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CDTLink

Some Thoughts on Effective Teaching

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By Professor Wee Chow Hou
Dean, Faculty of Business Administration &
Director of the Graduate School of Business

Introduction

Over the years, I have had the privilege of working with some of the best scholars and teachers through the annual Stanford-NUS Executive Program. In the beginning, I wondered how Stanford professors could easily score at least 6 out of a 7-point scale from a highly critical audience of top-notch executives. In contrast, NUS instructors were ranked far less favourably. I could not accept these results lightly. Together with some of my colleagues, we closely studied these great “gurus”. We have since caught up, and several of us now rank as well as the best Stanford teachers. So I would now like to share with you these acquired insights on how to be an effective teacher.

Learning from the Stanford Professors

What notable qualities did the Stanford professors exhibit? With great *authority*, Ezra Solomon would begin his lectures with an opening remark like, “When I was an economics advisor to President Reagan...”, making everyone sit-up and listen carefully. A great storyteller, George Parker has a *theatrical style* of teaching and punctuates his presentation with great jokes and fantastic anecdotes. He also makes complicated topics like financial ratios, mergers and acquisitions easy to understand.

When I sat in the class of Harold Leavitt, he captured the audience’s attention despite his need for a microphone to project his voice and his heavy reliance on chalk and blackboard. His secret simply lay in his wealth of business *experience* arising from years of training and consulting for very large American corporations. Jeffrey Pfeffer relies on *scholarship*: he draws the attention of the audience to his research findings as reflected in his books and journal publications and explains these findings in layman’s terms. When you listened to Jim Howell’s lecture on the state of the world economy, you felt that you understood all the issues involved as Jim’s strength was in *organisation*. He can structure a very complex topic in such an orderly and systematic way that people who have never studied economics can understand

Yet, beyond each man’s unique teaching style or strength, they all shared one common trait: they each possessed great *communication skills*.

Some Inferences about Effective Teaching

Several interesting points about effective teaching can be gleaned from the above. Firstly, *there is no one best style of teaching*. Each Stanford professor had his own unique manner that appealed to the audience. Although not everyone can be as charismatic as George Parker or as authoritative as Ezra Solomon, we can discover the style of teaching most suitable to us if we invest enough time and effort to cultivate our personal strengths.

Secondly, *everyone can be a “star” teacher* as there is no one ideal mode of teaching. The key is to have the confidence and willingness to learn, especially from as many great teachers as possible. I believe that I am a very strong teacher today – my style of teaching is continually evolving because I am always learning from others.

Thirdly, *communication skills are very important*. One need not be loud or forceful in speaking. But to excel in teaching, one needs the ability to express ideas clearly and succinctly. So if we have communication difficulties, we should be humble, acknowledge our weakness and seek help from others.

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Some Thoughts on Effective Teaching

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Finally, *presentation and teaching skills can be acquired*. For example, authority and experience can be gained through our consulting and outside work. Scholarship comes through research and publications. Organisation can be learnt and theatrics achieved through practice. In fact, these characteristics are all part of our duties and responsibilities as academics. It only depends on our willingness to learn and progress. I personally have witnessed how several of my colleagues at the Faculty of Business Administration have grown in teaching stature and strengths over the years because of their relentless motivation for self-improvement.

Improving Teaching Effectiveness

How does one improve one's teaching effectiveness? Based on my years of university teaching and of conducting executive training/consulting for international companies, I can say there are four key areas of concentration:

① *Know Your Strengths*

It is vital to know your strengths so that you can develop your particular teaching style. For instance, not everyone can excel in large classroom teaching; instead, we could perhaps teach smaller classes such as tutorials or seminars. In addition, it is necessary to:

- a. Enhance course content and development;
- b. Make greater usage of information technology and teaching software;
- c. Keep teaching materials relevant and updated;
- d. Provide more "value-added" presentations.

② *Work on Your Weaknesses*

All of us are weak in one aspect of teaching or another. Teaching in NUS itself may also pose certain challenges that we may not know how to cope with despite our academic credentials or personal experiences in teaching at other institutions. Consequently, invite, when necessary, established colleagues who are known as great teachers to sit in during your class. They can provide constructive comments on how you can improve your teaching skills to fit specific circumstances. Many faculties and departments have established peer review committees for teaching and research whose services can also be utilised. Besides inviting "critics" to your class, you can also proactively sit in the classes of better teachers.

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The University has also provided other facilities for those who need help to improve their teaching. For example, it is now possible to videotape your own teaching with the help of the Centre for Development of Teaching and Learning (CDTL). An unobtrusive, self-learning way of monitoring yourself, videotape allows you to review your performance after class, discover your shortfalls and take appropriate action to overcome those faults. Attending courses offered by CDTL and the Centre for English Language Communication can also help improve your communication and presentation skills.

③ *Pay Attention to Personal Grooming*

In teaching, I believe personal image matters. Because we are largely role models to our students, the extent to which we project ourselves (whether positively and confidently or negatively and passively) will hence naturally affect how our students perceive us. If you are well attired, your level of consciousness is heightened and you tend to behave with a particular decorum. If dressed sloppily, you are likely to behave casually. So when you are dressed well and have good manners, students will probably regard and respect you more.

④ *Know Your Students*

The University is a great place for us to mould the minds and characters of future leaders. But how many of us teachers actively do so? Do we pay close attention to the students' feedback/end-of-course evaluation and study the comments carefully to see how we can improve ourselves? Do we remember our students by name and show them concern beyond the classroom? Some of the hallmarks of a great teacher are his/her ability to establish strong rapport with students, to be sensitive to their needs, and to be a caring mentor/counsellor. If we show profound care for our students, we would probably have a greater, more positive impact on the lives of students than if we kept aloof.

Within the classroom setting, knowing the capabilities of our students will naturally help us pitch our teaching at the right level and stretch their academic limits. Armed with this knowledge, we can better stimulate creativity, enhance analytical thinking and cultivate learning skills among our students, thereby helping to fulfil an important national agenda, i.e. building a learning nation and encouraging thinking schools.

Conclusion

Teaching excellence must be a key responsibility of any academic, especially for those working in NUS. As a nationally funded institution, our biggest contribution to the socio-economic well-being of Singapore is the quality of graduates that we produce because they are the future leaders of our society. With more foreign students entering NUS, this role of shaping future leaders has taken an international significance. Thus, it is important that we continually improve upon our teaching effectiveness. Let us work harder to enhance our strengths, overcome our weaknesses, invest more effort in knowing our students, and learn to project ourselves more positively. What I have shared is not new, but I hope my views will enable you to be more aware of the important roles we play. After all, *awareness is the beginning of wisdom* – a trait that we should all aspire to achieve as academics. ❖

Peer-Review:

A Method of Evaluating Teaching

Current Methods of Teaching Evaluation



By Associate Professors
Lai Yee Hing (right) & Lee Hian Kee
Department of Chemistry
Faculty of Science

Evaluation of teaching staff by students, as has been practised by the National University of Singapore for the past decade or so, provides useful student feedback on teaching performance. When used judiciously, evaluation statistics can assist staff to improve their teaching and overcome, or at least minimise, their deficiencies in helping students learn. However for ease of analysing the evaluation, such feedback is mainly in numerical form, and consequently, may not be the most desirable gauge of teaching performance as it is subject to personal bias.

In science and engineering, one critical parameter in the analysis of experimental errors (the so-called determinate errors) is personal bias. Unless experiments are carefully designed and carried out, they may lead to invalid results if the possibility exists of personal bias creeping into the collection of data and/or interpretation of the results. Thus, in an evaluation by students that bases itself even more so on opinionated perspectives, the significance of personal prejudice bearing on the outcome cannot be overemphasized, especially if it is taken as the sole, exclusive measure of teaching performance. After all, it is, at the present time, a one-time exercise, held towards the end of each semester.

Ideally, evaluation should be a continuous process. Since the implementation of the modular system, we have been placing greater emphasis on continuous assessment of students. This, it is argued, gives a better gauge of the ability of students, instead of a single major examination at the end of the semester. Yet a single evaluation exercise is deemed sufficient for student evaluation of staff teaching performance! This begs the question: Why not have something akin to continuous assessment for evaluation of teaching performance? Obviously, there are logistical difficulties, and implementation of such a scheme to the same degree as continuous assessment for students would be practically unfeasible. But what if we combine the current student evaluation exercise with peer review in which staff members are reviewed by their colleagues who sit in during their lectures at least twice over a semester?

In the academic world, peer review is already an established practice. Review of manuscripts submitted to journals, grant applications, promotion exercises, etc. are part and parcel of academic life. By extending this to teaching performance, we might yet have a fairer and more objective assessment of teaching performance.

Peer-Review in the Department of Chemistry

Beginning in session 1998/99, the Department of Chemistry has instituted a new format for peer-review of its staff members on their teaching. Openness and transparency in the review process are the hallmarks of this scheme. The reviewer (we would like to think this is not an assessment or evaluation in the strictest sense of the word) need not necessarily be a senior staff member (this is after all a *peer*-review exercise). He/she sits in on a lecture or tutorial, and subsequently provides brief written comments of his/her impressions of the lecturer/tutor during the class, based on the following points:

- Lecture was well-organised and covered the topic adequately
- Lecturer's speech was audible and clear
- Lecturer's explanations were clear, and seemingly understood by students
- Lecturer's enthusiasm
- Students' response to lecturer
- Other general comments

The term "lecture" is used in a general sense and can also include a small- (with 10 students) to a medium-sized (with more than 10 students) tutorial.

Rating is based on "can be improved", "satisfactory", and "very good". Reviewers are encouraged to be as constructive as possible in their critiques. No numerical scores are given. Both lecturers and reviewers are told that reports will be returned to the teaching staff being reviewed. There is absolute transparency in the scheme. Reviewers are asked to contact staff to be reviewed to arrange for a suitable time to attend the lecture or tutorial. No one is assigned reviewing duties based on impersonal third-party directives. It is important for everyone concerned that the review is not for judgemental purposes. It is meant to be an objective, and honest appraisal, and the results of the review should be considered in this spirit.

Student Response as an Important Assessment Criterion

The first four parameters for reviewers to comment upon are standard ones in evaluation forms – the only difference is that they are considered from the reviewer's, not student's perspective. The fourth parameter we consider being important for a meaningful review: students' response to the lecturer as perceived and observed by the reviewer. We believe unquestionably teaching is a two-way process, especially so at the tertiary level of education. Most student evaluation exercises are based only from the students' perspective in which the lecturer is judged on how well he/she provides knowledge. However,

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is that all all there is to the learning process? Shouldn't the student's role be a critical factor in the learning process too? We say yes. Thus, the staff member sitting in on a colleague's lecture is also asked for any student reaction (if any) to the lecturer's teaching, including his prompting and encouragement.

How many of us teaching staff have experienced this frustration: Despite our encouragement and prompting, student response is generally minimal or non-existent. This parameter is not a component of the teaching evaluation form. However, we contend that it is important to gauge the level of student response (again, if any) so that a reticent class provides food for thought for the lecturer concerned. He/she should begin to ask why this is the case. Is he/she not providing the encouragement, or is not seen to provide such interaction? Is the lecture being conducted at too fast a pace, leaving no time for students to respond in a positive manner? Is sufficient time being given to students to assimilate and digest the information – and thus, are the explanations clear enough for students to understand *during* the lecture? Is too much material being given so that students have difficulty coping with the flow of information?

With the honesty and objectivity implicit in the peer-review system, the reviewer can bring some of these reasons to the attention of the lecturer. It can be argued that the current teaching evaluation system also allows for students' comments. This is true, and this component should remain. It is, however, difficult to judge the honesty and objectivity with which these comments are made since they are made anonymously, and to put it succinctly, anything goes. How much credence can we put on anonymous assessments? Even in a scientific reviewing process that does provide for anonymity, collegiate responsibility, objectivity and credibility dictate against impartial, mendacious and mischievous assessment. In an assessment exercise like student evaluation, there is no such honour system in place. In fact, even numerical scores that lecturers and tutors receive from students evaluating them may not have been given honestly and fairly, unless they are completely consistent across the entire spectrum of modules taught by the staff concerned.

The feedback on students' response as seen from a third party is therefore, we feel, an important component of our peer-review scheme. Since we make no distinction as to whether the review is taking place at a lecture or a tutorial, the level of student response is contingent upon which type of teaching is being reviewed. For a big class of several hundred students, no one expects student interaction of any appreciable extent; for a tutorial, we might expect more (although this expectation is not often realised). The fact is that our peer-review system allows such interaction to be recorded by the reviewer, and acted upon accordingly by the lecturer or tutor concerned in order to improve upon his/her teaching.

Improving Our Peer-Review System

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This is only the first iteration of the peer-review system in our Department. Although it is by no means a definitive approach to the problem of obtaining a fair and useful review of teaching performance, we feel it offers a useful non-student perspective that should be taken seriously. The best judges of teachers are probably teachers themselves; their opinions should then be more seriously valued than hitherto has been the case. We anticipate changes in the questionnaire: for example by January 1999, we will have incorporated a section in which reviewers are asked to list two-to-five good points about the lecturer or tutor, and two-to-five areas in which there may be room for improvement. We will also seek opinions from staff members themselves what other additional parameters ought to be reviewed during a lecture or tutorial. ❖

Gathering Student Feedback:

A Short Survey on Various Mechanisms in Some NUS Faculties

Before registering for their exams, all NUS students must fill up computerised on-line forms and evaluate both course curriculum and staff. The results are then released to relevant staff for review and action. Besides this mandatory university-wide exercise, different faculties have other ways of gathering student responses. *CDTLink* looks at some of these practices:

Meetings with the Deanery/Heads of Schools/Department Representatives

The **School of Building & Real Estate (BRE)** holds Student Liaison Meetings at least once every mid-semester when problems have become evident but are not yet irreparable. Each meeting comprises the Head of BRE, course leaders, student representatives (from each year and tutorial group), and the President of the Building & Management Society. Owing to large number of student representatives, two separate meetings are held, with Levels One and Two together, and then Levels Three and Four. Some common issues include course content, student workload, pace of work, and adequacy of equipment and physical amenities. The School then takes action where possible, explains policy considerations when suggestions cannot be acted upon, and advises students on matters of conduct.

The Dean and Vice-Deans of the **Faculty of Dentistry (DEN)** meet student representatives once during each of the four terms in the dental course. The student representatives, made up of two representatives from each class and the President of the Dental Society, bring up academic, clinical or other problems encountered in the students' daily work (e.g. laboratory support, tutors, workflow problems etc.). Action is taken immediately by the Deanery where possible. Otherwise, the problems arising are channelled to the relevant parties to sort out.

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Peer Review:

Building a Community of Scholars

Peer review in the university is not merely about judgement on the quality of teaching for promotion and tenure. Peer review is also about how faculty can be more effective colleagues to each other in improving their work as teachers and in building a community of scholars interested in the pursuit of academic excellence and continuous learning. There are some underlying assumptions behind the practice of peer review, namely learning, teaching and faculty roles.

Today, the concept of learning is closely associated with the promotion of a knowledge society where students learn not only by mastering information and facts but also by questioning to understand meaning and make connections. University classrooms are essentially communities of scholarly inquiry in which students interact with faculty and each other to engage in active learning.

Teaching for deeper understanding goes beyond form and technique. One assumption is that teaching is a scholarly activity, rooted in approaches to learning and thinking. Choices about course design, assignments given, and criteria for evaluating student learning are all reflections of how a teacher understands his/her field. Perhaps then, peer review should involve strategies that capture the scholarly substance of teaching.

Consequently, peer review must transcend classroom observation to include an assessment of the reflective reasoning behind the choices made in teaching. Does the peer review process then highlight faculty perceptions of their roles as members of the university community?

In January 1994, twelve American universities (including Purdue, Stanford, Northwestern and Syracuse) joined forces in a two-year American Association for Higher Education (AAHE) project to develop new prototypes for the peer review of teaching. Working together, the campuses selected pilot departments in eight fields – chemistry, mathematics, English, history, music, business, engineering, and nursing – and took into account the following factors:

- Student evaluations of teaching, though essential, are not enough as there are substantive aspects of teaching that only faculty can judge.
- Teaching entails learning from experience, a process that is difficult to pursue alone. Collaboration among faculty is essential to educational improvement.
- The regard of one's peers is highly valued in academe; teaching will be considered a worthy scholarly endeavour – one to which large numbers of faculty will devote time and energy – only when it is reviewed by peers.
- Peer review puts faculty in charge of the quality of their work as teachers; as such, it promotes ownership as an alternative to more bureaucratic forms of accountability that would otherwise be imposed from outside academe.*

What the AAHE pilot projects proved was that peer review has to go beyond the classroom to be effective.

At Stanford, the History Department's pilot programme institutionalised three components: the institution of a pedagogy colloquium for all academic job searches in the department; the introduction of teaching dossiers and peer evaluation into the department's training cycle for graduate students; and the encouragement of course portfolios (case studies of course development and reflective memoranda) by faculty for peer exchange and commentary.

Stanford's Mechanical Engineering Department chose to make the academic scholarship rewards and incentive architecture of the School of Engineering explicit and subject to peer review. The English Department had a very specific focus for its pilot project: the mentoring of junior faculty members in the department in a comprehensive and extensive manner to support them in all aspects of a successful academic career in the research university environment.

Learning from other universities' experiences with peer review is one way to understand the significance and impact of the process. Setting up peer review mechanisms in the university can raise difficult issues. Faculty may find their comfort levels challenged as they try to decide on a role for peers in judging student learning. There is also a natural hesitancy in involving external peers while the time needed for peer review could be perceived as an area of concern. These are all valid issues that NUS must grapple with if it wants to implement peer review as an integral part of university teaching and learning.

In the business community, a comprehensive review technology known as the 360-degree feedback is revolutionising the way successful corporations are achieving business goals and enhancing work performance. The feedback exercise involves the collection of perceptions about a person's behaviour and the impact of that behaviour from bosses, direct reports, colleagues, project team members, internal and external customers, and suppliers. The 360-degree feedback is acknowledged as a promoter of cultural change, employee excellence and effective teamwork. Perhaps, in the same way, peer review and student evaluation can be perceived as components of a 360-degree feedback equivalent for the university that aspires to educate graduates for a knowledge society through the building of a community of scholars.

* "AAHE Peer Evaluation of Teaching Project Overview and Update", October 1994.



By Ms Elizabeth Su
Communicator
Corporate Communications
Kent Ridge Digital Labs
(Formerly Senior Assistant Director,
Office of DVC Shih)

Dealing With Regurgitation:

An Engineer's Perspective On Student Assessment Process



By Associate Professor W. A. M. Alwis
Department of Civil Engineering
Faculty of Engineering

Students are expected to study in order to master as best they can the material covered in each module they take. To obtain a fair gauge of this achievement, how then should examinations be set?

For most students, “study” is just what needs to be done to do well at the examinations. Memorisation is evidently easier than serious study (i.e. understanding concepts and learning application strategies). If students can score well at examinations by spewing out material learnt by heart, most would do so. So an examination that inadvertently or otherwise allows success by memorisation may not be adequate in measuring the level of mastery. When marking examination scripts, it is also not easy to tell a regurgitated answer from one composed through the use of appropriate concepts and application strategies. The difficulty arises when the student needs to make use of what is supposed to have already been learnt. Thus, it makes good sense for examiners to provide more meaningful assessments that prevent regurgitation.

Some believe traditional close-book examinations tend to permit success by regurgitation. In contrast, the open-book format is thought to be a better evaluation format. However, does providing access to information during examinations by itself solves the problem of identifying those who have simply regurgitated memorised material? The answer, which may also vary from discipline to discipline, can be found indirectly by examining the functional needs of graduates, as these needs will expose any mismatch between current performance and past grades.

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Turning to the practice of engineering, there are things that engineers need to know anytime, anywhere. A civil engineer should not have to look up a textbook to find out why reinforcements are normally needed in a concrete structure or what factors should be considered when designing a building. In general, engineers should remember formulae of fundamental significance in the subject area, design parameters commonly used by engineers and configurations that are basic in practice. For obvious reasons, an evaluation that attempts to find out how much students “know” in this respect can best be measured by close-book examinations.

There are charts, tables, equations and other reference material engineers must know how to use. To evaluate one’s ability to determine when and how to use these resources, appropriate reference materials should be available to the student at assessment time. Open-book examinations or project-based assessments can be adopted for measuring the level of such application skills. Project assignments also enable development of teamwork and other practical skills in students.

Most valuable to a person when practising the art of engineering is the level of understanding of engineering concepts and ability to use them creatively. In evaluating a student’s achievement in this regard, how information and basic skills are adopted and composed to respond to a question or an assigned task is more important than the information that is accessed and presented by the student. Both close- and open-book formats as well as project assignments can be adopted here for assessment.

The need for adopting a variety of examination formats in engineering disciplines is clear. However, preventing regurgitation remains a separate problem irrespective of whether access to external and unspecified information is allowed or not during examinations. Strategies adopted by students when preparing for examinations reveal a clue: they rely on familiarity in order to memorise and regurgitate. This is apparent when students provide the occasional incorrect but elegantly packaged solutions to a slightly twisted question that they mistake for a familiar one.

Setting unfamiliar questions is therefore at least one way of minimising the possibility of success by regurgitation. But this concept should be introduced carefully. Only the questions asked or tasks assigned in the assessment process need to be unfamiliar to the extent that needs to break the potential of regurgitation. Overall assessment format may remain the same year after year, and the scope of the assessment will have to strictly remain within that of the module.

There are several hurdles to clear if the academic community wants to use unfamiliar questions in examinations. Those who think familiarity as an absolute primary requirement of examinations will need to change their mindset. Students are also likely to consider unfamiliar questions as scary. Nevertheless, what is fundamental is that examiners should assess a student’s achievement on a “regular as-is” basis rather than under temporary “exam-primed” conditions. Consequently, what can be achieved by thoughtfully introduced unfamiliarity at examinations should not be underestimated. ❖

Comprehension, Critical Thinking & Creative Thinking

A Tricriterial Approach To Student Assessment

The Three Cs

In assessing students for philosophical skills I generally consider three criteria – comprehension, critical ability and creative insight. These constitute what I characterise as the three Cs of evaluation. I suspect my approach is applicable to most subjects in the humanities and, to an extent, can also be extended to scientific disciplines.



By Dr Arun
Balasubramaniam
Department of Philosophy
Faculty of Arts & Social Sci-
ences

Comprehension

Comprehension involves the ability of a student to faithfully present an argument or a philosophical position. However, comprehension should not be confused with regurgitation. Regurgitation reproduces without understanding and can easily be eliminated by properly designed questions in which scope for such imitation is disallowed. By contrast, comprehension indicates the student's mastery of an established body of knowledge and, being central to the proper deployment of other skills like critical and creative thinking, it has to be an important criterion of assessment.

Moreover, comprehension itself can be exhibited in two different ways. **Deep comprehension** occurs when a student is able to focus on the central principles of a position without conflating them with other peripheral assumptions required to articulate a particular version of it. Students with **shallow comprehension** tend to confuse central and peripheral assumptions. Without deep comprehension a student cannot engage in effective critical thinking because criticism tends to focus on the limitations of auxiliary assumptions built into a particular version of a position – assumptions which can be easily modified or relinquished without serious threat to the position being criticised. This brings us to the assessment of student critical skills.

Critical Thinking

Here the student is judged on the ability to identify both the scope and the limits of the position being entertained. What is important is not the position taken but the arguments deployed by the student. Indeed the student may display critical skills by extending the range of application of a given theory in new directions. Such **constructive critical thinking** can occur only if the student comprehends the position concerned with sufficient depth to separate its deep and shallow assumptions.

Critical skill can also be displayed through exposing the limits of a position. Such **deconstructive critical thinking** also requires deep comprehension. Weaker students who cannot distinguish peripheral and central assumptions tend to criticise the former. Their overall critical strategy often fails because the position attacked is easily defended by amending its less central claims. By contrast, students with deep comprehension are more likely to make adequate deconstructions. This would often motivate them to proceed to the third stage of thinking – creative thinking.

Creative Thinking

Just as good critical skills depend on deep comprehension, so do good creative skills depend on deconstructive critical thinking. In addition creative thinking requires highly developed imaginative skills to generate a new viewpoint. Since such a viewpoint often emerges through trial and error in which different alternative positions have been tested it requires the interplay of both imaginative and critical powers.

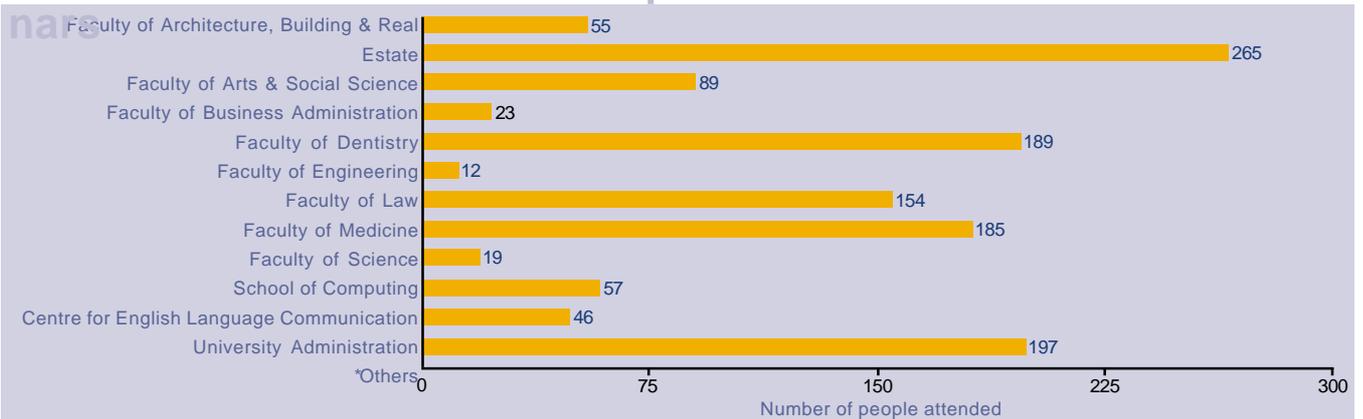
As with critical thinking there are two types of creativity – **combinatorial creativity** and **de novo creativity**. In the former students combine insights from two different positions so as to articulate and defend a new synthetic position. More rare is *de novo* creativity which occurs when a student arrives at a completely novel, but defensible, position. Such *de novo* creativity can be threatening to teachers since it may tend to subvert their own laboriously elaborated positions. This imposes a moral burden on teachers who are required to both welcome and reward such innovations commensurately.

Conclusion

The tricriterial approach I have proposed assumes that thinking – especially philosophical thinking – moves through three successive stages. The first involves comprehension – either shallow or deep. Deep comprehension opens the arena to constructive and deconstructive critical thinking. Deconstructive critical thinking motivates either combinatorial or *de novo* creative thinking. In evaluating students' capacity for philosophical thinking – and possibly thinking in general – we should attend both to the level they have reached and the degree of knowledge and skill they display therein. ❖

1998 Statistics at a Glance:

Who came to CDTL's Workshops and Seminars



* Others include American Studies Centre, Animal Holding Unit, various research institutes/schools/institutions of higher education in Singapore.

IT Workshops Clueless about IT? Help is here!

CDTL can show you how to use PowerPoint, Harvard Graphics, IVLE, ScreenCam, FrontPage, Designer's Edge and other IT applications. In past seven months, we have held over twenty IT workshops to help NUS teaching staff improve their lecture presentations and get their course materials on the Intranet. For participants to benefit the most, no effort has been spared in carefully planning and executing each session.

"Each workshop takes at least three weeks to prepare," says Multimedia Producer Eugene Hiew. "We read extensively for tips, search the Web for the latest information and experiment with the programmes. We aim to help both those who are and aren't familiar with the Windows environment."



Azman bin Johar (left) lends a friendly hand to a workshop participant

The various applications are made easier for lecturers to use by templates designed by Eugene, Principal Educational Technologist J.A. Gilles Doiron, Analyst Programmer Kiruthika Ragupathi and Graphic Artist Ma Lin Lin. Paced to suit the learners, our hands-on workshops are also conducted through a team effort. Besides the facilitator (usually Gilles or Eugene), at least two other CDTL staff members (e.g. Kiruthika and/or Technical Officer Azman Bin Johar) are there to personally attend to the participants who are limited to a maximum of twenty per workshop.

At each workshop's end, feedback is collected and reviewed to improve subsequent courses. In addition, facilitators are happy to provide post-workshop assistance if required. Notes Gilles, "Conducting these workshops is personally challenging. I like to teach whenever I can as it is very satisfying to see lecturers gain a new perspective in expressing their knowledge."

More workshops, both basic and more advanced modules, are in the pipeline. So if you want to learn IT to help your teaching, do check <http://www.cdtl.nus.edu.sg/cdtlhome/workshop.htm> regularly and register for one of our courses soon. You can be sure you will be in good hands.❖

Video Update Disguised Blessing

Disaster struck while CDTL was creating the Department of Community, Occupational and Family Medicine's (COFM) video – our main in-house editing system broke down! Our post-production team, headed by CDTL's Principal Media Producer Manuel Gamboa, had to seek an alternative.

"We found a local production house with a non-linear editing suite," Manuel revealed. "We could then use the latest technology and create in particular the attention-grabbing animation for the introductory segments." So despite the setback, *COFM: Serving the Community, the Nation and the Region*, commemorating the fiftieth anniversary of COFM, was completed on time and proved to be quite stylish. Vice Chancellor Lim Pin and the audience were duly impressed by the video when it premiered at the Opening Ceremony of the COFM building on 17 October 1998.



An artistic rendition of the COFM Building

For some time now, CDTL has been planning to acquire its own non-linear editing suite. With the tender process complete, we hope to do so soon. After all, CDTL continually seeks to improve the services it offers to the NUS community.❖

Foreign Observers We have guests!

Recently, CDTL played host to some foreign guests who were in Singapore on fact-finding missions to learn about local educational facilities and practices. On 30 October, Associate Professor Daphne Pan, CDTL's Director, personally escorted Dr Ali Abdul Aziz Al Sharhan, United Arab Emirates' Minister for Education & Youth, and a six-member high-level delegation on a tour round CDTL. After A/Prof Pan's introduction of the functions of CDTL, Principal Educational Technologist J.A. Gilles Doiron explained how we support NUS teaching staff in the use of IT; Media Producer Christopher Chew introduced our video production facilities; and Principal Media Producer Manuel Gamboa demonstrated our video conferencing capabilities for which our Emirate guests showed great interest. CDTL must have left an impact on our Arab visitors for before he left, His Excellency Minister Sharhan remarked to A/Prof Pan that CDTL was indeed "unique" in combining various services, "not technology in one place and pedagogy in another".

On 22 December, Assistant Director Joseph Peters guided Ms Nguyen Thi Vân Trang and Ms Dáng Dô- Hoàng Lan of Lê Hồng Phong High School, Ho Chi Minh City, on their tour of CDTL. Besides being treated to a similar video conferencing demonstration as our earlier visitors, our Vietnamese guests were also given short demonstrations by Gilles and Multimedia Producer Eugene Hiew on the use of IT and multimedia. At the end of their visit, the two ladies left with some ideas on how to apply technology to the teaching of English in their country. ❖



Dr Ezzat Abd-El-Mawgood (left) & Dr Ali Abdul Aziz Al Sharhan (centre) being welcomed by A/Prof Daphne Pan



Ms Dáng Dô- Hoàng Lan (left) & Ms Nguyen Thi Vân Trang (centre) are shown the ropes by Eugene Hiew

If you have feedback on this issue of CDTLink, please call us at 874 3052 or email us at cdtsec@nus.edu.sg.

Food for Thought: Practical Teaching Tips on the Internet

Need some advice on how to improve your teaching skills? The answers you seek may be found in your computer. For your convenience, we at CDTL have combed the World Wide Web and found various websites of teaching hints compiled by your teaching peers in other universities. Please feel free to check out these sites listed below:

- Teaching Tips – McMaster University
<http://www.science.mcmaster.ca/idc/tips.htm>
- Teaching Tips – San Francisco State University
<http://cet.sfsu.edu/tips.html>
- Teaching Tips – Iowa State University
<http://www.cte.iasate.edu/tips.html>
- Common Problems and Related Links – Carnegie Mellon University
<http://www.cmu.edu/provost/teaching/commonc.htm>
- Teaching Tips – University of California, San Diego
<http://www-ctd.ucsd.edu/tips.htm>
- Teaching Tips – University of Tasmania
<http://info.utas.edu.au/docs/cult/tips.html>
- University of Oregon, Teaching Effectiveness Program – See links to “Spotlight on Good Teaching”, “Troubleshooting Your Class”, “Teaching With Technology”, “Teaching Ideas”
<http://darkwing.uoregon.edu/~tep/>
- Teaching Tips: 101 Things You Can Do The First Three Weeks of Class – University of Nebraska-Lincoln
<http://www.unl.edu:80/teaching/101ways.html#anchor245169>
- A Berkeley Compendium of Suggestions for Teaching with Excellence – University of California, Berkeley
<http://uga.berkeley.edu/sled/compendium/>
- The Educational Development Resource Centre, Hong Kong Polytechnic University
<http://hednet.polyu.edu.hk>

To improve how we serve the NUS teaching community, “Food for Thought” will henceforth be a regular *CDTLink* feature highlighting various teaching resources that academic staff can easily access. ❖

Teaching & Learning

HIGHLIGHTS
Faculty of Architecture, Building & Real Estate

In^(ter)ventions: Monument to the Machine



Display of six monuments created by Architecture students.

To investigate the fundamental aspects of making, Level One students in the School of Architecture worked on Constructions, a design assignment. Over 5 weeks during last semester, eighteen students from Studio B curated a joint exhibition called *In^(ter)ventions: Monument to the Machine* in which they designed and erected monuments to six machines. Each team of three re-invented their chosen machines through their own interpretations, being challenged in the process, to rework familiar expectations, re-think the machine's traditional typology and develop a better understanding of the concept of machines. The students were asked to explore form and meaning expressed through structures, constructions and materials. The models created were one-to-one in scale; many were conceived with moving parts illustrating a central idea. Emphasis was placed on rigorously manifesting meaningful interpretations through conceptual thought and through the physically precise art of fine crafting, detailing and making. ❖

Faculty of Architecture, Building & Real Estate

Brainstorming

During the most recent in-house seminar organised by the Teaching Development Committee of the School of Building & Real Estate, Dr Grace Wong and Dr Alice Christudason shared some ideas gleaned from the "Thinking Schools, Thinking Classrooms, Thinking Students Seminar" held by the 'First Singapore Summer Institute'. They dealt with the 'Brainstorming Method' which can be used to generate options when discussing a certain topic. This involves coming up with as many ideas as possible without censure and seeking combinations of ideas to find solutions. A 25-minute workshop followed, during which staff were divided up into several sub-groups and asked to use the 'Brainstorming' to generate ideas on "How we can be more creative in our teaching". Staff members then had a lively discussion over the many valuable suggestions made on how to be more creative in their teaching. ❖

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Faculty of Dentistry **Video Demonstrations: Better than Live?**

At the Dental Faculty, live demonstrations have traditionally been used to teach technical and clinical procedures to students in small groups. Over the past decade, such teaching sessions in the subject of Removable Prosthodontics (dentures) have been gradually replaced by well-made instructional videos. Making a good video clip involves many man-hours of scripting, filming, editing and voicing. However, a well-made instructional video with good picture and voice quality has many advantages over a live demonstration. Each student is able to clearly witness the same procedure presented in a consistent fashion and content does not vary from demonstrator to demonstrator. Key points are incorporated as graphics to help learners focus on important issues. The video can also be replayed to refresh one's memory and even digitised for viewing on a CD-ROM (e.g. look into our Video-on-Demand series on *Clinical Procedures for Removable Partial Dentures*). With digital editing, the video can easily be updated without remaking the whole film and used as part of a multimedia presentation. ❖

Faculty of Engineering **Jellyfish & Virtual Lab**

The Department of Mechanical & Production Engineering (MPE) is using *JellyFish*, a tutoring and assessment system developed at the University of Western Australia (UWA). Set in a self-learning tutorial environment, *JellyFish* allows staff to set a sequence of problems, deadlines and marking strategies. To access the tutorial, students log in via a Web browser. At any time, teaching staff can monitor the progress of individual students or whole classes. As *JellyFish* helped to reduce class failure rate considerably at UWA, MPE has adopted two courses developed at UWA, i.e. first year *Dynamics* and *Calculus*. Presently, two other MPE modules (and one from Electrical Engineering) are under preparation using the *JellyFish* tutoring system as the platform. MPE will also be employing *Virtual Lab* to simulate mechanical engineering experiments using JAVA 3D graphics. Not a replacement for the actual laboratory, *Virtual Lab* prepares the students for the real session and familiarises them with the actual set-up and environment through the incorporation of advanced animation and simulations. It enhances the understanding of physical concepts being taught, allows students to experiment with parameters physically not possible in a real laboratory environment, and highlights safety precautions. In the post-lab sessions, software tools help students to process the experimental data and visualise the results using 3D graphics. Furthermore, diagnostic tools provided explain the discrepancies between the experimental and expected results. ❖

Faculty of Business Administration Seminar on University Teaching

More than 30 professors in the faculty attended a lively seminar on problems and issues in university teaching. The seminar, held on 27 October 1998, was facilitated by Dr William Koh and Dr Audrey Chia, both of whom received 1998's Faculty and University teaching awards. Issues discussed included the use of the case method, managing large lecture groups, structuring small classes to promote participation, and provoking critical and creative thought. This seminar will be the first of a series. The next seminar will address graduate and executive education. ❖

School of Computing Web-based Electronic Conferencing

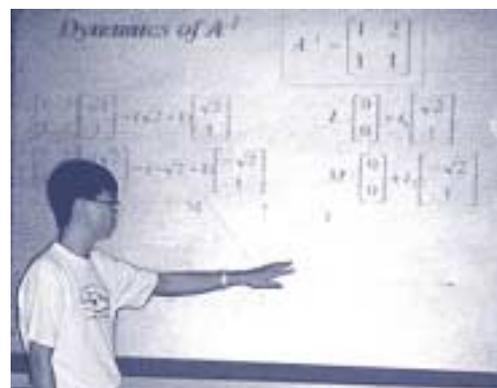


Electronic conferencing in action.

IC52A8, *Advanced Human-Computer Interaction*, is a graduate level course introduced during the 1998/99 academic year. The course instructor, Dr Chee Yam San, introduced the use of Web-based electronic conferencing to encourage students to participate in critical discussion and reflection on issues related to humans and the design and use of computing technologies. Discussion questions were posted to the conference each week to explore more deeply issues related to the week's lecture topic. Students were required to read the prescribed materials and participate in the conference *before* attending the week's lecture so that they attended the lecture with a reasonable sense of the lecture content. Hence, the lecture material was presented more concisely, and the second lecture hour was used to review and extend the discussion and to bring it to closure. In general, students found this format engaging and useful. They were also motivated to work hard as the quality of their discussions formed part of the course's continual assessment. ❖

Faculty of Science Learning through Teaching in SPS

Since its inception in 1996, the Special Programme in Science (SPS) has maintained that every participant is responsible for his or her own education. Correspondingly, many activities and projects in SPS are initiated and conducted by the students. Often they take on the role of facilitator or instructor for the activity; in the process they learn how to organise such events and to judge the quality of their peers' work in an erudite fashion. Two such activities in SPS during last semester were the literature presentation and the short essay writing. For the presentations, students gave talks based on materials garnered from the articles they selected from science journals. In addition to questions on technical details, their fellow students commented on the style and effectiveness of the presentations and suggested areas for improvement. In the short essay assignment, students wrote a four-page essay on "information technology". They submitted their work to two of their peers who each critically reviewed the essay and supplied editorial comments. A revised version of the essay was then turned in for grading. By playing the role of critics, the students realised what it takes to put up an excellent piece of work. ❖



Soh Chin Ann, an SPS student, points out the intricacies of invariant lines.

Faculty of Medicine Human Patient Simulator



Simulator: mannequin & computerised monitoring equipment

The human patient simulator represents the latest in medical training technology. It comprises of a mannequin and a computer that automatically determines the patient's response to user actions, and both procedural and pharmacological interventions. Patient profiles can thus be created, and various medical scenarios superimposed on them, allowing medical and paramedical personnel to practise managing patients. As the variables of patient profiles, medical conditions, and emergency situations can be combined in many different permutations, simulated scenarios for teaching medical students, specialist doctors and nurses can be easily and realistically done. Furthermore, the risk to actual patients is avoided. Singapore is the third country in Asia to acquire such a simulator and it is run by staff from the Department of Anaesthesia, National University Hospital. ❖

The Faculty of Medicine (MED) holds face-face meetings between the Dean/Vice-Deans and student representatives a few times a year to elicit curriculum feedback. For social affairs, a Vice-Dean is assigned as an advisor to the Medical Society & Club. The Department of Electrical Engineering (EE) also convenes a Staff-Student Liaison meeting once every semester; the Department Head and key faculty appointment holders meet student leaders from the EE Year 1 – 4 cohorts and representatives from the larger MSc classes.

At the Department of Chemical Engineering (CE), the Chemical Engineering Student Society committee calls for welfare meetings at the beginning and end of each semester. This committee voices student problems pertaining to any course/teacher/issue that affects their performance on campus to faculty advisors who then convey these problems to the Department for necessary action. Similarly at the Faculty of Business Administration (Bizad), all students are free to give feedback on all matters mainly via the regular meetings held between student leaders of the Bizad Club and Bizad Society and the Dean's Office. The Sub-Dean (Student Matters) counsels academically weak students, students with other problems, as well as students going on overseas exchange programmes to see to their needs and prepare them for the programme.

In contrast, the feedback channel between the Deanery and students at the Faculty of Law (LAW) is very informal. The academic secretary of each Year and of the Law Club can approach the Sub-Deans at any time about academic issues, and occasionally, welfare matters too. Social interaction between staff and students is carried out through frequent coffee sessions organised by the Law Club during which problems can be voiced. At least once a year, EE also organises tea sessions for staff members to mingle with the undergraduate students from each year cohort.

Each MED department has at least one staff member who raises several times a year with class representatives on academic matters. DEN course co-ordinators keep a record of student progress and meet with respective students to discuss their performance every term. When their module is completed, some DEN staff also conduct their own course appraisals. For instance in the Problem Learning module, both students and staff carry out both verbal and written feedback on their performance as teacher and learners. As small group teaching is the norm in DEN, feedback is often obtained informally within these small groups.

At EE, Year 1 – 4 student leaders and MSc class representatives regularly consult the EE Year 1 – 4 Co-ordinators and MSc Program Managers respectively when they encounter problems. Student bodies (e.g. Innovators' Club and Electronics Club) also meet with staff members regularly to plan activities that enhance students' self-learning (e.g. robotics competitions and courses by student instructors for fellow students).

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All MED students are assigned personal mentors who are staff members; mentors meet their students as frequently as desired. In DEN, each staff is a mentor to about 6 students. Mentors meet their students regularly and submit a report of each student every term. They keep track of student progress and counsel them on academic, and sometimes personal, problems. Not only is student welfare seen to, but staff can also impart the dental school's mission and goals to the student.

Introduced in 1986, the Personal Tutor Scheme (BRE's mentor programme) provides an in-house counselling facility for students who need help, and to build up sufficient cumulative records of every student's progress in character and capability from the beginning of his/her studies at BRE. Each staff member is assigned a number of students or tutees whom they will meet twice a semester or when the need arises.

Bizad has instituted a mentor scheme for all first year students. While the Faculty arranges for the initial meetings of mentors with their students, students are free to approach their mentors throughout their course of study for advice in all matters. Consequently, almost all staff members, especially those teaching first-year modules, the Vice-Dean (Academic Matters) and the Sub-Dean (Student Matters) play active roles in getting student feedback.

Every EE student is assigned a Personal Tutor whom he meets on a regular basis to discuss activities for the EE1000 module on Independent Study. The Personal Tutor will also take such opportunities to raise other issues like feedback on teaching programmes, career guidance, student's progress and welfare, etc. In addition, CE has a mentor scheme in which a few students are allocated to each staff member for guidance in both academic and personal problems. Due to student initiative, the LAW student lounge was created with help supplied from the Sub-Dean in the provision of a room and some furniture. In addition, both faculty and students now collaborate to promote LAW to potential applicants by meeting interested parties to discuss various aspects of law school life and learning. During recent Student Liaison Meetings at BRE, action taken on student comments ranged from clarifying the scope of demanding projects to adding more chairs in lecture rooms to accommodate the exceptionally large First Level intake during this academic year.

At MED, the Curriculum Review Committee responded to concerns of information overload during Year 1 & 2 by reducing the curriculum. A revamped clinical skills foundation course was started in 1998; based on feedback from the students, certain lectures will be modified and more exposure to clinical, procedural and communication skills will be included in the next course beginning April 1999. Two years ago, student feedback showed they were very stressed during the March final examination due to the number of disciplines covered. Based on this, the final examination in Obstetrics and Gynaecology was brought forward to September. ❖

On 24 October 1998, Associate Professor Ian Smith, with the assistance of Assistant Professor Steven Coombs presented a seminar at CDTL entitled, “The Integration of Creativity and IT in the Teaching of Thinking”. In the following pages, *CDTLink* presents an essay based on the seminar, as well as a response from Ms Cynthia Lau, a participant of the same seminar.

IT is CreatIve

During his lecture “The Integration of Creativity and IT in the Teaching of Thinking”, Ian Smith presented two examples of how IT can be integrated with the teaching of creativity. The Reflective Log helps one to reflect on points achieved after a task is finished; the Spidergram, a creative thinking conversational template, helps organise one’s thoughts and feelings about a subject matter visually.

However, I believe there are more novel ways of using IT, especially in generating new ideas. A quick search over the Internet yielded me a list of over 50 IT product titles alone with similar applications and features that can be used for such a purpose. What really surprised me was that a few of the applications are in common programmes like MS Word and WordPerfect.



By Ms Cynthia Lau
Management Training Officer
Civil Service College

Understanding Creative Thinking

Basically, IT applications used for creative thinking can be classified under the following:

- Idea Generation, where one creates new ideas, thinks of alternatives, explores possibilities and novel ways of thinking;
- Idea Evaluation, where one assesses the feasibility of ideas against a list of criteria and chooses the best option;
- Idea Management, where one organises, records and manages the thoughts and ideas during the thinking process (e.g. the Reflective Log and Spidergram).

For easy recall, just think of Idea GEM. In particular, I wish to feature IT applications that can help generate new ideas, which is what creative thinking is most often used for.

IT Can Generate Ideas!

In teaching creativity, thinking techniques are employed to deliberately force the mind to think in another paradigm. This usually provides the thinker with fresh insights and concepts, which when applied back into the context of the problem, may yield novel solutions. Using the operational principles of these techniques, we can further classify our software list as follows:

Problem Reframing

(e.g. Thesaurus and Dictionary Features in word processors, *Paramind*)

Rearranging or substituting the words of a problem statement can present new meanings and insights. Standard features in a word processor like MS Word, e.g. thesauruses and dictionaries, can help us in this area. We can achieve the same effect if we use manual dictionaries and thesauruses, but electronic versions are faster and easier for cross referencing. In addition, the programme, *Paramind*, forms new ideas by “meaningfully exhausting the interaction of words”. It basically generates new text from a given input and expands it logically by using related words. The original idea, modified in several ways, is then presented in a fresh perspective.

Random Selection

(e.g. *Ideas Fisher, Innovation Toolbox, Internet Explorer, Netscape*)

The use of random words to stimulate the production of new ideas in a short time works on the principle of creating a forced connection. Your mind basically tries to associate the concepts and features of random word to the problem/thought to yield new ideas. By employing the randomizer feature of the computer, software applications have been developed to generate random words for getting new ideas. We can also extend this technique to using pictures, videos and sounds available on the Internet to do a forced connection and to stimulate more creative thinking. One can use a computer programme to suggest a random word or ask a friend to suggest and then search the sites related to that word. By visiting the sites listed, one may find new and interesting ideas along the way.

Asking Questions

(e.g. *The Creative Whack Pack, Ideas Fisher, Innovation Toolbox, MindLink*)

Asking questions is a useful way to direct the thinker to look at the problem from another perspective, and perhaps even challenge the basic assumptions in the existing paradigm of the problem. The software classified here basically takes in the input from the user and then poses sets of questions and keywords to provoke the person to think of new ideas.

Continued on next page...

Brainstorming and Group Processes

(e.g. *BizIdeas for Windows, Group Systems, Groupster, The Electric Mind, Simplex*)

In brainstorming more ideas and perspectives can be derived through a group process: ideas are not evaluated in order to produce as many ideas as possible, and individuals are encouraged to piggyback on the suggested ideas to come up with new ones. Through the Internet, groups can now brainstorm virtually via resources such as Internet Relay Chat and Online Chat Rooms. There are also several meeting room programmes designed to facilitate the group process more effectively. Some even allow members to key in their ideas simultaneously and anonymously.

IT is the Thinkers' Assistant

As IT becomes more accessible to everyone, it may seem that the need for man to think for himself decreases. However, the rapid advent of these new technologies in fact forces us to think more creatively and critically as we need to know how to manage, apply and give new meaning to the vast amount of data now available on our desktops. Instead of hindering, IT can increase our creative and thinking capabilities. ❖

NB: *This article is not an exhaustive one. For more details, please visit Creativity Web at:*
<http://www.ozemail.com.au/~caveman/Creative/index/html>

The Integration of Creativity and IT in the Teaching of Thinking

By Associate Professor Ian D. Smith & Assistant Professor Steven J. Coombs
 National Institute of Education
 Nanyang Technological University

Introduction

This paper introduces several Information Technology (IT) tools that not only assist the teacher to integrate creativity and IT, but also significantly improve the teaching of critical and creative thinking. IT is inevitably changing the role of teachers from knowledge **dispensers** to knowledge **facilitators**. As the new millennium approaches, it is essential that teachers exploit these technologies so that our students can make full use of a resource that is rich, flexible and infinitely patient to optimise their creative potential. After defining what we mean by critical and creative thinking, we shall give examples of various reflective thinking generic IT tools as they are applied in a post-graduate instructional technology teacher training programme at NIE.

What is Critical & Creative Thinking?

Creativity is usually defined as the thinking processes involved in the creation of novel ideas or products. Sternberg and Lubart, for example, defined creative insight as the ability "to entertain unusual, novel, or unpopular ideas for solving a problem at hand" (1995, p. 538). Creative thinking involves critical thinking or reasoning about complex issues in order to make a decision about an original idea, product or service. According to Marzano (1992), critical thinking involves the use of declarative knowledge, procedural knowledge and conditional knowledge to solve a problem.

Psychologists believe that most people are capable of critical and creative thinking and that these higher-order processes may be taught to primary school pupils. IT is a particularly powerful teaching tool: it allows access to a rich variety of resources, enables flexible thinking to flourish, and can operate as an inexhaustible learning coach due to its inexhaustible patience. The goal is to teach pupils useful strategies to locate and select appropriate information from large databases (e.g. the World Wide Web) and to avoid becoming overwhelmed by an overload of information. This can be achieved by providing learners with reflective tools that stimulate various critical and creative thinking skills.

The Benefits of Teaching Thinking with IT Tools

Encouraging a learner to progress through a defined pattern of thinking steps represents a reflective process that may also be explained as a *creativity heuristic*. The thinking steps underpinning a reflective tool can be designed as content-free, "empty" templates. The learner can use these generic reflective tools as a self-coaching device, developing an ability to focus thoughts and ideas and turn them into useful concepts and knowledge (Coombs & Smith, 1998).

Representing a user-friendly thinking tool, IT may be employed as a catalyst to both assist and accelerate this kind of reflecting process (Coombs, 1998). Generic IT tools such as Word® and Excel® may be developed to produce content-free, reflective templates that encourage the user to perform focussed reflections relative to some learning task. Thus, reflective tools are employed in the context of “task-managing” a purposeful learning activity that provides the learner with meaningful feedback of his/her actions. This means that knowledge and understanding of authentic learning events can only be gained through reflective activities that encourage the learner to make sense of the experience. Harri-Augstein and Thomas (1991) believe that reflective tools achieve this learning process through the recursive and cyclical nature of critical reflection relative to some active learning task. Many IT instructional systems contain task-based recursive learning features and, therefore, provide an educational **value-add** that aids reflection and improves critical thinking.

The use of a word-processing tool encompasses some of the learning attributes of using a pen and paper, including reflective skills involving text literacy, user control of the system, specific content knowledge being authored, and coding knowledge of the English language. The pen-and-paper method has the additional benefit of touch, as the medium represents a more tactile interface than that of the word processor’s keyboard. However, using a computer to write has four additional benefits: i) a recursive reflective learning feature in using the word processor as both an editor and reviewer of authored content; ii) a text format and design feature aiding better quality manipulation and organisation of the material; iii) additional thinking steps when using language utilities (e.g. thesaurus, grammar, spell checker); and iv) the ease of an icon-supported graphical user interface. Compared to the use of paper and pen or other types of instructional media, these additional features of a word-processing IT medium can significantly improve the quality of students’ critical and creative thinking.

Figure 1. *The Spidergram - a reflective personal management tool*

Personal Experiences (PE) referral sheet. Enter the topic, issue, subject or event you wish to think/explore about into the **Focus** balloon. Think deeply and reconstruct all the personal events of your experiences that relate to this focus and enter them as raw data labels/expressions into the PE balloons. Add extra balloons as needed. If a PE becomes a focus for a sub-set of experiences, then put this event as a new focus into another Spidergram conversational template. Continue as necessary until you have exhausted your focused brainstorming session!

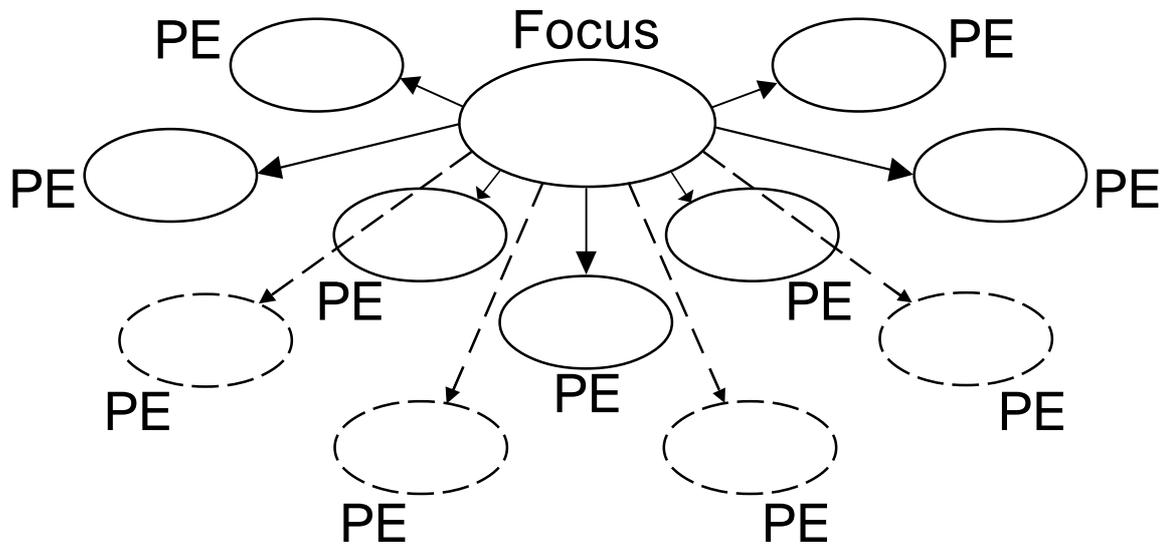


Figure 2. *The Reflective Learning Journal*

Date of entry	Task/Activity - Overview	Rationale of educational process undertaking

Please complete above entries as part of your on-the-job project management activity.

Continued on next page...



Open discussion session during the seminar on "The Integration of Creativity & IT in the Teaching of Thinking"

How IT Reflective Tools Have Been Integrated into a Teacher Training Module

Because of these additional reflective learning benefits that IT tools can offer learners, we decided that the critical and creative thinking templates discussed earlier would benefit from having an IT interface. To test the effectiveness of these IT reflective tools by using them meaningfully in the curriculum to support learners on a teacher training module, the Spidergram and the Reflective Learning Log (Figures 1 and 2 respectively on Page 15) were provided as Word file templates that could be downloaded from the NIE School of Education's Website. Since July 1998, over one thousand teacher-trainee students in NIE's post-graduate diploma in education (PGDE) programme have used these generic templates to support the pedagogical thinking components of their IT practical project work. Besides the Spidergram and Reflective Learning Log, two other new downloadable templates were also designed: a Reading Table and an IT Pedagogic Table. More details of the PGDE IT project work supported by the use of these templates, including working copies of these templates and exemplars, can be obtained by visiting the PGDE IT Website, which is currently located at:

http://www.soe.ntu.edu.sg:8000/programme/pgdes/ned513/IT_projects_portfolio.htm

The above discussion has outlined how creativity may be integrated with IT in the teaching of thinking. The use of reflective scaffolding tools (e.g. the Spidergram and the Reflective Learning Journal) in their project management of various assessment tasks has benefited students undertaking the Instructional Technology module at NIE. These IT tools have provided them with a rich, flexible and untiring resource that represents a significant advance over previous critical and creative thinking tools such as brainstorming and concept mapping, because of the advantages of computer software over pen and paper. The value-added benefits of teaching thinking with IT tools promise to make student thinking even more creative in the future. ❖

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

Editorial Information

Guest Writers

Wee Chow Hou, Lai Yee Hing, Lee Hian Kee, Elizabeth Su, W.A.M. Alwis, Cynthia Lau, Ian Smith, Steven Coombs and Arun Balasubramaniam.

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Advisor

Daphne Pan

Editor

Verena Tay

Production

Eric Chung, Gerald G.P. and other CDTL staff

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

The Editor, CDTLink
Centre for Development of Teaching and Learning
Central Library Annexe, Level 6
10 Kent Ridge Crescent
Singapore 119260

Tel: (65) 874-3052

Fax: (65) 777-0342

Email: cdtsec@nus.edu.sg

www.cdtl.nus.sg