

*With the ever increasing reliance on IT in education, how courseware and instructional mediums are designed is vital if technology in education is to be used and implemented successfully. The aim of this issue of CDTL Brief is to examine some of the issues surrounding **Instructional Systems Design**.*

e-Learning at Singapore Polytechnic: From Concept to Reality

Mr D. Paul Gagnon

Educational Development Specialist/Instructional Designer

Educational & Staff Development Department, Singapore Polytechnic

Overview

The Virtual College (VC) at Singapore Polytechnic was established in 1996 as a pilot project with two major objectives: (1) to promote independent learning among Singapore Polytechnic students, and (2) to promote life-long learning through distance education for graduates and professionals from industry. From its inception, the VC moved quickly through a number of stages, beginning with the first trial application of content delivery via Singapore One in 1997, to the launching of its first modules in 1998 on Magix, thence to full delivery of online modules using two Learning Management Delivery Systems (LMDS): Type B (an in-house project) and Blackboard (an off-the-shelf purchase).

From 1997 until the present, the number of modules now available to students and the public has grown from 37 to over 1000. These modules now reside on Blackboard, the LMDS system of choice. Currently, the VC has approximately 14,290 users, with hits numbering in the 5.5 million range.

Present Status

While this increase in the number of modules and users is encouraging, it must be acknowledged, nevertheless, that much of what constitutes e-Learning today remains little more than the porting of classroom text to the Internet, and trying to reproduce the functionality and 'look and feel' of existing classroom materials. The Web is thus utilised as a delivery system for what already exists, as opposed to being viewed as an instrument for seeking ways to expand the scope, sequence and delivery of content.

Accordingly, new VC initiatives will stress that the role of IT in teaching and learning must expand to reflect an understanding of the best practices in online pedagogy. In this way, the VC will continue to pursue its two important strategic objectives: (1) to enhance lecturers' abilities to deliver materials in a new and more vibrant manner, and

(2) to stimulate student interest and application to online learning programmes.

The overall philosophical orientation within the VC continues to be that IT exists to provide multiple vehicles for exploring knowledge and supporting learning-by-doing. Therefore, lecturers are now being encouraged to explore ways to move from 'sage on the stage' to 'guide on the side'. Concomitantly, it is believed that as the lecturers become more skilled and experienced with technology, the more they and their students will be better prepared for the knowledge-based society. To nudge lecturers towards this perspective, the VC strategy is threefold:

1. establish a comfort zone with the technology,
2. provide ongoing pedagogical support to guide their thinking about how to use the technology,
3. encourage explorations in the development of their instructional delivery methods.

The current online pedagogical focus increasingly, then, explores ways to adapt and utilise existing interactive software tools for delivery using Blackboard. It is felt that this approach to module development will eventuate in materials that reflect a more student-centred and constructivist pedagogy, as opposed to the didactic teaching and learning model now extant.

The end goal, of course, is to provide staff with the confidence and the skill-set to move skilfully and effortlessly through the continuum of *Classical Tutorial*, *Activity-Centred*, *Learner-Customised*, *Knowledge-Paced* and *Program-Customised* lessons—as and when it suits individual pedagogical purposes.

Subsequently, modules are being developed and delivered which model these new approaches. It is also recognised, however, that much trial and error must attend such explorations. To that end, more resources are being allocated to test the various ways that Blackboard can enable teaching staff to extend the online pedagogical paradigm.

Future Directions

Currently, a number of initiatives exist to support the growth of staff in the development of online modules that reflect the online pedagogical lesson continuum. One such initiative is the *Online Learning Rubric*. Based on a four-point scale—with 1 representing little or no development and 4, good to excellent development—the rubric serves as a guide for lecturers in the self-evaluation of their module design. The current target is for the VC modules to reflect a benchmark of at least 3 by the end of 2002. Concurrently, new initiatives will be rolled out to push the benchmark towards 4.

Supporting the rubric initiative is a systematic and comprehensive training programme that builds around a required basic training workshop in Blackboard. This programme features enrichment workshops that focus on the specific skills necessary to understand and successfully deploy the many features available within Blackboard. These workshops are offered on a rotating and regular basis and are designed, not only to facilitate staff skills with current Blackboard features, but also to encourage new ways of thinking about their online pedagogy, as they journey towards mastery in online pedagogy.

Another practical initiative designed to support this movement to skilled online instructional delivery is the *Competency in IT Certification*. This programme identifies the essential IT skills considered to be prerequisites for successful design, development and delivery of online modules. Staff who can demonstrate competency in all skills will be issued the certificate.

Further support rests with research and development staff, who are focusing on the enhancement and effective use of instructional software to model practical approaches to curriculum delivery. For example, expansion is underway with respect to Virtual Lab applications/simulations that demonstrate effective pedagogy in the areas of case study and problem-based learning.

Rounding out these initiatives is the recent acquisition of Centra's Virtual Classroom technology to complement Blackboard and thereby, enhance the distance learning capability of the VC. By providing this virtual face-to-face platform, confidence grows that lecturers can build successfully on existing pedagogical strengths. Notably, this technology will facilitate more successful utilisation of current Blackboard content, as well as provide on-time, anytime, anywhere, training and development for workers in Singapore and abroad.

Challenges

The history of the VC at Singapore Polytechnic has been one of meeting and overcoming challenges. Current directions reflect this history and build on experiences to date. Future challenges to be handled include: conversion of module materials to files appropriate for downloading to pocket PCs and personal digital assistants, and the development and delivery of reusable content processes within Blackboard. Thus the Singapore Polytechnic VC continues to sail successfully on a virtual and ever-changing sea: its vessel sound, and its Captain, Officers and crew well trained and ever vigilant. ■

Considerations for Web-Based Learning Design

Mr J.A. Gilles Doiron

Principal Educational Technologist, CDTL

In universities around the world, teaching staff are being encouraged to create online learning materials. Not just making lecture notes available to students, lecturers are urged to make better use of Information and Communication Technology (ICT) for teaching and learning by creating online activities for their students. However, most have little experience in designing Web-Based Learning (WBL) to enhance their curriculum, although some may have ad hoc knowledge of the Instructional Systems Design (ISD) process. The following are points to consider when reflecting on how to build a WBL activity for your students:

1. Establish a formal development process that is best suited for your course. Focus on meeting the needs of your students and plan, design, test, build, deliver, observe, and refine accordingly. Quality outcomes depend on adhering to this process.
2. Think of the learning objectives when choosing media to support learning. Never use technology for the sake of using technology.

For example, should you use video clips? Ask yourself whether motion or time-based sequencing is an essential element of the point you are teaching. If not, then forgo using video. Your students will be more impressed with rational choices of media types than in being wowed by irrelevant bells and whistles. Also remember that more and more students are accessing course materials from home and that, for most, bandwidth is still an issue. If your learning objective requires that you use video, advise your students that they should access this WBL on campus through the Intranet.

3. Provide ample opportunity for the user to interact with the information. Appropriate instructional design provides for meaningful interactions between the student and the concepts to learn.

If you are not familiar with web programming and web authoring tools, talk to specialists from your faculty Centre for Information Technology Application (CITA) or from the Centre for Instructional Technology (CIT).

The use of HTML, Java, and Shockwave offers ways to add interactive design elements that engage the learner. Buttons, hot spots, controls, movable objects, and data entry fields: each has its use in instructional design. Keep in mind that your design goal should be to encourage intellectual interaction with course content; some interactions could be used to test if students have understood relationships and concepts, while others could be used to activate deeper levels of learning, gradually adding complexity to the learning activity.

4. Design WBL, where possible, that adapts to the students' abilities and intelligently responds to the students' input. Design your WBL to detect whether a student is having difficulty with a concept or a task, and offer remediation through extra information presentation and reinforcement, or suggest alternative resources (e.g. other courses, publications, hyperlinked information). Be an effective communicator. Provide meaningful feedback to student input; reinforce a concept and clarify common misunderstandings. Respect the learner. Avoid any content or feedback that is instructionally insignificant, annoying, or degrading.
5. Keep in mind that students learn through a variety of styles. Visual learners need lots of graphic illustrations to understand concepts and relationships. Verbal

learners use text and narration to accomplish the same end. Reflect on the type of presentation features you should include in your WBL and whether learners with differing learning styles will benefit equally.

6. Reject and abandon the traditional linear approach to designing instruction. In WBL, the student should be the one to decide on which direction to take in their personal sequence of learning. While it is perfectly acceptable to suggest a path through a course, dictating that students follow a predetermined path through linear design is not recommended. Good WBL design allows the students to customise their learning path: to start where they want, to stop and return to where they left off, and to access items from various pathways.
7. Ask some students to test your designs. Follow the WBL developers' maxim: test early and test often. This applies to both the instructional design and the user interface, including icons, buttons, and navigational features. Also remember that your personal views on screen layout and user friendliness may conflict with those of the target audience. Seek the advice of multimedia producers, educational technologists and experienced instructional designers: call on CDTL, CIT and your CITA staff. ■

Creating a Meaningful Learning Environment Using ICT

Dr Madhumita Bhattacharya

Instructional Science Academic Group, National Institute of Education (NIE), Nanyang Technological University

This article describes the process of creating a Meaningful Learning Environment (MLE) by going through a three-step cycle (i.e. activity-artefact-reflection) and recording the process of learning in the form of digital portfolios. The production of quality MLE and learning through MLE is assured by following an integrated method of feedback and evaluation, consisting of self-evaluation, peer review and teacher-feedback carried out through various activities [e.g. online (synchronous and asynchronous) discussion, classroom group discussion and presentation]. The methods explained below are based on my own practical experience of designing project-based activities for NIE students. Using Information and Communication Technology (ICT), the students create digital portfolios during the course of their studies in instructional technology; learning takes place individually and collaboratively as each student interacts with their team members and the teacher.

What is Meaningful Learning?

In order to effectively integrate technology into a meaningful learning experience, we must first have a clear understanding of what a meaningful learning experience is. Meaningful learning occurs when learners actively interpret their experience using internal, cognitive operations.

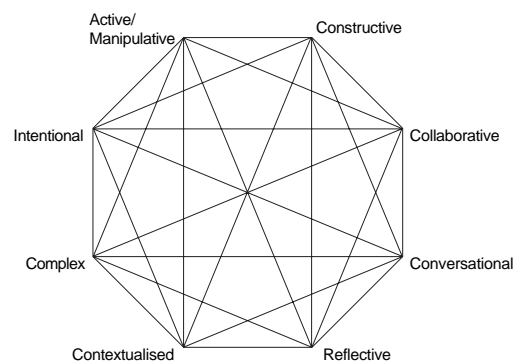


Figure 1: Attributes of Meaningful Learning

Meaningful learning requires that teachers change their role from sage to guide. Since students learn from thinking about what they are doing, the teacher's role becomes one of stimulating and supporting activities that engage learners in thinking. Teachers must also be comfortable that this thinking may transcend their own insights. Meaningful learning requires knowledge to be constructed by the learner, not transmitted from the teacher to the student (Jonassen, *et al.*, 1999).

According to Jonassen, *et al.* (1999), meaningful learning is:

- **Active (manipulative):** We interact with the environment,

manipulate the objects within it and observe the effects of our manipulations.

- **Constructive and reflective:** Activity is essential but insufficient for meaningful learning. We must reflect on the activity and our observations, and interpret them in order to have a meaningful learning experience.
- **Intentional:** Human behaviour is naturally goal-directed. When students actively try to achieve a learning goal that they have articulated, they think and learn more. For students to experience meaningful learning, they must be able to articulate their own learning goals and monitor their own progress.
- **Authentic (complex and contextual):** Thoughts and ideas rely on the contexts in which they occur in order to have meaning. Presenting facts that are stripped from their contextual clues divorces knowledge from reality. Learning is meaningful, better understood and more likely to transfer to new situations when it occurs by engaging with real-life, complex problems.
- **Cooperative (collaborative and conversational):** We live, work and learn in communities, naturally seeking ideas and assistance from each other, and negotiating about problems and how to solve them. It is in this context that we learn there are numerous ways to view the world and a variety of solutions to most problems. Meaningful learning, therefore, requires conversations and group experiences.

To experience meaningful learning, students need to do much more than access or seek information—they need to know how to examine, perceive, interpret and experience information.

Steps in Creating MLE

In the introductory courses in the Instructional Technology for Teacher Education Programme at NIE, the trainee teachers are assigned to create an MLE using ICT. Working in groups particularly in pairs, the trainee teachers experience the process of meaningful learning as they progress through the following steps of producing the MLE.

1. Developing an Idea Map Using Mind-mapping Tools:

Each group of trainee teachers decides on a topic and brainstorms on how to include various attributes of meaningful learning in the creation of a learning environment for their students. The trainee teachers then represent their ideas in a visual format using ‘mind-mapping tools’ (<http://www.mindjet.com>).

Next, two other groups of trainee teachers review each Idea Map. The feedback is provided to the creators online using the discussion forum ‘Blackboard’ delivery platform (<http://www.blackboard.com>). Based on the peer-review feedback received, each trainee teacher then makes changes and modifications. The trainee teachers also note down their reflections on how useful they have found these sets of activities.

2. Creating a Flowchart of Activities*:

Based on their own requirements for developing a student-centred learning environment, the trainee teachers organise the

information and activities that they want their students to cover by following four basic steps:

- divide the content into logical units;
- establish a hierarchy of importance and generality;
- use the hierarchy to structure relationships among chunks; and
- analyse the functional and aesthetic success of the complete system.

Next, the trainee teachers sequence the activities using flowchart techniques such as Grid, Web, Sequence and Hierarchy. After sequencing the activities the trainees start working towards the detailed design of the individual screen for display in the form of storyboard.

3. Designing the Storyboard:

A storyboard is a visual representation, or sketch, of what an interface (e.g. computer-based training, website, movie, book) is supposed to look like. The trainee teachers draft their storyboards based on the following three key considerations:

- **Navigation:** What and where will it appear on each page? What technology will be used to implement it?
- **Identification Info:** What type of identification information (e.g. title, menu link, home link) did each page need?
- **Content:** What should be visible on a particular page?

To help them create their respective storyboards, the trainees learn the techniques and strategies of searching information on the Internet and how to evaluate these resources. Then they search the Internet for relevant data to be incorporated into the chosen topic for their respective MLE projects.

4. Creating the MLE Using PowerPoint:

To actually create their respective MLEs, the trainee teachers learn and use the advanced features of the MS PowerPoint software as well as media selection for maximising learning effectiveness. When developing the MLE, the trainee teachers concentrate on three aspects:

- **Context:** creating a real-life, complex and authentic scenario;
- **Activities:** designing activities for collaboration, sharing, decision-making and knowledge construction; and
- **Tools:** providing tools for searching, thinking, reflection and creativity.

The trainee teachers make a workstation presentation of their final artefact of their respective MLE projects.

* Cognitive psychologists have known for decades that most people can only hold about four to seven discrete chunks of information in short-term memory. The goal of most organisational schemes is to keep the number of local variables the reader must keep in short-term memory to a minimum, using a combination of graphic design and layout conventions along with the editorial division of information into discrete units. The way people seek out and use information also suggests that smaller, discrete units of information are more functional and easier to navigate through than long, undifferentiated units.

Subsequently, peer evaluation is conducted and the feedback collected is used to modify each project before final submission.

Integrating the Learning of ICT in Education through Digital Portfolios

As they create their respective MLEs, the trainee teachers learn to use different learning technologies. At the same time, the trainee teachers have to maintain a learning portfolio on the Web that tracks their progress through a set of learning activities [i.e. designing and developing artefacts, taking part in online (synchronous and asynchronous) discussions, reflecting on various tasks] as they work towards completing the MLE project. The trainee teachers are evaluated based on different rubrics for different activities—a rubric to evaluate the trainee teachers' reflections on various activities was also specially created (Bhattacharya, forthcoming).

For students to visualise the learning as a whole and not as bits and pieces of tasks to complete, it is vital that the students understand how the different activities that they perform are connected and integrated (Bhattacharya &

Richards, 2001). Hence, the e-portfolio is used to assist the trainee teachers to better understand and articulate their learning as they developed their personal professional knowledge and skills about IT in education. This is because digital portfolios are capable of showing a more complete picture of student progress and achievement than traditional approaches to assessment. By developing digital portfolios, the trainee teachers are able to demonstrate a variety of competencies, take greater responsibility, and become skilled at self-evaluation.

References

- Bhattacharya, M. (forthcoming). 'Electronic Portfolios, Student Reflective Practices, and the Evaluation of Effective Learning'. *Australian Association for Research in Education–2001 conference proceedings*. Fremantle, Australia.
- Bhattacharya, M. & Richards, C. (2001). 'Innovative Course Design as Action Research: Instructional Technology for Teacher Education'. *Society for Information Technology and Teacher Education–2001 conference proceedings*. Orlando, Florida. 1052–1057.
- Jonassen, D.H.; Peck, K.L.; & Wilson, B.G. (1999). *Learning with Technology: A Constructivist Perspective*. Upper Saddle River, NJ: Merrill Publishing. ■

Understanding Strategies of Authoring Computer Courseware

Mr Alfred Low

Educational Technologist, CDTL

For computer-based learning to be effective, it has to be designed and authored successfully. This essay aims to familiarise teachers with a few strategies of authoring courseware that will make learning meaningful and effective. The following courseware authoring strategies that one can adopt to create learning environments will be discussed: the Socratic approach (Keller, 1987, p. 176), Simulations/Games, the Computer-as-Pupil and the Intelligent Assistant (Keller, p. 3).

The Socratic Approach

This is an authoring method that develops a questioning approach similar to the dialectic approach used by the Greek philosopher, Socrates. By engaging students in a dialogue, the Socratic strategy seeks to enable students to see their own mistakes and misconception. The typical characteristics of Socratic-based courseware “to recognize and respond to specific types of student misconceptions” through engaging in students in a dialogue can be summarised into the following five rules (Keller, p. 183):

- If the student commits an error of fact, the courseware corrects him/her.
- If the student commits an error about something outside the current topic, the courseware does not give a detailed correction.
- If the student chooses an over-generalisation or a non-

specific option, the courseware offers counter-examples from a different perspective.

- If the student gives an irrelevant answer, the courseware gives feedback on relevancy and offers counter-examples.
- If a student jumps to a conclusion, the courseware emphasises logical reasoning skills.

Although these five rules can be programmed as essential parts of the courseware, it is not possible to guarantee the effectiveness of any one rule. However, all five rules do contribute towards containing and managing how each student thinks.

The Socratic method has been extended to teach causality to students. In doing so, the “basic strategy [has] remain[ed] Socratic, assuming that by learning about specific cases first, students could then generalise to others” (Keller, pp. 182–183). For example, a student, who is conversant with Java, an Object-Oriented-Programming (OOP) language, should be able to apply that knowledge in the learning of LINGO, another OOP language.

Simulations/Games

This method of authoring uses the computer to develop simulation models of an experimental or imaginary world designed for pedagogical purposes (Bork, 1981). Where simulations of real world systems are used in computer-based learning, the computer's power to manage symbolic

activity is harnessed to allow the learner to exercise real control over controlled circumstances and to practise certain skills (Crook, 1994). For example, in a virtual UN Security Council environment (symbolic activity), a student of international relations, by assuming the role of UN Secretary-General, can conduct negotiations (control) with other diplomats and enact strategies to counter international terrorism. Or in a virtual Accident and Emergency Department (symbolic activity), a medical student can adopt the role of a doctor and be challenged to make optimal treatment decisions (control) when faced with certain crisis.

Although simulations as described above may resemble recreational games that award points for correct answers or actions, they are instructional in nature and are not played for casual amusement. Instructional simulations pre-test the student, provide feedback during each simulation, post-test the student, generate a student record, and generally do not award points (Criswell, 1989). Such courseware that are able to capture a student's choice of answers have an in-built repository of choice permutations. Simulations also require sets of complex algorithms that are able to assess and draw conclusions on each individual user's performance profile.

The Computer-as-Pupil

This type of courseware aims to allow learners to construct knowledge and develop problem-solving skills as they interact with the computer. An example of this constructivist approach (Crook, 1994) to help learners acquire programming skills is the popular LOGO environment in which a robotic creature/computer graphic, such as a Turtle, is instructed to move around by typing commands into the computer, thereby drawing shapes, designs, and pictures (The Logo Foundation, 2000).

The Intelligent Assistant

This courseware authoring method aims to provide support as the learner interacts with the programme. One example of a software programme created based on this strategy is the Microsoft Office Assistant that appears as an animated miniature graphic and offers you guidance while you work with Microsoft Office.

According to Keller (pp. 187 & 197), when an intelligent assistant is built into a courseware, it monitors the learner's progress and gives help when help is deemed to be needed as the learner engages with the programme. In this way, the learner's thinking is challenged and alternatives are presented. By constantly confronting and forcing the learner to clarify his/her ideas, the intelligent assistant shifts the learner away from a passive mode towards becoming an active participant in the learning journey through machine/user conversation.

Although the intelligent assistant strategy may seem similar to the Socratic approach, there is a distinct difference between the two. The Socratic approach creates an environment of continuous dialogue; in contrast, the intelligent assistant strategy invokes dialogue when it is assumed it is needed.

Conclusion

Despite the large number of courseware authoring strategies available, there is no single correct or complete strategy that can address each and every instructional problem. As Keller notes, "courseware cannot directly find out from the student what it needs to know, and so instructional decisions must be based on partial and inferential knowledge" (p. 195). In addition, computer courseware cannot ascertain a student's motivational level in the same degree that a human teacher can. Consequently before designing courseware, it is important that a thorough needs analysis be carried out first so as to determine which authoring strategy is the most appropriate for the job.

References

- Bork, Alfred. (1981). *Learning with Computers*. Bedford, Mass, USA: Digital Equipment Corporation.
- Criswell, Eleanor L. (1989). *The Design of Computer-Based Instruction*. New York: Macmillan Publishing Company.
- Crook, C. (1994). *Computers and the Collaborative Experience of Learning*. Chatham, Kent: Mackays.
- Keller, Arnold. (1987). *When Machines Teach: Designing Computer Courseware*. New York: Harper & Row Publishes, Inc.
- The Logo Foundation. (2000). 'What is Logo?'. <http://el.www.media.mit.edu/groups/logo-foundation/logo/index.html>. (Accessed: 15 January 2002). ■

Towards a Blended Design for e-Learning

Associate Professor Chen Ai Yen & Associate Professor Tan Oon Seng
National Institute of Education, Nanyang Technological University

The Challenge

With the proliferation and increasing use of Information Communication Technology (ICT), how people communicate and access information has improved in efficiency and efficacy. While people may love to surf the Web, enjoy email and readily employ other modes of ICT, it is unclear if they would want to embark on more formal learning on the Web, which is an aspect of e-Learning.

What is e-Learning? e-Learning is not just about learning on the Web. Elliott Masie, President of the Masie Center, believes that "e-Learning should change the **experience** of learning. It should **extend** learning choices and it should **expand** training options beyond the limitations of the classroom" (Rosenberg, 2001: 37-38).

Because e-Learning is so close to us, we cannot ignore it. But are we aware of its utility? Two years or so ago, the e-

Learning business was one of the gold rushes of the dot.com fever with many predictions on the high return-on-investment of e-Learning. To date, “nearly all the e-learning companies have yet to earn a profit” (Welber, January 2002). Now some providers are asking themselves:

- What really are the needs of potential e-Learning clients?
- After all the piloting and experimentation, is there now a trustworthy model of e-Learning?
- Is there really an emerging generation of e-Learners?
- Can technology re-define needs and the ways people learn?
- Are web learners developing sustainable deep learning and how do they do so?

Whilst technologies continue to proliferate and standards and benchmarks continue to evolve, there unfortunately seems to be a lack of clarity about the why, what and how of e-Learning.

The Response

To establish the rationale behind e-Learning we argue that as teachers, the anchor should be our teaching vision, mission and beliefs embedded in our core knowledge, expertise and activities. The face-to-face, teacher-students interaction that takes place when students learn the complexities and heuristics of thinking, problem-solving and applications unique to the domain of our professional field or ‘expertise’ cannot be easily replaced by current methods of e-Learning. Perhaps artificial intelligence and more sophisticated multimedia delivery and interaction will assist in more domains of metacognition in learning in the future. But it is probably a myth that most people are willing to sit in front of a computer or a formal programme like educational videos or video recordings of lectures. One wonders how many distance learning students, when given a set of 20 lectures on video, faithfully go through each of them.

Besides offering content, many online providers are struggling with designs of interactivity. Many universities and online companies have invested heavily in attempts to use the right timely technology and instructional design. For instance on 4 April 2001, the American Massachusetts Institute of Technology (MIT) announced its OCW (OpenCourseWare) and promised to put a comprehensive range of its professors’ course materials for *free* access to the world. At the moment, there is still nothing on the MIT website (<http://web.mit.edu/ocw/>); but it is promised that some 100 or so courses will be uploaded by September 2002.

In the MIT approach, e-Learning is solely about making content available and interaction is not an issue. MIT has made clear that it will not make its courses generally available for interaction, as the OCW is not intended to take the place of an MIT education. For MIT, a student’s education occurs through face-to-face interaction with the professors, rather than through sophisticated platforms: what happens on campus is primarily an access to a variety of course content and a greater awareness and sharing of the scope of each professor’s knowledge, expertise and inspirational personal qualities.

While we can admire MIT’s generosity in sharing its course contents, what we can learn from the MIT approach is that we should not stress on the sophistication of human-machine interaction. Instead, we should strive for a correct blend of purposes, passion, content and methods using technology to achieve and enhance what we teachers and academics have and are good at.

Beyond Standards, Templates & Technology: The ‘Right’ Blending & Focus in e-Learning

If e-Learning is not just about accessing static content or the capacity for interaction, what should be the focus? What should be the e-Learning standards? Is there a model or some kind of good template for instructional design? Given that learners and teachers in the new millennium face some urgent learning problems [i.e. (1) too much content to be covered in too limited time, (2) too many learners with diverse needs and interests, (3) too many problems and issues demanding solutions], we would like to argue that a problem-focused approach, a less-explored paradigm, is more suitable than giving priority attention to standards, templates and technology.

Consider the MIT approach where the core content knowledge is provided on the Internet, which in some ways address the first two learning problems mentioned above. Problem (2) cannot be solely addressed by technology. Face-to-face teaching and interactions on campus where learners see at first hand how their teacher-experts facilitate learning and cognition will still have to be blended with IT usage.

In this blend of learning, we believe that all learning begins with a presentation of a real-world problem or scenario. As Tan, *et al.* (2000) has observed, “the search for educational methodologies that emphasise real world challenges, higher order thinking skills, multi-disciplinary learning, independent learning, e-learning, information and knowledge management and collaborative skills appear to have a confluence in problem-based learning” (p. xi). Consequently to enhance a combination of face-to-face teaching and IT usage, problem-based learning approaches should be incorporated.

The reasons for this stand are as follows: Although technology can augment the reality of the ‘problem’ presentation, it is unable to provide the solution. Although technology can increase the learners’ information about the world with its ease of accessibility and interaction, it cannot encourage and inspire how to solve messy real-life problems that professionals encounter in their different fields and daily life. At the most, technology may trigger the need to learn, communicate and collaborate. Because technology alone does not automatically lead to successful learning, it is necessary to look for more holistic teaching methodologies that optimise good usage of technology.

Educators have always appreciated the value of using problems to stimulate learning and enhance the quality of thinking. But deciding when to pose a problem and what should be the scope of the problem has in the past been limited by the learner’s availability of, and accessibility to, information.

In contrast, the IT revolution has brought about two new changes. First, the roles of educators have been re-defined: teachers have now become coaches, facilitators and designers of learning and seek to empower students to become more independent learners who can make better use of the accessibility and wealth of knowledge and information (although students do not always like this aim and prefer to be spoon-fed).

Second, the advent of online learning has brought about new paradigms and approaches in the presentation of problems and the learning of problem-enquiry and problem-solving processes. Teaching in this new paradigm requires a blending of human-to-human facilitation and human-machine interaction; in addition, problems are used as triggers to enhance knowledge sharing and enterprise. Hence when teachers ask questions, these questions should focus on the key learning problems to be solved. When designing and developing courses with essential content to be learnt, questions that are posed to students should be linked to basic instructional design elements (e.g. learning goals, objectives, content, participants' needs, instructional and learning methods and procedures, resources and technologies, evaluation and feedback).

e-Learning should not be just about changing the mode of delivery and the retrieval of content for information focusing on a single discipline. By incorporating problem-based learning approaches into e-Learning, not only do we gain a fresh perspective to e-Learning, but we can now see clearly that the problem-focused e-Learning approach is about:

- changing the paradigm of learning;
- actively defining the scope and goals of learning;
- the learning of heuristics;
- the learning of thinking processes;
- activating prior knowledge;
- being inevitably engaged in the learning process;
- optimising flexibility;
- having a multi-disciplinary approach;
- encouraging divergence; and
- constructing solutions to unstructured, real-world problems.

Hope & Expectation of Problem-focused e-Learning

We hope our problem-focused e-Learning idea provides a different angle of contemplation for those intending to use e-Learning. Apart from learning to be facilitators of the learning process, we need a new paradigm to see ourselves confronting and solving problems as well as being designers of the learning environment. To decide how much of the problem-focused approach should be face-to-face and how much online, it is thus important to consider the following three points:

- the *how* of e-Learning is deriving the right blend based on your own belief, mission and core competence;
- the *what* of e-Learning is being problem-focused rather than concentrating on content, interactivity and standards; and
- the *why* of e-Learning is about technology enhancing our access to information and expertise that helps us solve messy real-life problems.

References

- Rosenberg, Marc J. (2001). *E-Learning-Strategies for Delivering Knowledge in the Digital Age*. New York: McGraw-Hill. p. 37–38.
- Tan, O.S.; Little, P.; Hee, S.Y. & Conway, J. (2000) *Problem-based learning: Educational innovation across disciplines*. Singapore: Temasek Centre for Problem-based Learning.
- Welber, Michael. (January 2002). 'Where We've Been & Where We're Going: A Look at the Future of e-learning'. http://www.elearningmag.com/elearning/article/article_Detail.jsp?id=6703. (Accessed: 26 February 2002). ■



The Centre for Development of Teaching and Learning (CDTL) engages in a wide range of activities to promote good teaching and learning at the National University of Singapore, including professional development, teaching and learning support, research on educational issues, and instructional design and development.

contributors

D. Paul Gagnon
Gilles Doiron
Madhumita Bhattacharya
Alfred Low
Chen Ai Yen
Tan Oon Seng

advisor

Daphne Pan

editors

Verena Tay
Christina Low

layout

Ma Lin Lin

© 2002 *CDTL Brief* is published by the Centre for Development of Teaching and Learning. Reproduction in whole or in part of any material in this publication without the written permission of CDTL is expressly prohibited.

The views expressed or implied in *CDTL Brief* do not necessarily reflect the views of CDTL. An online version is available at our web site.

Comments, suggestions and contributions should be addressed to:

The Editor, *CDTL Brief*
Centre for Development of Teaching and Learning
Central Library Annexe, Level 6
National University of Singapore
10 Kent Ridge Crescent
Singapore 119260

Tel: (65) 6874-3052
Fax: (65) 6777-0342
Email: cdtpost@nus.edu.sg
<http://www.cdtl.nus.edu.sg>