entitled: *Learning to Teach, Teaching to Learn: A Handbook for NUS Teachers*. Unlike the 3rd edition which was comprised of a series of booklets on various topics compiled into a folder, this new handbook is now a slim handsome volume full of basic practical tips on how to teach and facilitate learning. Two years in the making, *Learning to Teach, Teaching to Learn* contains new sections (e.g. on the new learning paradigm, problem-based learning) and updated information on the use of IT in teaching and learning at NUS. All NUS teaching staff members are entitled to a free copy of the handbook. If you have yet to receive your handbook, please contact your faculty's Dean's Office immediately. ■

A New Look...

This issue of *CDTLink* is unique: we at CDTL have freshened and updated our design layout as well as compiled our first bumper issue of 20 pages (vs. the usual 16 pages). These innovations are part of our continuing efforts to make *CDTLink* as reader-friendly as possible and to provide you with more insights into the craft of teaching and learning. If you have any feedback on this issue, please email us at *cdtpost@nus.edu.sg*. We look forward to hearing from you. Thank you. ■

In the past few months, CDTL has experienced some staff changes. We would like to thank:

- Ms Angeline Leigh Carpenter-Ames, Research Assistant, who left at the end of November 2001 to pursue her doctorate in sociology full-time at NUS, for all her invaluable support in the past and wish her well for her future endeavours.

At the same time, we welcome:

- A/Prof Tan Cheng Han, Dean, Faculty of Law who assumed the post of CDTL Affiliate in December 2001; as well as
- Ms Lydia Tan, Research Assistant, who joined in late November 2001. ■

2002 TLHE Symposium

Call for Registration

2nd Symposium on Teaching and Learning in Higher Education

4–6 September 2002

Theme: Paradigm Shift in Higher Education

CDTL will be conducting its Second Symposium on Teaching and Learning in Higher Education to increase awareness of pedagogical issues that enhance teaching and learning. The theme is on the changes in learning processes and outcomes caused by the shift from the instruction to the learning paradigm. The official language of the symposium is English. Two pre-symposium workshops will be conducted respectively by Prof Marshall Lih and Prof Barbara Gross Davis on 3 September 2002.

Keynote Speakers:

- Barbara Gross Davis, Asst Vice-Chancellor, Student Life-Educational Development, University of California, Berkeley, USA
- Chong Chi Tat, Deputy President & Provost, Office of the Provost, NUS
- Marshall Lih, Senior Advisor for Engineering Education & International Research Collaboration, National Science Foundation, USA

Invited Speakers:

- Denise Chalmers, University of Queensland, Australia
- Tim Hill, University of Bristol, United Kingdom
- Ora Kwo, University of Hong Kong, Hong Kong
- Gabriele Lakomski, The University of Melbourne, Australia
- Jean Michel, Ecole Nationales des Ponts et Chaussees, France
- Susan C. Piliero, Cornell University, USA
- Malcolm Tight, Unviersity of Warwick, United Kingdom
- Peter Jarvis, University of Surrey, United Kingdom

Registration:

The registration fee for the symposium is S$400 if the payment is made before 1 July 2002, and S$450 after this date. (Cheques/bank drafts should be made payable to National University of Singapore). The fee will cover a copy of the symposium proceedings, admission to all sessions, lunch and refreshments. The registration fee for each pre-symposium workshop is S$50.

For more information and/or to register online, please refer to *http://www.cdtl.nus.edu.sg/tlhe* or contact:

Ms Rita Roop
Centre for Development of Teaching & Learning
National University of Singapore
10 Kent Ridge Crescent, Singapore 119260
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TEACHING & LEARNING highlights

Dr Grundy-Warr and NUS students during a field site visit, Mae Hong Son province, Thailand

Faculty of Arts & Social Science

Learning by Doing

In May–June 2001, 29 NUS Geography students participated in NUS' first Field Studies module in northern Thailand's Chiang Mai and Mae Hong Son provinces. Dr Carl Grundy-Warr (Department of Geography) devised the module, which was based on project and teamwork 'in the field', with no final exam. Each student undertook four team projects and one individual assignment during almost six weeks of field-based studies. Collaboration with Chiang Mai University and with various Thai government and non-government agencies facilitated the trip. Invited practitioners and scholars supplemented fieldwork with seminars. Students engaged in various projects and fieldtrips on a broad range of topics including cultural landscapes, hill-tribe cultures and tourism, agro-tourism, eco-tourism and conservation, community forests, and migration geographies.

Field Studies helps to generate a sense of collective and individual responsibility for learning. In the process, students apply various field methods; improve their observation and analytical skills; apply concepts and ideas learnt in the classroom to the real world; develop awareness and an appreciation of the problems, pitfalls and potential benefits of doing primary fieldwork; and see the links between research, teaching and learning. To take the geographical Field Studies module into its next phase, Dr Grundy-Warr, Dr Paul Barter, and Dr Tim Bunnell are planning a fieldtrip to Malaysia and southern Thailand in November–December 2002. ■

An ABCD seminar in progress

Faculty of Dentistry

Back to Our ABCD...

Traditionally, small-group seminars in dentistry are teacher-centred and involve the review and presentation of several staff-selected scientific papers by students to their peers. The staff then discusses the merits of individual papers and the validity of the conclusions drawn from the research. Due to time constraints, the scope is often limited and learning issues are seldom clear. Consequently, student and staff feedback over several years have shown that undergraduates had problems associating basic knowledge gained to the clinical practice of dentistry. To ensure maximum participation by students, optimum internalisation and sound application of knowledge gained, 'ABCD (Applied Basics in Clinical Dentistry) seminars' were recently developed and introduced.

ABCD seminars are student-centred and the responsibility for learning is entrusted to the student. Learning issues (basic knowledge), grouped into various sub-headings (e.g. material, properties), are raised in the clinical setting that students are exposed to (application). Individual students select their own reference sources from textbooks, lecture notes and scientific articles. Foundational knowledge obtained by students is summarised during the seminar and applied to the clinical selection, usage and failures of dental restorative materials. A global approach to learning is used to help students see relations between concepts and applications and build connections between topics. To sustain a high level of attention and interest, activities such as the manipulation of materials and reading of manufacturers' instructions are included. From a feedback survey conducted, all students agreed that the ABCD seminars have helped them associate basic knowledge with clinical applications. Approximately 80% of students ranked this seminar format most beneficial compared to the other types of seminars that they have experienced. ■

Solving biomedical problems from an engineering perspective

Faculty of Engineering

Adopting a Multi-disciplinary Approach: A Minor in Bioengineering

The Faculty of Engineering has recently launched a new multi-disciplinary Minor in Bioengineering Programme. Administered by a newly formed department, Division of Bioengineering, this programme has contributions from the Departments of Electrical & Computer Engineering, Chemical & Environmental Engineering, Mechanical Engineering as well as the Faculties of Medicine and Science. Its aim is to provide a broad-based training for engineers who are conversant at the interface between engineering and the life sciences, so as to meet the manpower needs of the biomedical industries.

This Minor is currently being offered to Stage 2 engineering students. The students are required to take four additional multi-disciplinary modules outside their major: one compulsory core module known as the 'Principles of Bioengineering' and three modules chosen from the new Life Sciences Curriculum, thereby requiring students to attend lectures conducted at the Faculties of Medicine and Science. So far, the students have found the Minor very enriching and have gained a whole new insight on applying engineering skills to solve problems in biology and medicine. ■

Faculty of Medicine

Medical Ethics Come Alive!

Medical students in debate

In August 2001, the Faculty of Medicine initiated a Debate-cum-Seminar to create awareness and stimulate interest in Medical Ethics among our students. The topic for the debate was 'Human Genetic Testing' and the debate pitted Year 3 head-on against Year 4 medical students. There were animated arguments for and against the topic, making the subject come alive for many in the audience of over 200 students. The seminar that followed featured two prominent medical professionals, Drs Lee Suan Yew and Chew Chin Hin, who serve as role models for students and young doctors to emulate.

The Debate-cum-Seminar will be an annual event, constituting an essential component of the Medical Ethics Module developed by the Faculty of Medicine for the New Curriculum. Apart from being exposed to various aspects of ethical issues in clinical practice, students will also be responsible for completing an Ethics Case Study as part of the course requirements. ■

Faculty of Science

The New Undergraduate Life Sciences Curriculum

A Life Sciences student working in the research laboratory

In the academic year 2002/2003, the Faculty of Science in collaboration with the Faculty of Medicine will commence a new integrated undergraduate programme in Life Sciences. Designed to provide NUS undergraduates with fundamentals in biological and biomedical sciences, this curriculum will enable graduates to contribute to various life sciences initiatives in Singapore. The new curriculum will be broad-based, integrated as well as streamlined. Core skills in the life sciences will be developed through emphasis on fundamental concepts and principles, laboratory competence and research techniques. The undergraduate life sciences curriculum is a four-year degree programme. In the first two years of study, students take foundation courses in Cell, Molecular and Organismal Biology as well as Chemistry, Biocomputing, Bioinformatics and Biostatistics. From Year 3 onwards, students can choose to concentrate in one of three areas: Biomedical Science, Molecular and Cell Biology or Biology. For further details, please visit: *http://www.science.nus.edu.sg/Undergraduate/LifeSci/*. ■

School of Business

Team-based Multi-disciplinary Problem Solving

Let chaos reign, then rein in the chaos.

The School of Business will offer an Advanced Module, entitled *Team-based Multidisciplinary Problem Solving*, to University Scholars Programme participants from July 2002. This module will help students learn and think across disciplines and direct their own learning through a problem-based learning (PBL) approach. During the first few weeks, the concepts of PBL, cross-disciplinary learning and problem solving will be discussed. The remaining weeks will be devoted to hands-on investigation of several multi-disciplinary problems designed by the course facilitator.

Each problem investigation goes through three phases: 1) brainstorming in class to identify the knowledge areas and concepts required to understand the problem; 2) researching the identified knowledge areas and concepts from books, journals, databases, and discussions with experts within and outside NUS; 3) meeting in class subsequently to share and discuss the individual discoveries in various knowledge areas in order to understand and solve the problem. For example, students will conduct a feasibility study of a bullet-train link between Singapore and Kuala Lumpur. To cover the problem from different perspectives, students are expected to self-research relevant concepts in physical and human geography, civil and structural engineering, physics, politics, sociology, and economics, as well as the experiences of actual high-speed commuting projects in the world. ■

School of Design & Environment

Teaching Thinking & Inquiry in the Building & Real Estate Disciplines

Prof K.P. Mohanan

As part of its continuing series of Teaching Seminars, the Department of Building and the Department of Real Estate hosted an *In Conversation* session with Prof K.P. Mohanan, CDTL's Deputy Director, on 7 November 2001. The discussion centred on how staff can help to promote critical thinking skills and inquiry-based learning for building and real estate students at the School of Design and Environment that will help prepare them for their professional roles in construction and real estate. Prof Mohanan provided insights to certain teaching-learning and assessment tasks that he has designed to help students enhance their capacity for independent thinking and inquiry. He also elaborated on some of the methodological strategies he has used in achieving his goals based on an experimental General Education Module called 'Introduction to Rational Inquiry' which he had taught recently. This module aimed to help students understand and appreciate the modes of thinking and inquiry in academic disciplines, and provide first-hand experience in the strategies of discovering and constructing knowledge, as well as the ways of critically evaluating knowledge claims.

An extended and lively dialogue ensued about the problems of teaching thinking and inquiry within the cocktail of multi-disciplinary modules taught in the Departments of Building and Real Estate. Nevertheless, all present agreed that the knowledge base for developing the capacity for thinking and inquiry would necessarily include subject areas like cognitive neuroscience, physical sciences, pedagogical theory, philosophy of science, and ethics, which could be reasonably representative of the spectrum of academic knowledge. ■

Facilitation: A Different Pedagogy?

...continued from page 6

- *Control*: To what extent are students empowered to perform in class?

Unfortunately, establishing an ideal set of class dynamics is not simple. However, in my opinion, what will be an acceptable balance of the above factors will depend on the facilitator's teaching philosophy (e.g. are you student-centred or teacher-centred?) and perception of the students' relative status (e.g. do you treat students as students or as intelligent adults?).

3. Establish core values

The teacher-as-facilitator should have a set of core values to guide his/her actions (Argyris & Schon, 1974). These core values will prevent the facilitator from behaving defensively when strong differences in views erupt in class or when students conduct themselves in an unacceptable manner. Some of these core values (Schwarz, 1994) could include:

- sharing and acquisition of valid information;
- free and informed choice; and
- internal commitment to the choice.

By sharing and actively acquiring new information, the faculty member ensures that old content is discarded and new content is shared with the students. When students are not coerced or manipulated to respond in class, their responses will be made out of free and informed choice. To promote group solidarity and cohesion, both the faculty member and students must stand by any decision or choice made collectively in class.

4. Communicate

I have found that it is paramount for a facilitator to *listen* to not only what is said, but also what is not said during a discussion. The facilitator has to be alert and spot when and how individual students within the class express confusion or strong feelings. By practising *empathy*, the facilitator can quickly respond to any doubts or questions students may have.

Cultivating *dialogue skills*, as espoused by Senge (1990), is equally important. To encourage dialogue in class, both students and the faculty member have to suspend their own assumptions and show respect for each other in class: individual pride and ego must make way for a sincere interest in learning from one another.

5. 'Sculpt' students' thinking

Pushing for acceptance of one's view should be balanced with a willingness and ability to inquire or question the views of others. Hence for effective facilitation, one's *probing* or *questioning skills*, and the *ability to integrate* or *summarise* various viewpoints is equally important. In this manner, different viewpoints can be generated and presented, and all in the class can achieve a fuller understanding of what is taught or learned.

In my view, one's learning and thinking can only be 'sculpted' with the use of the various communication skills discussed above, and a compassionate attitude towards acceptance of one's and others' mistakes made along the way. After all, the aim of 'sculpting' is not to impose one's view on the students, but to help them mould their new understanding of the concepts learned to their existing body of knowledge and views (if any).

Facilitating students' learning in a classroom is a very complex process. Before we are able to successfully shift our pedagogical approach from instruction to facilitation, I believe the academic teacher must question his/her own assumptions or beliefs of what learning and teaching involves before even adopting a different mode of teaching.

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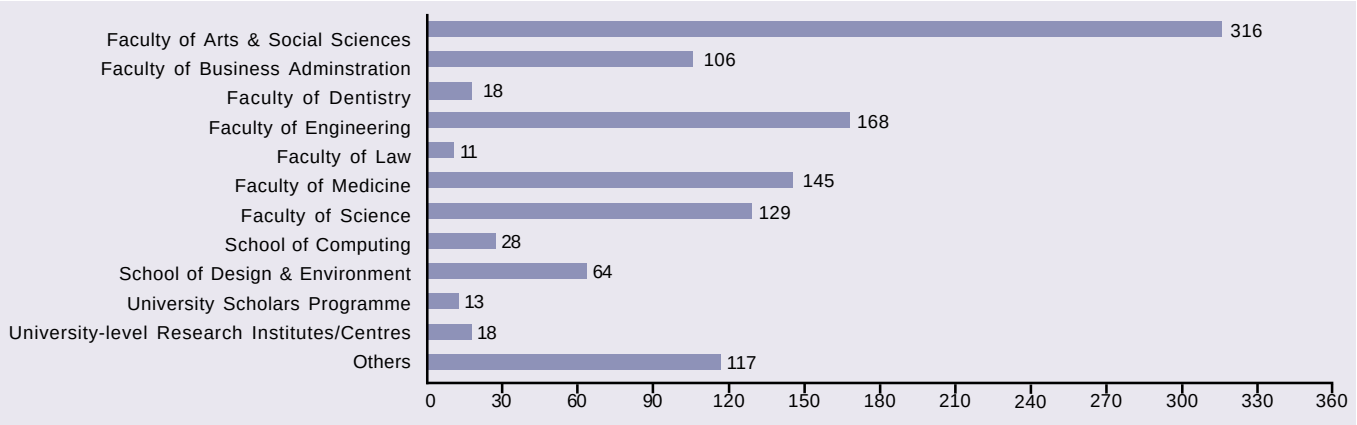
2001 Statistics at a Glance:

Who came to CDTL's Staff Workshops & Seminars



Interactive Teaching & Learning in Large Classes

...continued from page 5

- using the one-minute paper to help shy students ask questions;
- moving closer to a particular student when he/she is asking a question;
- showing respect for the students, and not putting them down (even if the questions they raise appear 'dumb' to me).

Another set of strategies involves encouraging students to respond to questions, such as allowing enough time for students to frame their answers to the questions raised, and handling wrong answers tactfully (i.e. not putting the students down and embarrassing them). I also often avoid exchanges with only one student; in fact, I always find it worthwhile co-opting the 'backbenchers' by drawing them into the question-and-answer loop.

Other strategies that have helped me to encourage active student learning in large classes include implementing:

- a participatory lecture format:
  - inviting students to shout out everything they know (or think they know) about an issue or topic;
- the think-pair-share strategy:
  - asking students a question or posing them a problem;
  - getting students individually to *think* about the answer/solution; and
  - getting students to *pair* up to *share* their answers/solutions, thereby creating a more superior collective answer/solution;
- games during the lecture:
  - inviting a few students to take part in a question-and-answer game; and
  - getting other students to participate by calling out suggestions, clapping (when right answers to given), or even groaning (when wrong answers are given).

Finally, I have learnt from experience that the attention span of my student audience rarely stretches beyond fifteen minutes. Consequently, I always break the lecture session up into fifteen-minute segments and I slot in a participatory activity (e.g. think-pair-share, game, question-and-answer session, and one-minute paper) after each segment.

Further reading

Carbone, Elisa. (1998). *Teaching Large Classes: Tools and Strategies.* Thousand Oaks, CA: Sage.

Johnson, David W.; Johnson, Roger T.; & Smith, Karl A. (1991). *Cooperative Learning: Increasing College Faculty Instructional Productivity.* Washington, DC: ASHE/ERIC Higher Education. ■

Feedback—From Teacher to Student

...continued from page 8

error' or ' grammar + logic + rhetorical error'. As these elements are important in the assessment of writing, each of these elements is given a certain weightage—a higher score for a more serious error. Students are then prompted to think about what went wrong especially in those errors with higher scores and they are encouraged to come prepared to suggest alternatives.

Peer review, if appropriately implemented with regards to student abilities, can result in a more dynamic way of talking about errors. The didactic element need not be always from the top as the tutor can facilitate the discussion so that it becomes mutually beneficial to all parties involved.

Basically, feedback is important to students but it is not always possible to provide detailed comments individually. Depending on the nature of the discipline and assignment involved, one has to maximise whatever time that has been allocated to convey necessary feedback.

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Employers' Feedback

...continued from page 9

The logistics

While it is difficult to use students' learning outcomes in evaluating individual faculty, they are a critical component of the evaluation of teaching at the department level. Although an ongoing employers' survey of graduates can be organised at the department level, it may also be valuable for a faculty member to conduct his/her own survey so as to gain valuable indications of the quality of his/her teaching. Unfortunately, complexities may arise when dealing with a shared module, or a cross-faculty module. But these complexities are worth overcoming given the usefulness of employers' feedback in highlighting a module's achievements in terms of the quality of learning outcome attained.

Conclusion

Employers' feedback can bring forth evidence of the quality of graduates' learning outcome and give an overall judgement of the curriculum. Such feedback is crucial as it indicates the value of university learning and demonstrates the graduates' abilities and mental capacities in the workplace. Consequently, conducting regular employers' feedback surveys can determine the future directions/requirements of higher education, customise education according to employment needs, and most importantly, help universities to understand whether the learning objectives of their programmes have been achieved.

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1b. National University of Singapore. (2001). 'Outstanding Teaching Award Selection Criteria'. *http://www.cdtl.nus.edu.sg/oea/criteria.htm*. (Access date: 9 December 2001).

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The author is greatly indebted to Mr Glen O'Grady, Senior Educational Development Specialist, CDTL, for his invaluable comments on this article.

Different Strategies for Effective Language Teaching

Ms Angela Loo Siang Yen
Lecturer, Centre for English Language Communication

The growing use of psychology in education and the impact of technology in the classroom have left language teachers wondering if language teaching should still continue as it is. Currently, many of us are restricted to conventional methods of implementing knowledge of the four skills, namely reading, writing, listening and speaking, whether the approach is communicative or structural. However, there are many advantages to be gained if the teaching of language incorporates new and relevant strategies and modes outside of its traditional scope.

Good language teachers should be liberal enough to realise that the teaching of language does not merely embrace grammatical rules, writing rules and expansion of vocabulary. The Sapir-Whorf hypothesis states that language reflects reality or whatever occurs in this world, including the society, economy and behaviour/psychology of the people around us as well as the silicon chip that is so much a part of our lives today. Indeed, all these reflect, in turn, the language we use as well. Hence, if one teaches language, one must not forget that there are so many important tools that affect or even promote language teaching. (In this article, I am certainly not merely referring to teaching materials or the communicative approach towards the teaching that most language teachers are familiar with.)

For instance, some knowledge of psychology brings about not only behavioural success at mastering language, but also cognitive success as a result of increased confidence. Language students often face difficulties in grasping new concepts, vocabulary and grammatical rules at the beginning of the term. They may become less confident and feel demoralised, particularly when they do not realise that this phenomenon is in fact normal. At best, the teacher can try to reassure and convince the students that such a situation is common, or pray and hope that they will be able to remember the concepts better over time.

However, teachers who are familiar with psychological concepts, such as Francis Robinson's (1970) SQ3R method of studying, can teach students a more effective method of studying. SQ3R stands for a 5-step process: (1) Survey, (2) Question, (3) Read, (4) Recite, and (5) Review. These steps can be fully utilised for concepts taught in a language and communication module. If the course is on writing, the student first **surveys** the main topics of the course to get a feel of how the materials are organised. Second, the student **questions** the main topics/section headings found in the course book (e.g. "What is Procedural Writing, and how is this different from Process Writing?"). Third, the student is then ready to **read** the material and answer the questions he/she has just raised. Fourth, the student **rehearses** the answers without looking at the book. This may be accomplished by taking notes during the reading step, so that the student achieves *elaborative rehearsal*[1], rather than *maintenance rehearsal*[2].

1. *Elaborative Rehearsal* is the process of remembering by way of meaningful association between new information to be remembered, and information already in long-term memory.
2. *Maintenance Rehearsal* is the process of remembering by mere repetition. The attempt to remember telephone numbers is an example of maintenance rehearsal.

Finally, the student **reviews** what he/she has been taught during the course. Revision is in fact one effective method of transferring short-term memory to long-term memory. Hence, students may study more effectively if they are taught both language skills and the SQ3R method.

With regard to using technology in the classroom, researchers such as Hanson-Smith (1997) have suggested that the teaching of language using computers could involve: (a) accessing language material such as games and activities through the Internet or CD-ROMs; and (b) utilising word processors for multiple drafts of essays. In my opinion, computers can be further exploited: teachers should encourage students to build their own language-learning websites. Students should learn to use certain software programmes (e.g. Dreamweaver, Microsoft FrontPage) and perhaps even master basic html and java-script programming. (At present, many of my Computer Science and Engineering students are undoubtedly skilful, but a large number of Arts and Science undergraduates whom I have taught is still new to web creation.) In addition, undergraduates have the incentive to read books or surf the Internet to research material for their websites. They could also take more initiative in using the target language to write interesting webpages.

In the United States, the notion of CALL (Computer Assisted Language Learning) is very popular, involving the utilisation of computer programmes for language learners. One such programme, 'Editor-in-Chief', helps students to hone their text-editing skills (which are essential if the students have to produce tertiary writing of decent quality) before they hand in the final draft of a thesis or a resume. However, Asian teachers who implement the CALL syllabus in the classroom are few and far between. In order to conduct CALL-related courses, language teachers will benefit from being trained in the IT domain.

As NUS strives towards creating an intellectual hub for students to develop laterally and multi-dimensionally, optional training courses should be made widely available for teachers who want to take the extra step to make their teaching more exciting and beneficial to the students. In particular, language teachers who have gained IT skills and an understanding of basic psychological concepts will be better equipped to teach and motivate students effectively.

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The **Role of Wireless Pocket PCs** in **Medical Curriculum Delivery** & **Formative Assessment** for **Medical Students**

Dr Pradeep Alur, Ms Chang Hsueh Fun, Associate Professor Koh Dow Rhoon, Associate Professor Khoo Hoon Eng, Associate Professor Roy Joseph, Associate Professor Lee Szu Hee, Professor Lee Eng Hin
Faculty of Medicine

The use of hand-held Personal Digital Assistants (PDAs) for scheduling, email, note taking and storing addresses and phone numbers, has become increasingly popular in recent years. In May 2001, Harvard Medical School announced that it would be the first educational institution in the US to adopt PDAs as the information standard, in effect entering a post-PC era[1]. PDAs have the potential to play an important role in curriculum delivery and daily clinical activities of medical students and staff. Their compact size is convenient for clinical students who have to move from location to location to see patients. The PDA can keep them on track and help reduce some of their anxieties so they can focus on learning[1].

Although most institutions have based PDA trials on the Palm operating system with PC synchronisation, an attractive alternative is the Pocket Personal Computer (PPC) which uses Microsoft's Pocket PC 2002 operating system, and which has a colour screen, large memory capacity for storage and wireless capability. Several medical schools have initiated trials of PDA-based curriculum delivery, but wireless technology and online formative assessments have largely not been assessed. In a pilot project, we evaluated the use of wireless PPCs for medical curriculum delivery and online formative assessment for medical students at the National University Hospital.

Twelve final-year medical students posted to the Department of Neonatology in October 2001 were the first to experience the use of wireless technology in their curriculum. Each student was loaned a PPC at the beginning of the one-week posting in the Department, where a wireless networking point was located. The medical students used HP Jornada 565 PPCs fitted with Ylez compact flash (CF) wireless LAN cards operating on a 802.11b wireless network standard in the 2.4 GHz spectrum, that enabled internet access in defined locations. The PPCs were preloaded with: (1) a posting schedule, (2) pre-tutorial reading materials, (3) objectives for the posting and for each tutorial, and (4) Adobe Acrobat reader. In addition, the PPCs were equipped with wireless email access for each student. The reading materials were designed to promote independent and active learning as well as critical thinking. References were hypertext-linked for direct access on the Internet to facilitate evidence-based learning. The students could print via an infrared-enabled printer. One of the tutorials involved interactive use of the PPCs, in which teaching materials consisting of case scenarios and images in Acrobat format were beamed to students before the session, eliminating the need for a projector and screen.

The students were given a formative assessment at the end of the posting. The assessment consisted of 64 questions in multiple-choice, true-false, match-the-following and image-based formats. A unique single-use password was created for each student. Questions and choices were visible in a single screen navigated by vertical scrolling only. Images were reduced to fit the PPC screen but could be easily enlarged with a screen tap for better resolution. The questions were viewed sequentially in a forward manner but previous questions could be accessed and reviewed randomly. Questions that were skipped were highlighted in a separate row. Before submission, the user was alerted to review the responses. After submission, scores were instantly displayed as percentages. Correct and incorrect answers could be reviewed for learning. A three-point Lickert scale consisting of disagree, agree, or strongly agree, was used to record a post-trial online feedback survey of all students.

An assessment question in multiple-choice format displayed on the Pocket PC

The students were extremely enthusiastic about the use of PPCs and the results of the study were very encouraging. All the students agreed that instructions provided for the use of the PPCs were adequate and 83% did not require further assistance. Prior to the study, 75% of the students had been familiar with the use of PPCs. 100% agreed, of whom 42% strongly agreed, that the PPC was useful and convenient for the retrieval of online reading materials compared to a hard copy format. 100% agreed that wirelessly accessible reference materials were timesaving and 83% said that they might not have searched for the reference material, had it not been accessible on the PPC. 100% agreed that having posting schedules on the PPC was very useful. All agreed that the PPC could play an important role in medical education. All twelve students completed the assessment within the stipulated time of one hour. No interruptions in the wireless connection were encountered. All agreed that the questions were navigated with ease, that the physical formatting of multiple choice and true-false questions was good, that the ability to review answers was useful and that they found the PPC an effective learning tool. 92% and 83% agreed that the formatting of match-the-following and image-based questions was good, respectively.

Continued next page...

The Role of Wireless Pocket PCs...

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Dr Pradeep Alur (right, standing) teaches a group of medical students in the Neonatology posting using the Pocket PC

The project was conceived by the Department of Neonatology, which took the initiative in its design and execution. CITA-Med (Centre for IT and Applications – Medicine) was involved in the practical aspects of planning and testing software and hardware and their procurement, set-up and maintenance for the project, and funding. The project took seven weeks from planning to execution, including three weeks for writing PPC software to format the questions, which was carried out by Grapevyn, a local software consultancy firm.

The project successfully demonstrated the feasibility and high end-user satisfaction in the use of PDAs for curriculum delivery to medical students. In spite of the smaller display, the easy accessibility of reference material on PDAs may promote student learning. Our pilot project also demonstrated the feasibility of using PDAs in small interactive sessions without the need for a screen projector. The results demonstrated that the wireless PPC can be effectively applied to realise learning paradigms in medical education. We speculate that wireless PPCs can substitute for networked desktop or laptop computers for curriculum delivery, online feedback and formative assessment, while reducing costs and increasing mobility.

Reference

1. 'Harvard to Use PDAs in Medical School Training'. *The Boston Globe*. 08 May 2001. ■

Acknowledgements

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Marking Assignment Scripts Using Digital Pads

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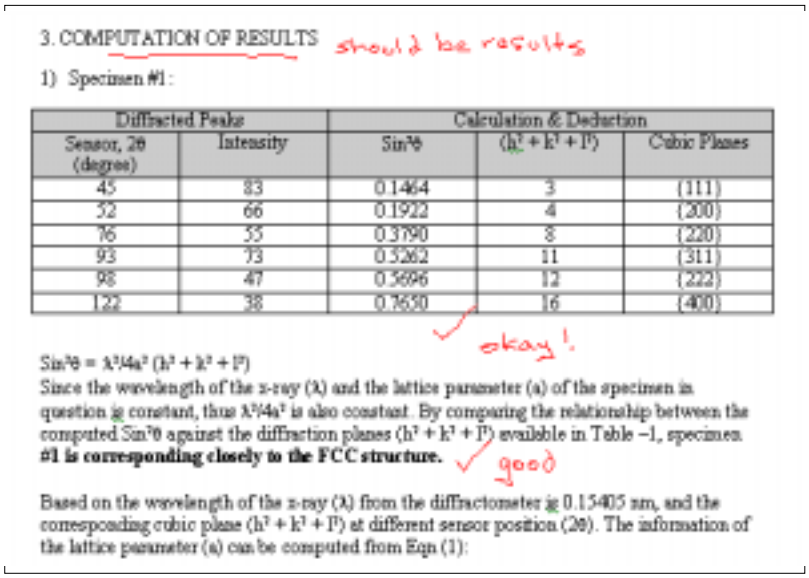

3. COMPUTATION OF RESULTS should be results

1) Specimen #1:

Diffracted Peaks		Calculation & Deduction		
Sensor, 2θ (degree)	Intensity	$\sin^2\theta$	$(h^2+k^2+l^2)$	Cubic Planes
45	83	0.1464	3	(111)
52	66	0.1922	4	(200)
76	55	0.3790	8	(220)
93	73	0.5262	11	(311)
98	47	0.5696	12	(222)
122	38	0.7630	16	(400)

okay!

$\sin^2\theta = \lambda^2/4a^2 (h^2 + k^2 + l^2)$

Since the wavelength of the x-ray (λ) and the lattice parameter (a) of the specimen in question is constant, thus $\lambda^2/4a^2$ is also constant. By comparing the relationship between the computed $\sin^2\theta$ against the diffraction planes $(h^2 + k^2 + l^2)$ available in Table –1, specimen **#1 is corresponding closely to the FCC structure.** good

Based on the wavelength of the x-ray (λ) from the diffractometer is 0.15405 nm, and the corresponding cubic plane $(h^2 + k^2 + l^2)$ at different sensor position (2θ). The information of the lattice parameter (a) can be computed from Eqn (1):

The merits of using digital pads in lectures were highlighted in a previous article, 'An Experience Using Digital Pads for Teaching' (*CDTLink*, Vol. 4, No. 1, p. 15). Recently, I have begun using the same digital pad from MGLogic for a different purpose: marking assignment scripts.

I ventured into electronic submission of assignments out of frustration. With the traditional paper submission, I had to arrange for someone to receive the assignments on my behalf. While I could simply instruct students to slip the assignments under my office door or into a locker with slots, I constantly faced the problem of students claiming to have submitted their assignments that I mysteriously did not receive.

When I started electronic submission of assignments in the form of Word documents, this solved the problem above but created another. To give students feedback on their work, I had to print out all the scripts—a costly and time-consuming endeavour. Then, I discovered that my digital pad had a packaged feature that allowed me to electronically write onto any Word document. The accompanying figure shows a page taken from a marked assignment. Electronic marking can present a tricky situation: what if marks are included and students tampered with them? This is no problem as Word has a file-saving feature that prevents editing using a password. You can find out more about this feature using Word's help facility (i.e. try the phrase 'password-protection' under Index Search). ■

The SAFTI Experience in Using e-Learning to Complement Military Training

LTC Anthony Chan
Head, Instructional Technology Centre
SAFTI Military Institute

Why e-Learning?

Five years ago, the Ministry of Defence adopted a training philosophy for the Singapore Armed Forces (SAF), known as the Self-Paced On Time On Need (SPOT-ON) programme, to tailor as much training as possible in accordance to individual needs, rate of learning and time of convenience. Initially the move took on the shape of distance learning packages using manuals and CD-ROMs. But as the use of the Internet widened, e-Learning became an extension of SPOT-ON.

SAFTI Military Institute provided one of the first test-beds for e-Learning in 1999 when the Battalion Tactics Course (BTC) went online. The following year, we extended the pilot project to cover the National Service Command and Staff Course (NSCSC). Both projects were made possible with the expertise and technical support provided by SCO Systems-Defence Science and Technology Agency. So far, we have completed four BTCs and two NSCSCs. In 2002, the Institute intends to launch another online course for company commanders.

How does e-Learning complement military training?

A principal consideration for adopting this new mode of delivery was that it could help elevate operational readiness and improve training efficiency. Using the traditional model, our active servicemen were spending, on an average, more than 1/3 of their time training and we could not afford to take them away from their jobs any further without affecting operational readiness. Time was also a premium for NSmen: they have an annual limit of 40 days for in-camp training and to ask them for more days of military training would mean greater economic cost both to themselves and the nation as a whole.

Consequently, SAFTI adopted e-Learning during the pre-residential phase to *impart and build knowledge* so that once the men are in camp for their residential phase, time could be optimised for map planning, face-to-face discussion and field exercises. e-Learning is not meant to substitute for the entire course which includes other forms of training methodologies. It has a place in granting greater convenience and a wider reach to the officers on course, but it cannot address all the levels of learning taxonomies adequately.

What is our experience with e-Learning?

A year into the trial, the Instructional Technology Centre at SAFTI developed a five-point management indicator to make sense out of the data collected from various instruments such as course results, internal validation reports, focus group surveys, interviews and the instructors' feedback. It was called the *5P E-learning Evaluation Framework* and covered *Purpose, Players, Pedagogy, Process* and *Performance*. Although this framework was not intended as a research evaluation tool, it has proven useful in supporting management decisions and policy directions towards e-Learning as well as subsequently provided a guide to other SAF units embarking on e-Learning:

PURPOSE *(i.e. the effect of e-Learning on meeting the organisation's aim and course objectives)*

- Many NSmen agreed that e-Learning has changed the learning paradigm of military training in the SAF and welcomed the convenience and flexibility of self-paced learning prior to in-camp training. 90% and above passed the knowledge test after the online phase.

PLAYERS (*i.e. the effect of e-Learning on the students and instructors*)

- **Students**: The demand on the students can be very high. Many found it hard to maintain the regular schedule for reading and submission of work. 84% of students had a

Continued next page...

Table 1: SAFTI Military Institute Courses with e-Learning Component

Course Title	Course Objective	No. of Students	Duration		Features of e-Learning Component		
			Online	In-camp	Delivery	Content	Others
BTC (twice a year)	Train mid-level Army officers to operate at the Company & Battalion levels	60	12 wks	5 wks	Broadband only	• Course Instructions • Publications • Videos • Courseware • Assignments • Feedback	• Email • Chatroom • Links to military websites
NSCSC (annual)	Prepare senior NSmen officers to be Battalion Commanders & Brigade Principal Staff	40	40 wks	5 wks	Dial-up & Broadband	• Course Instructions • Handbook • Publications	• Email • Chatroom • Discussion forums • Video-conference links to military websites

The SAFTI Experience...

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The SAFTI Instructional Technology Centre team at work (from left to right): Kevin Christopher Ou (seated), Yvonne Lim, Edmond Phon & Anthony Chan

PC. A few officers, who were not IT-proficient, reported that they felt peer pressure to keep up.

- **Instructors**: Instructors reported an overall increase in workload. They also had to expand their current realm of knowledge beyond their own area of expertise in order to respond to the wide range of students' queries.

PEDAGOGY (*i.e. the effect of e-Learning on adult education*)

- Officers from both courses reported that they benefited from each other's experience besides the course materials and their instructors' input. They still preferred hard copy or CD-ROMs rather than reading materials online. Most found it very hard to maintain a strict study regime on their own.

PROCESS (*i.e. the effect of e-Learning on training system processes ranging from curriculum design to delivery)*

- Three key players are needed to develop e-Learning: subject matter experts (SME), instructional designers and the technical support group. The 'project leader' should be the SME as well as be given proper training and guidance. Another critical success factor is a stable network infrastructure with a responsive first-line technical support team.

PERFORMANCE (*i.e. the quality of the end product)*

- There were no significant variances in the officers' performance compared to earlier courses. The variance in the results within a course was greater than the variance of the average result between courses.

Issues that arose & how we coped with them

Motivation to learn was one of our biggest challenges. As a military institution, we could not opt for extrinsic motivation and had to rely on essentially intrinsic motivation and some instructor-led facilitation. Before the course started, it was important to outline the relevant learning outcomes to the students and highlight some topics of interest relating to their real-life experience. The course commander was carefully chosen to create an open climate conducive to learning. We reminded the students of the importance of adhering to a study regime and that we would constantly monitor their progress on a weekly basis. In addition, we stipulated that there would be a 'knowledge test' at the end of the pre-residential phase. Interestingly, this combination of measures worked!

Members of SAFTI's Instructional Technology Centre (from left to right): Chan Boon Tong, Edmond Phon, Yeo Wee Han, Anthony Chan, Kevin Christopher Ou & Yvonne Lim

Final verdict

e-Learning is here to stay in SAFTI. Our experience shows self-paced learning appeals to the students and does achieve its purpose of imparting knowledge when the course is suitably designed and administered. It is a useful tool to support the learning process, both for the students and instructors. Nevertheless, it cannot replace the full spectrum of military training. ■

CDTL

The Centre for Development of Teaching and Learning (CDTL) provides a wide range of services and facilities to promote the teaching, learning and research programmes of the National University of Singapore. These include teaching and learning support, research on educational development issues, as well as instructional design and development.

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