CLOSING ADDRESS
by Prof. Soo-Ying LEE, Director of Research, National University of Singapore

I used to teach a course on Atomic Structure and Chemical Bonding. In the first few lectures, I talked about the electron, which accounts for the ‘e’ in e-education. The logo for today’s conference also shows the Bohr-like orbits of electrons around a nucleus.

The man who measured the charge to mass ratio of the electron was the British physicist J. J. Thompson. He said that the best way to learn about a subject is to teach it, and I believe in that dictum.

Six months ago, I decided that I didn’t know enough about e-education, also known as online education, and so I threw a challenge to Prof. Daphne Pan, Director, Centre for Teaching & Learning, NUS, to hold a workshop on the topic with a few invited speakers. I did not tell her that I had hoped to be one of the invited speakers so that I could learn about e-education while preparing to give the talk.

As you can see, I did not get invited to present a paper! Instead, as a consolation, I was asked to give the Closing Address. This meant that I had to sit through all the lectures, like a student again and learn from the other side of the rostrum.

Let me share with you what I have learnt, from the day when the idea for the Conference was hatched till now.

We started with one ‘e’ in e-education, but through the creativity of Prof. Daphne Pan, she introduced the 4 E’s that capture the issues surrounding e-education. They are Environments, Effectiveness, Economics, and Expectations.

Three speakers for each of the areas were invited, and financial support was provided by the University. The result is this opportunity to meet, to get the key players in e-education in Singapore to share ideas, to exchange views, and to learn something of the physical state as well as the state of mind of e-education in Singapore, which I hope that all of you have enjoyed as much as I have.

We have to thank Prof. Daphne Pan and her team for the excellent effort put in for the success of this conference.

You may have noticed that e-education was sometimes used interchangeably with e-learning during the conference. But there is a difference, as pointed out by Mr Tan Hock Guan, from Ngee Ann Polytechnic: education is controlled by institutions and instructors, while the student is responsible for learning. In other words, e-learning is the intended result of e-education.

While the title of the conference is on e-education, the speakers did not take a primarily institutional and instructor centric view. Throughout the conference, one could sense that while there are many approaches or models for e-education, a good one must always put the students first, with a strong focus on pedagogy, or risk failure.

The first area covered was on environments or platforms to host e-education. These are Integrated Distributed Learning Environments, abbreviated as IDLEs.
Mr Ravi Chandran, from NUS, presented the home-grown Integrated Virtual Learning Environment (IVLE), and Mr Lim Kim Chew, from Temasek Polytechnic, presented the partly off-the-shelf Online Learning Environment (OLE). Both are examples of IDLEs. Although Prof. Lawrence Wong’s, from NUS, presentation, on web-casting and multimedia conferencing, illustrated with the Singapore-MIT Alliance programme, was placed under Economics, a large part of it could come under Environments.

Dr Francis Pavri, from NUS, noticing the difference in approach of IVLE and OLE, raised the question of whether it is better to write your own or to purchase off-the-shelf packages for the e-education platform. The choice is determined by questions of availability of the software, cost, productivity, capability and taste of the institution. One can’t write everything, but one has to write what’s not available. Generally, one has to write some software, but of greater importance is the ability to integrate what one has written with whatever package purchased.

My field of research is molecular dynamics and spectroscopy. Once, I needed a fast Fourier transform subroutine. It could be pulled out from a numerical recipe book, but nevertheless I decided to write my own subroutine to integrate with a larger program, just to avoid using a black-box and to have a better understanding and control of what I was doing. I believe the purists among you would take a similar approach for your e-education environments. The danger may be a compromise in productivity, and the critic would say “why reinvent the wheel?”

With IDLEs, the students do more than just sit before a computer screen. Mr Ravi speaking on behalf of Dr Doreen Cheong, from Singapore Polytechnic, pointed out the advantages of focusing on interactivity through problem-based learning, case studies, multimedia simulations and virtual reality. Learning can be more fun and more learning can take place that way.

The second area covered was on effectiveness of e-education. In judging the effectiveness of online education, it is useful to recall one of the aphorisms of William Arthur Ward. He wrote:

The mediocre teacher tells;
The good teacher explains;
The superior teacher demonstrates; and
The great teacher inspires.

All we need to do is to substitute teacher with online education and we have a grading scale to describe its effectiveness. Clearly, the interactivity has to increase as we move upscale from mediocre performance to greatness.

One can have online teaching in increasing levels of sophistication of the software, from the simplest, to tell; to the intermediate, to explain; and to the advanced, to demonstrate concepts or ideas via simulation and with the full power of IT. But I believe that it takes a human to inspire. So, as instructors, we are still safe from being displaced or replaced from our jobs, but we must do better than just tell, explain and demonstrate as these are at the greatest risk of being taken over by machines, perhaps in 20-30 years. How many of us can inspire a class? As Mr Chan Heng Kee, from MOM, has quoted from a prediction of vanishing professions by Tom Peters, the teaching profession is at high risk of disappearing, probably to be replaced by online education.

Prof. Daphne Pan’s, from NUS, message, on effectiveness is: don’t be dazzled by the technology, but to focus on sound pedagogical principles. Online education will thrive if it generates new philosophies, concepts and ideologies.

Prof. Philip Wong, from NIE, examined the effectiveness of online tools versus other modes for instruction and learning, which clearly depends on the capability of the person using the tool. You
can have a poor driver with a super car, or a good driver with an average car, but the latter can outperform the former in getting from point A to point B. Nevertheless, a well-designed environment coupled with a learning culture and readiness are important.

Colonel Anthony Chan, from SAFTI, shared with us the 5-Ps - Purpose, Participants, Pedagogy, Process and Performance - of qualitative management indicators for open and flexible online learning, illustrated with SAFTI’s SPOT-ON projects. The message that came across was that developing an effective on-line course is very demanding.

The third area covered was on the economics of e-education. Online education may be costly to develop today, but with the advent of smaller, cheaper and more powerful computing tools, students can already hold classes in the palm of their hands.

From what we have heard, the institution typically would need a group of individuals skilled in converting university courses into interactive web-based learning modules. NUS, for example, has a Centre for Instructional Technology, for online education development. People, people and people are an important ingredient for success. They have to understand academic content, pedagogy, multimedia, databases, and project management. The quality of the online courses would depend to a certain degree on the capability of this group of people that are in short supply and therefore can be costly.

In most disciplines, deploying faculty members - the content providers - to do this part of the specialized task may not be the most effective use of talent, and they may also not want to do it as it can be a hindrance to their academic career advancement. For example, it would be rare to see top-notch scientists use Powerpoint. In many instances, they prefer the use of transparencies, and frequently just handwritten ones to save preparation time!

Online education promises to improve access to education and training with quality learning that at the same time can be cost effective. One member of the audience asked: Is online learning more effective than traditional classroom instruction?

It’s hard to set up an experiment to answer the question as there are many variables involved, and worst, not all the variables are known. Mr Chan Heng Kee has shown data from an experiment at Stanford University that showed online learning to be more effective, but cautioned that there are also experiments that showed otherwise.

Dr Klor de Alva, former President of Phoenix U, claims that online students beat classroom rivals, which on analysis could be attributed to the design of the university’s online environment. Also, the economics are such that only courses driven by the corporate world that pays are being offered on a significant scale today. Dr Looi Chi Kit’s, from ISS, description of the IT e-education at ISS is an example.

The final area covered is on the expectations or future of e-education. Needless to say, the future is hard to predict, and hazardous too as pointed out by Prof. Chee Yam San, from NUS. Recall some predictions on the future of computers:

“I think there is a world market for maybe 5 computers.”
- Thomas Watson, Chairman of IBM, 1943.

“Computers in the future may weigh no more than 1.5 tons.”
- Popular Mechanics, 1949.
“There’s no reason anyone would want a computer in their home.”
- Ken Olsen, Founder of Digital Equipment Corp, 1977

“640K ought to be enough for anybody.”

There is however one prediction that has borne out very well since 1965. This is Moore’s Law: Microchip capacity will double every 18 to 24 months. The number of transistors on a chip has increased more than 4,000 times since 1970. The Pentium III processor has close to 10 million.

The implications of this law for e-education are profound. Many technologies have become possible and will improve in performance with time. This includes voice recognition, virtual reality, and artificial intelligence.

If Moore’s Law were to survive on into 2030, the processor would likely surpass the computational power of the human brain! By then, it would clearly be possible to tell, to explain, and to demonstrate an idea or concept via online learning, and this is clearly a threat to teachers if they continue to work in the same way as today.

On the future of e-education, Prof. Chee Yam Sam has given us a glimpse of what e-education may be. Dr Mike Sipusic, from Kent Ridge Digital Labs, gave us the shape of the classroom of the future. The role of the professor/instructor will certainly be changed. This is a topic for another conference. Finally, Mr Chan Heng Kee brought us back to earth to look at the near term future on the importance of e-learning in Singapore’s transformation to the new K-economy.

Let me conclude:
We face an exciting and uncertain future in e-education, both for students and teachers, and there’s much more to learn and to experience. There are risks to be taken, and many twists to be expected on the road ahead. But the refusal to look ahead, to take calculated risks and to move forward may be the greatest risk of all. This is reason enough for us to want to host another similar conference next year.

Till then, all the best and let’s meet again. Let’s put our hands together to thank all the 12 speakers who have given generously of their time to share their thoughts with us today.

Thank you.

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