CDTLink

NUS National University of Singapore

Centre for Development of Teaching and Learning November 2005 Vol. 9 No. 3

Balancing Teaching and Research

Associate Professor John Whalen-Bridge
Department of English Language and Literature
Associate Director, CDTL

It is again time for the annual review for fellow faculty members. Understandably, most of us are anxious, especially since these reviews relate to tenure and promotion. Let us begin with a short, well-known prayer:

> Grant us the serenity to accept the things we cannot change,
> Give me the courage to change the things we can,
> And wisdom to know one from the other.

Often known as the 'Serenity prayer', it is attributed to the theologian Reinhold Niehuhr (1892–1971). One could find similar stoic sentiments in the historical figure of Marcus Aurelius (A.D. 121–180), Emperor of Rome, even though these lines never appear in Hollywood's version (*The Gladiator*, 2000). This example of the stoic figure brings us to the important point: it is a gladiatorial struggle to work, thrive and even survive in the academic arena.

Amidst the inevitability, what parts of this struggle can we control? The demands of teaching, especially for new faculty members, can be overwhelming. Whatever one does, it is never all one can do, but these demands are *immediate*: the eager learners will be there to face you on Wednesdays from 12–3pm, and then again on Thursday mornings from 8–10am, and then there are tutorial groups, but do not forget to set up activities that will be run by the TAs….

You get the general picture. The immediacy of teaching helps us to a degree. We are certainly motivated by the fatal knowledge that class *will* begin, whether we are ready or not, and it happens every week. Annual reviews take place but once a year and reviews for tenure and promotion only after six years (in most cases). The immediacy of teaching, then, is our salvation, but also our doom. It can lead to an imbalanced approach, which is bad for both research and, some might be surprised to hear, teaching. If we concentrate on only teaching alone—without the middle way between exasperating students and letting them coast to the finish line—we do them a disservice as well.

Many faculty members find writing impossible during the semester. Although the improbability of authoring an entire article while teaching two new modules ought to be acknowledged, there are still tasks we can achieve.

continued next page...

inside

For example, we can push projects forward, mature a conference paper into a chapter draft, or perhaps we can think about the architecture of larger projects and the details it would entail, should the project materialise. Much can be done *if and only if* we learn to partition our days. Robert Boice, in his book *Advice for New Faculty Members: Nihil Nimus*, recommends that we try to fit in 'brief daily sessions' for both research and teaching. It is possible to schedule several sessions during the week. For myself, I try to work in at least two sessions a week, four if possible. A 'brief daily session' does not have to be hours spent poring over research or in front of the computer; it can be no more than 20 minutes. Usually it is the beginning that is the hardest, so if one can overcome the initial anxiety and inertia, regular one- or even two-hour sessions should not be difficult to accomplish at all.

Boice's advice may sound utopian to some, and we are perhaps conditioned in graduate school to consolidating large stretches of time for binge-writing. Alternatively, mindful sessions in which we begin by asking ourselves precisely what can be accomplished under finite conditions have the benefit of training us to value the 30- and 40-minute odds-and-ends of time. Furthermore, working in discrete segments conditions us to think about the ways in which students learn in our classes and readers absorb our writings. Long, long stretches of time can be counter-productive. Whether we are working within a modest bit of time on our research or on teaching, the lesson is that we will accomplish far more if we are not wrecking ourselves with the thought of how much more we could get done if we only had long stretches of time in which to do it. Sometimes long stretches of time are exactly what is needed, but that is no reason to waste the small bits.

If you wait until the term break to do your research, you would have wasted the 15 weeks in between, but, worse, you would have lost touch with your ideas. It then takes you another six weeks to get reacquainted, and by then the December break will be over. Do not do this. Learn to work steadily during the semester, even if it is at a reduced pace. That way you will maintain both flexibility and fluency of your ideas.

But, as the saying goes, grant us the patience to know when all bets are off. Sometimes one has 'one of those semesters', and cannot follow such an ideal plan. If this is the case, quote Niebuhr to yourself and make sure you get back on the horse as soon as possible: write first and ask questions later.

Brief daily sessions are especially useful for keeping the words and ideas in motion. Whether to jumpstart a more ambitious research project, to maintain the flow of ideas for shorter tasks, or to balance one's approaches to teaching and the other demands of life to avoid burn-out, working in measured sessions and alternating tasks can be a way to preserve a small portion of one's original sanity.

References

Boice, R. (2000). *Advice for New Faculty Members: Nihil Nimus.* Boston: Allyn and Bacon. ■

A Survey on Awareness and Attitudes towards Plagiarism among Computer Science Freshmen

Dr Ooi Wei Tsang and **Mr Tan Tuck Choy, Aaron**
Department of Computer Science

Introduction

Plagiarism is the "act of taking (ideas, writings, etc.) from (another) and passing them off as one's own" (Webster's New World Dictionary of the American Language). In a setting where there already exists an author with an original piece of work created specifically for a purpose and audience (i.e. context) and a person who used all or part of that piece of work in another context and consequently mislead (directly, indirectly, by inference or omission) readers that he/she is the original author of that work, plagiarism is deemed to have occurred.

Although one would think that students plagiarise because they want to improve their grades, there have been accounts of plagiarism even for non-graded assignments. This suggests a habitual behaviour and/ or more worryingly, academic dishonesty among

continued next page...

students. To make matters worse, cyber-plagiarism has been rampant with the proliferation of Internet resources (University of Alberta, 2005).

Common forms of plagiarism

The following is a list of some common forms of plagiarism:

- Students usually claim that the similarity in their work is a natural consequence of their discussion with their peers. This is the most prevalent form of plagiarism. *Stealing the work of others* refers to the sneaky act of taking another's work without the latter's knowledge or agreement. This could happen with printouts or scripts left unattended at the printer or in the letter tray outside the teacher's office.
- *Blatant copying* refers to the deliberate act where the author permits his/her work to be shared with others. Non-acknowledgement of open resources would include the lifting of material from the Web without proper citation.
- Hiring someone else to do the work.

Survey

To better understand students' attitudes and awareness towards plagiarism, we surveyed 319 students from CS1101 "Programming Methodology" in October 2004. Our main goal is to evaluate whether students understand what is considered plagiarism and what their general experience and attitude towards plagiarism are.

In the three-part survey, students are presented with a number of scenarios and questions (Dennis, 2004; Swales & Freak, 2004). The first part seeks to find out students' understanding of plagiarism in the context of a programming assignment (a common form of assessment in computing and engineering disciplines) and the second part is set in the context of a written assignment. Finally, students are asked if they have ever plagiarise intentionally or unintentionally before. These questions seek to understand the reasons why students commit plagiarism and whether it is perceived to be a widespread phenomenon.

Results and observations (students' understanding of plagiarism in a programming and written assignment)

The first two parts of the survey list some possible scenarios of plagiarism in both a programming and written assignment and students are to indicate 'yes', 'no' or leave the answer blank. The results show that students are not aware of the exact definition of plagiarism. For example, when students are presented with the following scenario in a programming assignment: "Two students discuss the assignment, and submit the same program", only 53.9% of students think it is a case of plagiarism while 44.2% do not. In another scenario: "A student copies several methods from another student but notes in his program that he has done so", only 53% of students could identify it correctly as "not" plagiarism while 44.8% of students think it is. Out of the 12 scenarios, students are only able to correctly identify 7.77 scenarios on average.

In addition, the survey has not found any concrete relationship between awareness of what counts as plagiarism and the act itself. We do not find any correlations between the number of times a student correctly identify a scenario and whether he/she intentionally commits plagiarism or not. In fact, the results show that students who do not plagiarise identify 7.1 out of the 12 scenarios correctly, while those who intentionally plagiarise correctly identify 7.8.

In the third part of the survey, we ask students if they have ever plagiarise intentionally or unintentionally before. Students who have committed plagiarism previously are given eight possible reasons to choose from. We also ask students to give an estimate number of their peers (same faculty, same year of study) who have committed plagiarism. The results are given below in Figure 1, where the x-axis represents the various reasons (i.e. 'I ran out of time', 'I did it before and got away with it', 'I find it difficult to express my ideas in English', 'The assignment is too difficult', 'I am lazy', 'I am under pressure to get high marks', 'I just need to pass the module. I don't care about the course material' and 'I don't think the teaching staff care if I plagiarise or not') why students commit plagiarism.

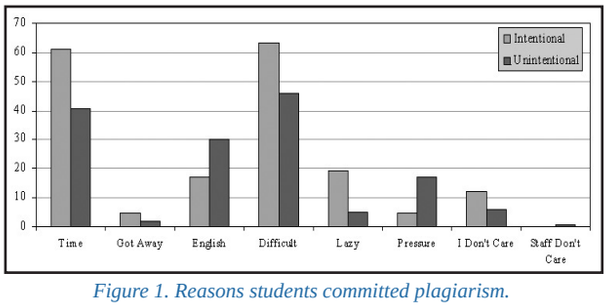


Figure 1. Reasons students committed plagiarism.

In the same section of the survey, we also found that students who think plagiarism is widespread are more likely to plagiarise. When we ask students to estimate the percentage of their peers who plagiarise, we find that those who have previously plagiarised intentionally or unintentionally before, gave a higher estimation of 34.14% and 33.78% respectively. Students who have never committed plagiarism before gave an average estimation of 15.73%. This phenomenon could arise from the common student mentality: "If my classmate is doing it, so will I."

Through the survey, we also try to map out the profiles of students who plagiarise. There is an interesting correlation between students' awareness of plagiarism and the country they have been studying in for the past

continued on page 11...

In Praise of Mahjong (Mahjong Paper, that is)

Associate Professor Eleanor Wong
Faculty of Law
Associate Director, CDTL

Introduction

I confess. I am addicted. To group work. I like my tutorial groups small. And even within my fairly small tutorial groups, I like to structure opportunities for breakout sessions and buzz group discussions because they facilitate active discussion, give shyer students the opportunity to 'rehearse' their ideas in a less intimidating forum and generally jack up the energy of the class.

One issue that arises from the use of smaller group-within-group sessions is how to optimise the 'reporting back' structure. I usually use the reporting session to ensure that major insights from the breakout discussions are fed back to the larger group and also to provide the teacher the opportunity to critique and comment. Additionally, the breakout sessions are sometimes intended to be building blocks for further discussion in the larger group. For example, I might assign students in their breakout teams to take opposing positions with the intention of generating a debate between teams upon re-convening as a larger group.

The typical reporting method is oral. A representative from each team reports what his or her team has discussed. Although this method is quick and easy, there are some disadvantages. Principally, because much depends on the representative, some students might dominate the reporting process. Other students, knowing that they do not need to present the report, might refrain from discussion. While some of these disadvantages could certainly be structured around, I was curious to investigate whether group work reporting structures that require some written product are more effective than group work reporting structures that do not (i.e., are purely oral).

As an experiment to investigate the possible differences, I chose two classes early in the semester, when students were less familiar with each other and the personal dynamics of specific tutorial groups would thus be less of a factor.

Test class 1

For the first class, students were tasked to read several different cases and formulate a rule that would satisfactorily explain the results of such cases. The same cases were assigned to two tutorial groups. For both tutorials, I further divided the students into smaller teams of three to four members. These teams were given time in breakout sessions to discuss what rule they thought the cases stood for.

However, I gave both tutorial groups slightly different reporting instructions. Each team in the first tutorial group was told to send a 'representative draughtsperson' to write their answers on the whiteboard while teams in the second tutorial group were told to report their answers orally.

I observed two differences. First, the discussion in the second tutorial group was not as rigorous as that in the first tutorial group. More team members remained passive and did not contest one another's points. Second, although the reporting students in the second tutorial group took notes of the discussion in their breakout sessions and referred to them when reporting back to the class, the points they made were less precise.

Test class 2

For the second class, students were tasked to read a case decided by a panel of several judges. Judges sitting on the same panel and considering the same case nevertheless often arrive at decisions only by a majority or arrive at a unanimous result but give different reasons. To decide what the case as a whole stands for, Law students must be able to analyse the different opinions and discern the common threads within them. This skill is a slight variation of the one that was taught in the previous class.

continued next page...

For this second class, I told the teams to write their analyses of the multi-opinion judgment on sheets of mahjong paper. The mahjong papers had to be displayed upon "time's up". The teams also had to be prepared to explain their written position orally and field questions during a 'show-and-tell' session. This format resulted in a good discussion for both tutorial groups.

Some tentative conclusions

1. *Rigour and contest.* Anecdotally, it appears that requiring a written report or summary (whether on mahjong paper or just on the whiteboard) materially affects the rigour with which students discuss an issue because they must actually agree on what to put on that paper. Somehow, students appear to feel more ownership of their position. Furthermore, when students just sit around and talk (even if they know they will be required to present as a group later), they are less precise and exacting. Often, teams will elect their strongest member to give the oral report and, perhaps, will rely on that member to make the best of the reporting rather than take greater responsibility for the precise points to be reported.

   These effects are not so important if the breakout groups are intended to be brainstorming 'list the ideas' sessions. However, if the objective is to challenge students to raise and critically evaluate ideas and possibly to arrive at some team consensus after debate, the rigour and precision engendered by a written component to the reporting process can be significant.

2. *Interaction and inclusion.* I also observed that writing on mahjong paper physically required students to move from their seats and gather in a circle around the sheet of paper. The circular configuration seemed to encourage discussion. In classes where only oral reporting was required, students tended to just turn around in their seats and talk during the breakout session. Sometimes they would not even turn their chairs around.

   Perhaps counter-intuitively, writing on mahjong paper sometimes also allowed a less-assertive student to partially control the process of formulating the team answer. This would happen when a team had one or more talkative students who dominated the oral discusion and one who was quieter but who took it upon himself or herself to write down the points. By making small refinements or asking questions to clarify what he or she should write, the less-assertive 'scribe' was, perhaps unintentionally, able to insert his or her input into the final product more than he or she might otherwise have been able to.

3. *Time management.* Interestingly, requiring written mahjong paper reports did not make the breakout sessions longer. On the contrary, having a blank sheet of paper in front of a team seemed to galvanise them to quickly come up with ideas to put on the paper. Even more so if the group could spy a nearby 'competing' team's sheet of mahjong paper steadily filling up.

4. *Drawbacks and caveats.* I observed two disadvantages of requiring written reporting structures. First, in some teams, the writing requirement led to a 'low energy' end to the exercise. For these teams, the writing process appeared to be less energetic and interactive than the rigorous discussion preceding it. These teams seemed happy to entrust the final delivery of their product to one writer. This effect is similar to the 'dominant representative' effect that I had observed in oral reporting structures. Thankfully, the effect was by no means universal. For most teams, the writing process continued to be interactive with team members gathered around the writer, still proffering suggestions.

   Second, requiring written reporting could sometimes crystallise thoughts too early. This might happen where an overly-anxious team might start to commit thoughts to paper very early in the discussion. Those early thoughts would then naturally condition the discussion. I found that one effective way to counter this was to walk around the class and, if I saw any written idea that was questionable, to quietly pen a question mark next to it and then walk on. This would spark further anxious discussion from the team as they reconsidered their early ideas.

Summary

Group work is an effective tool to encourage active learning. However, to discipline group discussions, a reporting structure of some kind can be useful. A reporting structure that requires simultaneous written reporting by different teams can increase the rigour and precision of the discussion, compel more team members to invest in the report product and does not require much more time or effort.

In short, 'gambling' on mahjong paper can be quite rewarding! ■

What Learners Learn through Problem Solving

Ms Peggie Chan
Centre for English Language Communication

Introduction

Problem solving forms an important part of teaching critical thinking. Many see problem solving as part and parcel of critical thinking while some consider it synonymous with creative thinking. Many know it to be the antithesis of rote learning, while others understand it to be the basis of problem-based or project-based learning. The existing literature on why problem solving should be taught is clear: learners derive immense benefits from this approach whether it is taught explicitly and whether it is taught in a discipline-specific area. This paper describes some learning outcomes in a course offered to engineering students—EG1413 "Critical Thinking and Writing" (CTW)—in which an assessment format called the position paper makes use of the problem solving technique to teach learners valuable critical thinking skills.

The assessment

Learners are given a broad theme area (e.g. technology and its impact on society) and in groups, investigate a more specific idea that should culminate in a position paper with a well thought-out thesis statement substantiated by appropriate claims and proof. Learners finally forward a solution or solutions to the problem they identify.

Definitions of problem solving

Mathematicians see problem solving as "a situation, quantitative or otherwise, that confronts an individual or group of individuals, that requires resolution, and for which the individual sees no apparent or obvious means or path to obtaining a solution" (Krulick & Rudnick, 1987). The position paper is designed such that learners have no visible means to the solution; they grapple with the problem from day one, and arrive at the solution after an extensive period of research.

The assessment in question sees problem solving as "what you do when you don't know what to do" (Trismen, 1988). This is clearly manifested in the way in which learners are presented with an ill-defined problem whose answer or solution cannot be reached with algorithms or formulae. The solution does not lie with the instructor nor is there a shortcut. Learners pick up problem solving skills by participating actively in the process of problem solving.

Tasks within the problem solving assessment

In the module, learners solve not only one but multiple problems by carrying out many tasks, overcoming difficulties, and learning valuable skills in the process, as shown in Table 1 (see page 7).

Problem solving and learning

Problem solving is an integral part of teaching critical thinking as it encourages learners to find the ways in which they learn best. To cite a few conditions, learners learn best when:

- they discover the answer for themselves
- they contribute the answer
- they have thought out the process through which the answer is achieved
- they come up with possible answers and
- they have surveyed all the data available, and have examined its support, concepts and underlying assumptions.

Overall, through working independently and collaboratively to complete the task, learners learn valuable skills in time management, task or project management, people and resource management. Motivation is high as learners could choose their own topic and the extent of the topic, based on their interests, abilities and pre-knowledge of the interest area.

However, the problem solving approach is not without challenges. Firstly, instructors need to familiarise themselves with the pedagogy of problem solving. To be effective, instructors need to pose open-ended and thought-provoking questions and not 'spoon-

continued next page...

Table 1. Tasks and skills learnt

Major tasks	Minor tasks	Critical Thinking and other skills learnt
Identifying needs of assignment	- Working out the what, when, why and who of the problem - Dealing with the genre of the position paper - Understanding the context of the task (e.g. purpose of document, needs and expectations of audience)	Analysis
Dissecting argument	- Expressing main claim, seeing link between claims and support - Identifying problem, causes and effects - Making assumptions - Drawing conclusions	Making logical connections
Undertaking research	- Distinguishing primary from secondary research - Undertaking surveys and interviews - Finding evidence to support thesis - Distinguishing between relevant and irrelevant information - Maintaining intellectual honesty/avoiding plagiarism	Evaluation Research skills
Writing of the assignment	- Analysing and interpreting data - Organising information - Using persuasive strategies to convince the audience - Writing to achieve the desired goal	Evaluation and synthesis

feed' learners with information. Secondly, even with assessment criteria, individual performance and contribution can seldom be objective. Additionally, it is difficult to assess a learner's acquisition of problem solving skills simply by looking at the relationship between the product (answer) and the process. Finally, it is not feasible to 'test' if the skill can be applied to a new or another learning situation. Additional cross-modular collaboration and networking among teaching staff will be required to closely monitor learners' 'real' use of the skills.

Indeed, although the approach poses challenges, it is clearly a rewarding one for learners. Here is what some learners have to say about the practical dimension of and the gain from the problem solving approach:

> Made me see problems in society that are not so obvious- made me understand that solutions are not so easy to create (so I whine less when others try and fail to solve society's problems).

> I like the research done for my PP [position paper] as I learnt new things related to my topic which otherwise I would not come across in my daily life. PP is a very good opportunity to think issues carefully and logically. It is different from the way how we do math calculation.

References

Krulick, S & Rudnick, J.A. (1987). *Problem Solving: A Handbook for Teachers*, 2nd Edition, Allyn and Bacon, Inc.

Sternberg, R.J. (2001). 'Teaching Problem Solving as a Way of Life', in *Developing Minds—A Resource Book for Teaching Thinking*, Arthur L Costa (Ed.). 3rd Edition, Association for Supervision and Curriculum Development.

Trismen, D.A. (1988). 'An Aid to Diagnosis in Mathematical Problem Solving', *Journal for Research in Mathematics Education*, Vol. 19, pp. 358–361. ■

Outstanding Educator Award Public Lecture Series 25 August 2005

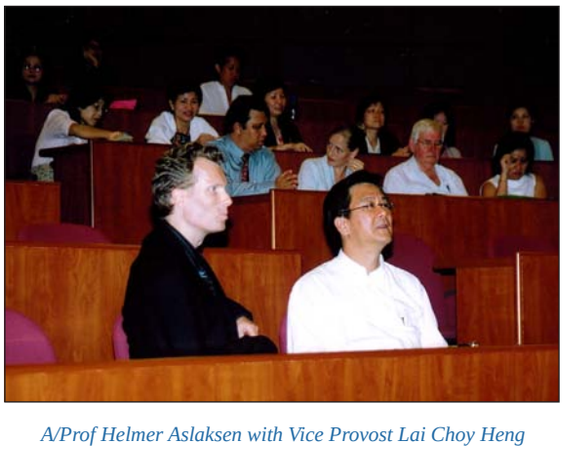
The second installment of the Public Lecture Series for the winners of the Outstanding Educator Award 2005 took place at the Engineering Auditorium on Thursday, 25 August 2005.

After welcome addresses from CDTL Director A/Prof Daphne Pan and the Guest-of-Honour Vice Provost Lai Choy Heng, participants were treated to two lively talks by A/Prof Helmer Aslaksen (Department of Mathematics and winner of OEA 2004) and Dr Chan Wai Meng (Centre for Language Studies). ■

CDTL Director A/Prof Pan (right) and Vice Provost Lai giving welcome addresses

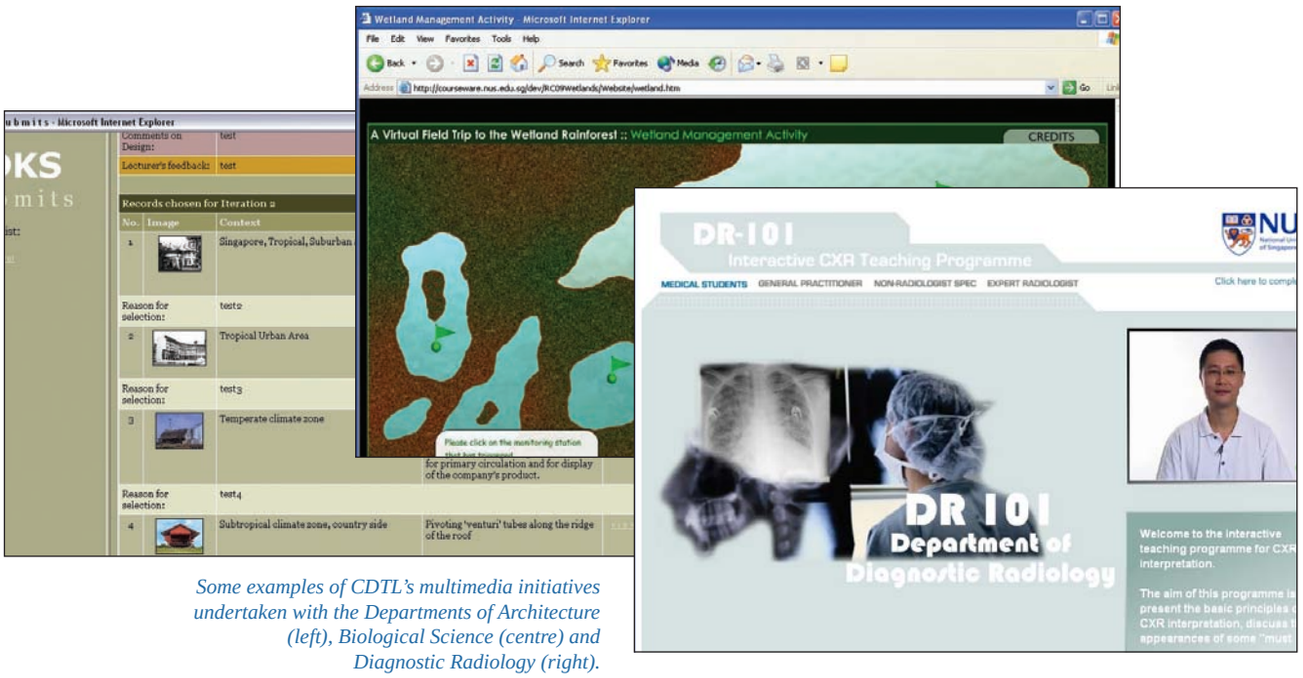
Registration for participants (above and below)

Winners of OEA A/Prof Aslaksen (2004; above) and Dr Chan (2005; below) giving their talks



A/Prof Helmer Aslaksen with Vice Provost Lai Choy Heng

CDTL's Multimedia Initiatives



Some examples of CDTL's multimedia initiatives undertaken with the Departments of Architecture (left), Biological Science (centre) and Diagnostic Radiology (right).

In keeping with the shift in NUS's educational value system where the goals of teaching are now focused on facilitating learning, nurturing critical, independent thinking and inculcating lifelong learning skills in students, there is an increasing need to develop quality learning content—materials that present content in an engaging and interactive manner, thus requiring significant student input and interaction. CDTL can assist faculty members to design innovative solutions by taking advantage of the potential of ICT (Information Communication Technologies) so as to enhance the quality of student learning experience.

For more information, please log on to http://www.cdtl.nus.edu.sg/mmi/summary.htm. ■

Calling All Writers

CDTL invites articles on any teaching and learning topic for the following two newsletters:

- CDT*Link* (700 words maximum per article; photos & illustrations in hard/digital copy are welcomed)
- CDTL*Brief* (text-only newsletter; 1000 words maximum per article)

To submit articles for consideration or to obtain more information, please contact:

Sharon Koh

Email: cdtsksp@nus.edu.sg

Tel: (65)-6516 4692 • Fax: (65)-6777 0342 ■

TLHE 2006

First Call for Papers for
Quality in Higher Education
TLHE 2006,
6–8 December 2006.

CDTL will be organising its International Conference on Teaching and Learning on 6–8 December 2006. The Conference will examine the problems and challenges of assuring quality in higher education. We invite papers from all stakeholders (students, administrators, industy leaders, teachers, employers, alumni, government).

The deadline for abstracts is 26 February, 2006. For suggested paper topics or more information, please visit the TLHE website at http://www.cdtl.nus.edu.sg/tlhe or contact the Conference Secretariat, Ms Rita Roop Kaur, at cdtrrk@nus.edu.sg. ■

Teaching & Learning HIGHLIGHTS

Faculty of Arts and Social Sciences

NUS-UM Partnership in Geography Field Studies

Over a six-week period in May–June 2005, staff from the Geography Department (NUS) organised a field studies module (GE3230 "Field Studies in Southeast Asia" [Tourism]) with colleagues from Universiti Malaya (UM). As part of the centennial celebrations of both universities, 32 undergraduates—12 from NUS and 20 from UM—collaborated on tourism research projects in Malaysia and Singapore.

In Singapore, students visited the Urban Redevelopment Authority, Chinatown, Sentosa and Gleneagles Hospital as part of their local field trips. For their projects, student groups comprising NUS and UM participants worked on such topics as war-site attractions, gastronomy and cultural tourism.

In Malaysia, students enjoyed visits to Tourism Malaysia, Menara Kuala Lumpur and Chinatown as well as field trips to Genting Highlands, Putrajaya and Malacca. Students also had a choice of either going to Cameron Highlands or Kuantan for a week to conduct research.

For all participants, the highlight is undoubtedly the warm friendships forged among students. As the UM Vice-Chancellor Dato Professor Hashim Yaacob noted at the farewell dinner for participants, the key achievement are the 'bridges of friendship' formed between students and faculty members from across the Causeway. More than just a collaboration, the NUS-UM joint module is also a celebration of Singapore-Malaysia partnership and cooperation. ■

Field trips are always fun and enriching, be it in Cameron Highlands' tea plantations (above) or at the Singapore River (below).

Faculty of Science

The Mathematics of Sudoku

Sudoku (meaning 'numbers singly' in Japanese) is a logic puzzle invented in the US in 1979, but it only became popular when it was introduced in Japan in 1984. It took the UK by storm in late 2004 and quickly became a staple in most British newspapers. Here in Singapore, it is also starting to pick up, with a daily puzzle in *Today* (Mondays to Fridays). In addition, most bookstores have a large selection of Sudoku books.

5	3			7				
6			1	9	5			
	9	8					6	
8				6				3
4			8		3			1
7				2				6
	6					2	8	
			4	1	9			5
				8			7	9

Figure 1. A Sudoku puzzle.

In the Department of Mathematics, we see this as a great opportunity for outreach. We will organise a Mathematics Camp for Junior College students on December 13, 2005. Part of the activities will be a lecture on the Mathematics of Sudoku in the morning and Singapore's first ever Sudoku competition in the afternoon. We also plan to give public lectures on the Mathematics of Sudoku and organise more competitions. ■

A Survey on Student Awareness and Attitudes towards Plagiarism among Computer Science Freshmen

...continued from page 3

five years. The results are given in the table below. We only show the results for three countries—Singapore, China and Vietnam—as there are too few students from other countries to provide any statistically meaningful results.

Table 1. Correlation between student's awareness of plagiarism and the country he/she has been studying in for the past five years.

Country	Average Number of Correct Answers		
	Written Assignment Section	Programming Section	Total
Singapore	3.43	3.70	7.13
China	3.59	4.49	8.07
Vietnam	4.08	4.54	8.62

As observed from Table 1, students who have studied in Singapore for more than five years have a much lower awareness of plagiarism.

We look at the number of students who admitted to intentional plagiarism and unintentional plagiarism, and analyse them by country. From Table 2, we can see that out of the 41 students who admitted to committing plagiarism intentionally, 36 of them have been studying in Singapore for more than five years. One explanation could be that many foreign students are scholars who do well academically. Given that difficulty in completing assignments is one of the reasons for plagiarism, it is not surprising that the better students plagiarise less.

Table 2. Countries in which students studied for the last five years and the incidence of plagiarism.

Country	Intentional	Unintentional	Never Plagiarise	Both Intentional and Unintentional
Singapore	36	88	139	23
China	1	15	25	0
Vietnam	1	3	10	1
Others	2	8	12	0
Unknown	1	2	0	0

Conclusion

While the survey results might not be representative, they do help us to get a glimpse of students' attitude and awareness towards plagiarism, and to formulate measures to address issues related to plagiarism. Continual efforts to educate our students about the ills and consequences of plagiarism are desirable. We hope that through these efforts, we could help students uphold academic honesty.

References

Dennis, L. (2004). 'Student Attitudes to Plagiarism and Collusion within Computer Science', *Fourth Learning & Teaching Conference*. University of Nottingham.

Swales, J.M. & Freak, C.A. (2004). *Academic Writing for Graduate Students, Second Edition: Essential Tasks and Skills (Michigan Series in English for Academic and Professional Purposes)*. University of Michigan Press.

University of Alberta (2005). *Guide to Cyber-Plagiarism*, University of Alberta. http://www.library.ualberta.ca/guides/plagiarism/. Last assessed: September 29, 2005. ■

Learning Geographical Concepts through Flash Simulations

Ms Yap Lee Yong, Alena
Educational Technologist, CDTL

Introduction

This paper describes the pilot-test of an IT-based project (Semester 2, AY 2004/2005), specifically designed in collaboration with A/P David Higgitt for GE1101E/ GEK1001 "Place, Environment and Society". This project uses the constructivist learning approach to help students understand complex geographical concepts.

Students often find it difficult to visualise the interlinked processes of a geographical event, in our example, the basin hydrological cycle. As hydrographs are essential aids to predict floods and manage river catchments, understanding hydrological concepts is important for the Geography student. For the pilot-test, the learning activity, comprising both the simulation movie and the activity worksheet, is uploaded onto the IVLE work bin as a non-compulsory enrichment activity for students to access as often as they like from mid-semester onwards. Within six weeks, 172 downloads of the learning activity are recorded. In the learning activity, students complete two tasks—view a Flash simulation movie and complete an activity worksheet. The first task utilises Flash interactivity to control the movie's speed and sequence. It also offers students opportunities for revision as the movie can be viewed online. The second task—the activity worksheet designed to incorporate the six levels of Bloom's Taxonomy for the cognitive domain (i.e., knowledge, comprehension, application, analysis, synthesis and evaluation)—promotes independent self-paced learning among students through a series of activities to be completed outside class.

The simulation movie

Using Macromedia Flash, the simulation movie animates the important components of a typical hydrograph as well as the various drainage processes that contribute to its shape. Figures 1–5 are screenshots of the Hydrograph Simulation Movie showing the progression of a typical storm hydrograph during a period of precipitation and its contributing processes.

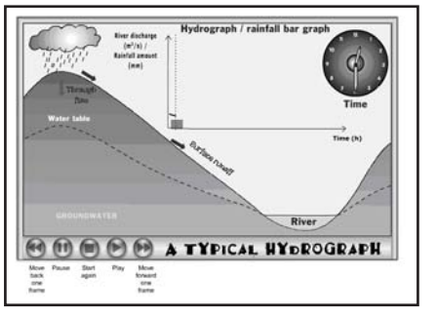


Figure 1. Stage 1 – Rain begins. Rainwater seeps into ground as through flow and some flow over land as surface runoff (or overland flow).

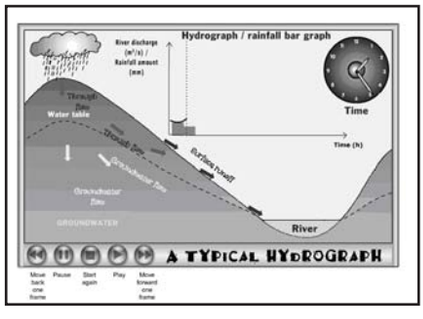


Figure 2. Stage 2 – Rain continues. Some surface runoff reach the river channel, increasing its discharge. Some through flow reach the groundwater and continue as groundwater flow while others emerge and join the surface runoff down slope.

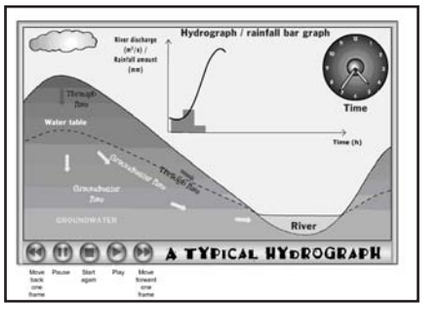


Figure 3. Stage 3 – Rain stops. River discharge reaches its peak. There is still some amount of through flow and groundwater flow contributing to river discharge.

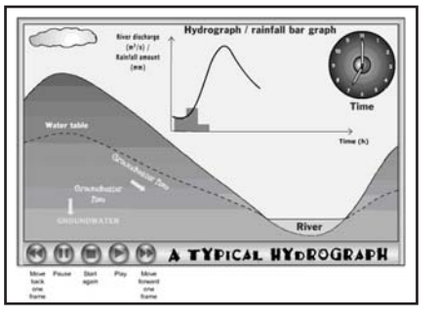


Figure 4. Stage 4 – Remnant groundwater flow continues to contribute to river discharge even after the rain has stopped.

continued next page...

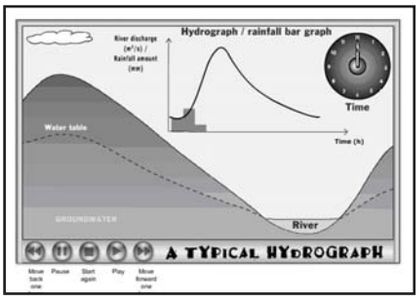


Figure 5. Stage 5 – River discharge returns to normal at the end of one complete cycle of a typical storm hydrograph.

The activity worksheet

Accompanying the Flash simulation movie is an activity worksheet that guides students in their learning. By following instructions, students achieve independent learning in the six levels of Bloom's Taxonomy of Cognitive domains, namely, knowledge, comprehension, application, analysis, synthesis and evaluation.

- *Step 1 (knowledge): Do your research*

  Students are given URL links to research on hydrographs.

- *Step 2 (comprehension): View a simulation movie*

  Students are asked to view a Flash simulation movie that plots a typical hydrograph over a 12-hour period to learn about the various contributing factors affecting the river discharge or the shape of a typical storm hydrograph.

- *Step 3 (application and analysis): Record your observations*

  Students then record their observations in a worksheet. By describing and explaining the various components of the hydrograph with regards to its input factors, students undergo an initial learning assessment.

- *Step 4 (synthesis): Make predictions*

  Using what they have learnt from the simulation, students then apply and transfer their learning to other scenarios to predict the different hydrograph patterns based on varying influencing factors.

- *Step 5 (evaluation): Draw conclusions*

  Students are asked to evaluate the importance of the hydrograph in the management of river catchments

Evaluation and feedback

A questionnaire survey is also posted online for students to evaluate and give feedback about the learning activity. 85 students complete the online survey which covers the following four areas of evaluation:

- Students' personal learning experience
- Content and educational value of the learning activity
- Instructional aspects of the learning activity
- Design and technical aspects of the learning activity

A majority of students indicate in the survey that they like the interactivity of the simulation movie which allows them to control the pace of their own learning. They feel that the learning activity has enhanced their understanding of geographical concepts and their ability to apply the newly learnt concepts effectively to new scenarios. Most students also find the activity challenging and motivating which contributes to an overall enjoyable learning experience. Other comments include:

- "It makes learning and understanding hydrographs interesting and effective."
- "The pictorial explanation enhanced my understanding for topic within the shortest time."
- "I feel that that the interactive features of the software has enabled me to slowly view the clip and learn about the logic behind the concepts."
- "It is very easy to comprehend. It is suitable for beginners."

Future plans

Based on student feedback, more interactive features are being added to the simulation movie. More geographical scenarios (e.g. human intervention and changes in microclimate) and influencing factors (e.g. rainfall, rock and ground cover characteristics) will also be added to broaden the scope of study. A self-assessment feature will be put in place for students as well. The learning activity will eventually be converted into an online micro-lesson designed with navigational features to allow for more flexibility in sequence and pace of learning. Students will then be required to transfer their new knowledge and skills in a problem-solving scenario through project work. ■

Structurally Beautiful and Beautifully Structured

Professor T.S. Andy Hor
Department of Chemistry

Chemistry is the study of molecules, and hence, by definition, it is *the* molecular science. The beauty of the science lies in the beauty of the molecules with a myriad of structural varieties. Molecular structures relate to molecular activities which in turn govern chemical functions and applications. The influence of chemistry on the development of other sciences, technology and medicine has never been more evident. In this molecular age when many subjects become molecular (e.g. 'molecular biology', 'molecular electronics', 'molecular engineering' and so on), the introduction of the new GEK2504 "The Four S's in the Molecular World" in AY 2004/2005 was therefore timely. The four S's refer to Structure, Symmetry, Space and Stability. They are connected to the fifth all-encompassing S, namely, Science.

GEK2504 is a new experiment with five ambitious goals:

- to break the preconceived barrier between science and other disciplines
- to make chemical concepts come alive
- to examine the interconnecting principles of the [4+1] S's
- to create new knowledge in a professional field based on the appreciation of fundamental scientific principles
- to provoke out-of-the-box ideas to analyse geometrical forms in life. Collectively, these goals define the intellectual challenge and help to formulate the scope and method of our teaching and learning.

The interconnectivity of the four S's and their roots in Science provides a focal point for discussion. The module uses scientific concepts of the four S's to explain various life forms, phenomena and processes. For example, the architect's primary concerns of the design of a living or working environment are the *structural* design, *symmetry* features, *space* utilisation and *stability* considerations. A practical architectural design therefore demands a good understanding and application of the four S's in science. Although an architect is not a science practitioner, he/she would have grasped some basic ideas in science in the course of his/her professional upbringing.

Barriers among different disciplines, even within science, may be common but many of them are artificial, or even imaginary. For example, stability to physicists is a thermodynamic issue, but to the chemists, it is more of a kinetic problem. When these structures are brought to the world of designers, artists, sculptors, architects or engineers, chances are that they will see the same structure in different lights. This speaks for the beauty of our human mind. It is shaped, or distorted, if you like, by our experiences in life. In GEK2504, we take students through different 'minds' and encourage them to venture out of their boxes to discover complex objects with simplicity and simple objects with complexity. Students also undertake a series of projects through which they relate the use of the four S's to both molecular and material forms in their daily lives. In doing so, they also venture into the world of chemical principles.

Molecular chirality is an important concept that students have to grasp in GEK2504. Chirality is the property of non-identity of an object with its mirror image. It figures prominently in drug design. Students learn molecular chirality through various molecular models (which many have not experienced before) and cutting apples (a task that most students have done *n* times). Everyone can cut apples, but when they are asked to cut two apples, both of which into two 'equal halves', and try to create non-superimposable mirror images, it can be a frustrating exercise. But in the end, students learn about 'homo-chirality' and 'hetero-chirality', two of the classical concepts that provided the foundation for modern drugs.

We then brought students from a fruit market to a football field where the concept of buckminsterfullerene (i.e. where the C_{60} sphere, also known as buckminsterfullerene, is visualised in a geodesic dome) comes alive. The intellectual trip shows students

continued next page...

that the most beautiful molecular invention can also be the simplest. Isn't this what life can be? Students could easily appreciate such beauty in the course of their constructions of molecular buckies from household materials. Some of their masterpieces are shown on the right and the following page:

Through this adventure, whether intentionally or not, we venture into the world of platonic solids (the five regular polyhedra—cube, tetrahedron, octahedron, icosahedron and dodecadehron), which provided as much inspiration for structural chemists as for architects, designers and soccer coaches. Buckminster Fuller, a famous architect, recognised this and used geodesic domes in his designs.

The molecular football is the tip of the iceberg in the 3-dimensional world. Our class went through a meandering journey in the platonic exploration. We ended up in the world of molecular origami, which is another new experience for most of us. Students combined their artistic skills with scientific know-how to craft many of the most beautiful structures and objects:

The relationship of stability with symmetry may not be immediately apparent to many. If you look at the Pentagon, which houses the Department of Defense in USA, in a slightly different light, you would see an almost perfect cyclopentadienyl anionic molecule with a perfect C_5 symmetry. This architectural design comprises five concentric rings housing different functional units with a good use of space. Most

Figure 2. Buckminsterfullerene (Molecular Soccerball) and its Parent Icosahedron constructed with sticks.

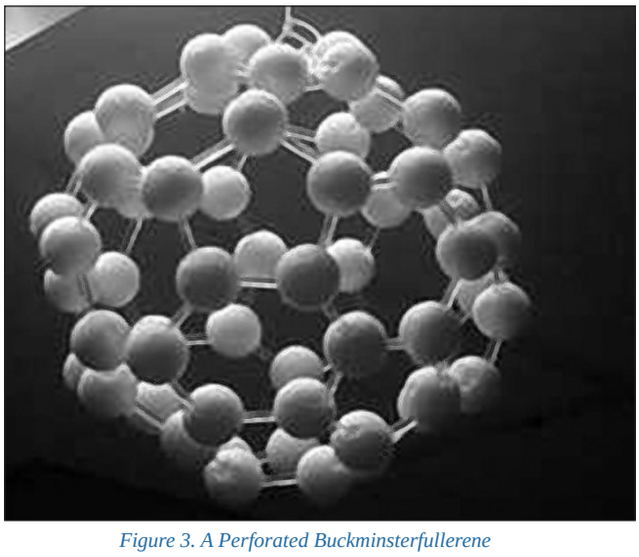


Figure 3. A Perforated Buckminsterfullerene

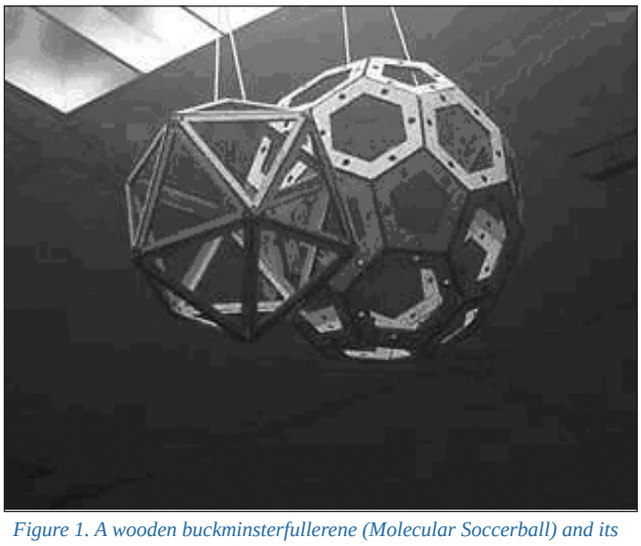


Figure 1. A wooden buckminsterfullerene (Molecular Soccerball) and its Parent Icosahedron.

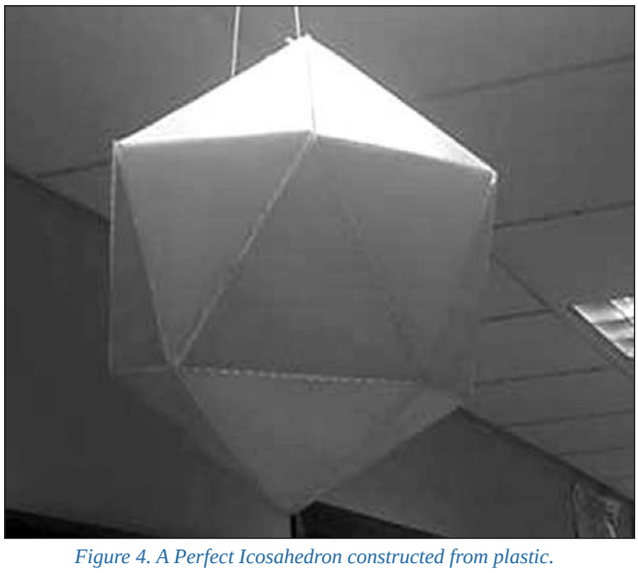


Figure 4. A Perfect Icosahedron constructed from plastic.

continued next page...

Structurally Beautiful and Beautifully Structured

...continued from page 15

Figure 5. A spiky Buckminsterfullerene

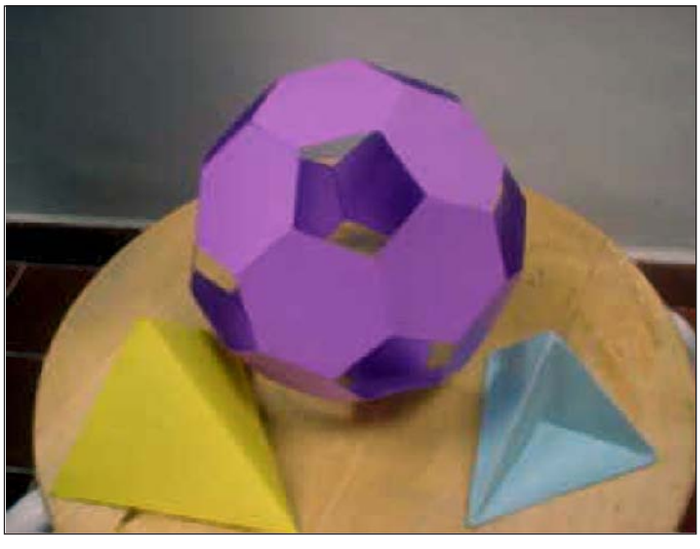


Figure 6. Molecular origami of Buckminsterfullerene and Tetrahedron constructed from paper.

importantly, it rests on a flat base that maximises architectural stability, in both kinetic and thermodynamic sense!

These structures all have one thing in common—they are structurally beautiful and beautifully structured.

GEK2504 is an experiment of both pleasure and frustration that allows us to create knowledge through the interaction of science, art and architecture. We look for scientific inspirations from architectural masterpieces, as much as we seek architectural inspirations from molecular entities. At the end, we, by accident, discover a new domain called 'molecular architecture'. Or, should we call that 'architectural molecular science'?

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.

editorial information

Guest Writers John Whalen-Bridge; Ooi Wei Tsang; Tan Tuck Choy, Aaron; Eleanor Wong; Peggie Chan; Yap Lee Yong, Alena; T.S. Andy Hor.

Contributors to 'From the Faculties: Teaching & Learning Highlights': Chang Tou Chuang; Helmer Aslaksen.

Advisor Daphne Pan

Editors Sharon Koh; Teo Siok Tuan

Graphic Design Ma Lin Lin

Photography Frederick Chew
(unless provided by authors)

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

The Editor, *CDTLink*
Centre for Development of Teaching and Learning
National University of Singapore
Central Library Annexe, Level 6
10 Kent Ridge Crescent, Singapore 119260
Tel: (65) 6516-3052 • Fax: (65) 6777-0342
Email: cdtpost@nus.edu.sg
http://www.cdtl.nus.edu.sg

Acknowledgement

The author gratefully acknowledged all contributions from the students in GEK2504 conducted in Semester 1 of AY 2004/2005. All the objects presented in this article were creations of the class. He has learnt probably more from the teaching than what he has taught the class.