PROCEEDINGS

OF THE SECOND

TEACHING & LEARNING SYMPOSIUM

04

Teaching Innovations **Continuous Learning** *and* **Improvement**

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Teaching Innovations:

Continuous Learning and Improvement

Proceedings of Summary Papers Presented at the Second Teaching and Learning Symposium by the Teaching Community of HKUST

Symposium Hosted by
The Senate Committee on Teaching and Learning Quality
Secretariat
Center for Enhanced Learning and Teaching

The Hong Kong University of Science and Technology
May 17, 2004

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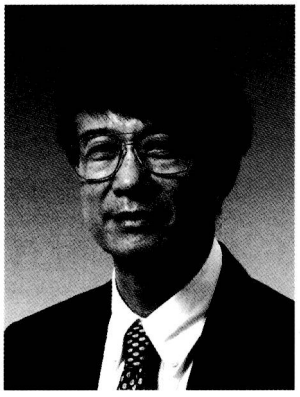
Foreword



The Second Teaching and Learning Symposium held at HKUST on 17 May 2004 was based on the theme of "Continuous Learning and Improvement." It, in fact, documented the many innovative ideas that have been pursued by our dedicated teaching staff since the first Symposium in December 2001. Many of these have been facilitated by the Continuous Learning and Improvement Project funded by the University Grants Committee (UGC), whose support we gratefully acknowledge.

In the past year, the UGC has refined the roles of the tertiary institutions in Hong Kong, in order to better differentiate the distinctive contributions that each makes to the diversity of educational opportunity available to Hong Kong's students. However, in one respect, all of them share a common role: each is expected to pursue "... the delivery of teaching at an internationally competitive level in all the taught programmes that it offers." HKUST has always taken this aspect of its role very seriously. One way in which our international standard is demonstrated is by the performance of our students when on exchange abroad. We find that they go abroad prepared to compete with students at some of the top institutions in the world and have achieved remarkable results.

One of the other driving principles of HKUST is innovation — and this is not limited to research or technology transfer. Many of our faculty bring to their classrooms the same creativity that has earned them international respect as scholars, and their contributions to the Symposium are testimony to that. They are also the product of a growing community of innovative teachers, who learn from each other new ways to improve the learning of their students.

Professor Paul Ching-Wu Chu
President
July 2004

Introduction

In December 2001, the first Teaching and Learning Symposium at HKUST highlighted the efforts of teaching staff to improve teaching and involve students in their own learning. It was held while the University was gearing up for the Teaching and Learning Quality Process Review (TLQPR), which culminated in the visit of the UGC's TLQPR Panel in January 2003. While the symposium ended with a discussion of how we could foster a creative and collaborative environment for teaching and learning, there might have been some concern as to whether the momentum could be sustained once the pressure from TLQPR was off.

Fortunately, the teaching staff did not simply breathe a great sigh of relief and turn to other pursuits. There may have been some sense of relief, not least on my part since I was coordinating our response to TLQPR, but the focus on teaching and learning, and the interest in making it better, continued. This second Symposium, in May 2004, is testimony to this sustained effort. The major themes and interest groups that have grown up among the active participants in our teaching development efforts formed the framework for the Symposium, with parallel sessions on *Visualization and Simulation*, *Web-supported Learning and Teaching*, and *Peer Learning*.

The two keynote speakers were both from Glasgow and brought us a glimpse of how teaching and learning improvements are being made in Scotland. Jim Boyle (University of Strathclyde) explained how his Department (Mechanical Engineering) had pioneered an approach to managing innovation that was being adopted across the university. Steve Draper (Glasgow University) reported on his university's experience with three specific techniques, including the use of the Personal Response System, whose inventor Nelson Cue was honored at our first Teaching and Leaning Symposium for Excellence in Teaching Innovation.

At this second Symposium, the innovative contributions of a number of individual faculty and teams were again acknowledged, and four were singled out for Excellence in Teaching Innovation Awards. While there were some that made use of advanced technology, several of the award-winning concepts were based mostly on innovative ways to organize and present the subject and promote the active involvement of students in learning. The final panel discussion on *Sustaining and Growing a Continuous Teaching and Learning Improvement Culture at UST* focused attention on the importance of the environment in which faculty and students pursue their educational objectives. If the progress in the period between the two Symposia is any guide, it seems a good beginning has been made.

Professor Peter N. Dobson, Jr
Associate Vice-President for Academic Affairs
July 2004

Note: All papers and presentations from The Second Teaching and Learning Symposium can be found on the Center for Enhanced Learning and Teaching web site at http://celt.ust.hk/tlsymp04/

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Program Committee

The symposium was successfully held on May 17, 2004 with the genuine support and contribution of the program committee.

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Remark: * Teaching Innovation Award Winners having dedicated their sustained effort to improve the quality of the students' learning by innovative means.

Keynote Lecture

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Managing Teaching Innovations

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ABSTRACT ONLY

Higher education has been facing a major challenge for the past thirty years: despite significant advances in our knowledge of what works in learning and teaching and the widespread (and inexpensive) availability of new learning technologies, teaching in universities has been slow to change. The reason for this inaction is easy to identify and can be articulated by most academics: the 'system' emphasizes the relative importance of research at the apparent expense of innovation in teaching. Since the 'system' is difficult (if not impossible) to change in the short term, the solution to this problem must lie elsewhere. This presentation describes how teaching innovations can be successfully introduced and argues that the key to success lies in how this change is managed – not only from the perspective of university administration and the department head, but also from that of the individual academic. The experience of the University of Strathclyde, and in particular the Department of Mechanical Engineering, will be used as an example. Strathclyde has been through the process of introducing pilot innovations in teaching and learning, and spreading these through the institution by way of the creation of innovative 'teaching clusters' – managed teaching suites with new styles of teaching space. The focus of the presentation is on how this was achieved, the effect (and development) of academic and support staff, the effect on students (and retention in particular) and on continuous improvement of the educational experience.

Video archive capturing the presentation of Prof Jim Boyle's keynote speech during the symposium can be assessed through http://celt.ust.hk/tlsymp04/papers.html#1

From Active Learning to Interactive Teaching Individual Activity and Interpersonal Interaction

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INTRODUCTION

In this talk I am going to describe briefly three teaching and learning techniques I have been involved in developing, and a theoretical story that may be used to reflect on them.

The three techniques are:

- CSCLN (Computer-Supported Cooperative Lecture Notes). A class is divided into groups, each of which must produce lecture notes for one of the lectures and publish them on the web for the whole class.
- PAL (Peer Assisted Learning) (also known as 'SI': supplemental instruction), where students may attend voluntary weekly sessions run not by staff but by students who recently completed their course.
- The use of the PRS classroom voting system. We have seen this put to a variety of different pedagogic uses, including self-assessment questions, to stimulate classroom discussion, and in contingent teaching where the lecturer does not have a fixed linear 'script' but rather a diagnostic branching tree where audience responses to early questions determine what is done next.

The theoretical story begins with the idea of active learning, which emphasizes the importance of getting a learner to do something rather than only listening or reading passively, and that the mental processing involved in deciding how to act plays an important role in promoting learning. However, is it just a coincidence that all three of these techniques involve interaction with 'peers', with other learners? Is there something in interaction, rather than only in personal action, that is important to learning?

CSCLN

The first time CSCLN (Computer Supported Cooperative Lecture Notes) was implemented, it was accompanied by an evaluation study looking at its value for students. It was carried out in a class of 59 students as an assessed exercise on a 20-lecture module on Human Computer Interaction, as part of a taught M.Sc. in Information Technology. Learners were divided into teams, and each team was required to produce public lecture notes for their assigned lecture on the web, thus

jointly building a complete set of public lecture notes.

The exercise had these features:

- It is an experience of cooperative work mediated by computer (by WWW and email).
- A practical exercise on using the WWW on a real task.
- Exploring a question-and-answer format for learning materials. Students were encouraged to structure their notes as a list of the key questions around which the lecture revolved, and suggested answers to those questions.

There were several educational ideas justifying this design.

- Learner reprocessing: re-expressing material in a new format.
- Self-monitoring: by looking at each other's notes, learners gain information about how well they understood each lecture.
- Similarly, the teacher is likely to discover problems in good time either because the notes are inaccurate or because of students' questions when writing up the notes.
- Peer interaction is good for learning content, good for giving opportunities for self-monitoring, and good for building a community spirit in the class.
- In the context of an HCI course, this is also seen as positive as a practical experience of CSCW (Computer Supported Cooperative Work).
- In the context of an information technology course in 1998, it was seen as positive just by being an occasion for practising web authoring.
- The Q&A format as another perspective on material. It could be interesting to take this further, and construct more course materials as if they formed a reference manual (i.e., indexed by questions).

The effectiveness of this exercise was evaluated using the method of Integrative Evaluation (Draper et al. 1996), including some observation, sample interviews at various times, and questionnaires. The main evidence came from a short questionnaire which, since lecture notes find their main use when revision for exams is being done, was administered directly after the exam. Of 59 students, 98% responded; and of these 84% said they had referred to the communal lecture notes, 76% said they found them useful and, most important of all, 69% said they found them worth the effort of creating their share of them. They also, as a group, rated these web notes as the third most useful resource (after past exam questions and solutions, and the course handouts). This shows that, while not the most important resource for students, nor universally approved by them, this exercise had a beneficial cost-benefit trade-off in the view of more than two thirds of the learners.

The exercise, associated teacher materials, and the set of web notes produced by the students may be seen at http://www.psy.gla.ac.uk/~steve/HCI/cscln/overview.html

PAL

PAL (Peer Assisted Learning) consists of organizing weekly group meetings for students on a given course, attended voluntarily but officially recommended by the department, and led not by a staff member but by a 'facilitator' who is a student who did

the course previously. The content discussed may be anything that seems relevant and important to the groups, but may include administrative details on the one hand, or deeper implications of the course material on the other. The longer-term aim is to encourage students to help each other, and to seek help both from others on the course and from those who have done the course earlier.

There are a variety of possible benefits from PAL.

- Information supply. It could be that simply the basic information provision is important: it is impossible to ask many questions in big lectures, and this is a chance to get them answered.
- Extra study time. Some of the weaker first-year students at this university appear (from other studies) to do almost no work outside contact hours. Simply spending an extra hour a week thinking about and discussing their work would significantly boost learning since learning depends on the amount of mental processing done. (In contrast, students with superior personal study skills would already have adopted the habit of going over and re-processing their lecture notes every day, and so would not need this aspect of PAL.)
- Generating explanations. Explaining a topic to someone else is powerfully conducive to learning in the explainer (apart from possibly helping the questioner). This is the essential cognitive boost from peer interaction, as studied for instance by Howe et al. (1995, 1998).
- Adopting peer interaction outside the sessions. The process may convince them that peer interaction is a powerful learning resource, and so introduce them to the practice of doing this outside these particular scheduled group occasions. This amounts to a general study skill being acquired.
- Tinto integration. Spending time interacting in a group of fellow students helps to bolster academic and social integration (thought by Tinto (1975, 1982) to be the most important predictors of student retention or dropout). That is, even if the content is not important to learning outcomes, the process may make the students feel much more at home in their role and in their subject, with general positive effects.
- Benefits to the facilitators. A separate set of benefits accrues to the facilitators.

More information on this can be found at http://pal.psy.gla.ac.uk/

PRS AND CLASSROOM VOTING SYSTEMS

One of the weakest points in the teaching at many universities is the use of lecturing, especially to large classes. The common diagnosis of what is weak in this method is the lack of interactivity. Teachers experience this as a feeling that they cannot get any discussion going and so lose much sense of how well the material is going over. A more theoretical view is that because no overt response is required of students, little mental processing in fact takes place, and hence little learning, at least during the lecture. A technology aimed directly at this gap is that of interactive handsets such as PRS, where every student can key in a response to a displayed MCQ (multiple-choice question), and the aggregated results are immediately displayed to everyone.

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