

Reflections ON PBL

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Technology and PBL

The Mind Behind the Computer: The Roar of Leo in The Republic

Through an email interview, we chat with Dr. Albert Miao, head of the team developing the Learning Management System (LMS) otherwise known as LEO (Learning Environment Online), about the learning tool that gets a million hits a day.

1. How would you describe LEO as a LMS?

LEO is a customisation of a generic LMS into a platform that closely supports the activities of our polytechnic's problem-based learning processes. RP's special PBL methodology -- together with its wireless, paperless policy -- means that its LMS needs to fit the institution like a glove.

2. What distinguishes LEO from other e-learning platforms used in places like NUS, NTU and other polytechnics?

Educational institutions, up to now, have conducted lessons mainly with hardcopy materials for a long time. It is not easy for staff and students in any institution to adopt a campus-wide LMS. One other challenge is that both students and staff need to be equipped with their own notebooks in order to derive full benefit from an LMS. RP was fortunate to have visionary leaders who were convinced that the time was right for a change. Instead of starting with paper and making a transition to a paperless environment, we boldly launched straight into an online virtual learning climate.

In addition, with RP's common learning process, every module conducted by every school and centre was to be based on this process. Thus LEO could more easily be designed to support such an academic need.

3. When your team was developing LEO, what pedagogical issues and input were sought from the academic staff?

The LEO development team was fortunate to have access to a generally clear and decisive vision about how our platform was to be used. The core PBL designers -- Dr. W. A. M. Alwis, Director of Academic Affairs and Glen O' Grady, Deputy Director of the Centre for Educational Development -- were able to visualise and describe many aspects of the PBL activities. We knew early on how students would be arranged into groups and teams, how many meetings they

would have each day, what constituted a reflection journal, how documents were to be shared, how assessment would take place and so on. In short, the LEO team needed to know how the pedagogical concepts would be translated into concrete actions by students and academic staff.

Together with enthusiastic input from staff and a close working relationship between the teaching and IT support staff, we managed to build a picture of how LEO was going to support the teaching and learning needs of the institution.

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Technology & PBL



In this issue we explore the use of technology in Problem-Based Learning settings. Before I comment on this, I wish to reflect briefly on the broader connection of technology and education.

The Centre for Strategic and International Studies in Washington DC predicts, unsurprisingly perhaps, that in the next 25 years, advances in computation, genomics and nanotechnology will drive major technological changes. These advances in technology coupled with expanded information flows, spanned geographies and reduced time lags in communication will help to revolutionise the world we live in. It is not hard to see already the development of knowledge economies, diffusions of knowledge, and inequalities in the distribution of knowledge. All of which are changing the shape of the world that we live in.

However, what is not readily apparent is how technology will revolutionise the classroom. We can already see technology effecting some changes with the emergence of new disciplines with new ideas worthy of study and discussion. These new disciplines are already challenging established disciplinary boundaries resulting in an emphasis on inter-disciplinary approaches to education.

Over the last two decades, there has been a fierce debate raging about how technology could or should change the way education is fundamentally organised, with predictions that the traditional classroom will disappear because of its rigidity in terms of time and space. Some have suggested that the traditional classroom would be replaced with more efficient systems that allow students to learn anywhere and at any time. Others suggest the classroom will remain but there would be a radical transformation in what will happen in the classroom because of the potential technology has in supporting or enhancing learning through the increased flow and exploration of information. Some researchers have gone on to argue that technology has the potential to transform the way students think and construct knowledge. These researchers describe technology in terms of environments that engage learners in processes that would better enable them to make sense of the world around them.

Currently, many technology enthusiasts in education are advocating a "blended" approach to learning. Wherein numerous modes are used to facilitate learning, however, what is becoming apparent is that the process of blending modes of learning along with other developments in cognition, brain research, sociology and economics of education, are challenging established beliefs in education.

So how should technology be used in PBL? How can technology emphasise the reflexive nature of PBL that focuses on both the act (process) and consequence (outcome) of leaning? In PBL learners and teachers can reflect, discuss and critique how technology, in the context of problem at hand, is being used to access, measure, analyse and share information. Students may wish to explore the value or the shortcomings of the associated technology, its bias and predispositions to reinforcing or challenging established practices, its cost or efficiency. Students may also express how the technology encouraged them to think or communicate in certain ways. The article on The Republic's LEO system shows how technology can be used of PBL to support the outcome of independent and flexible learners. However, it also provides some insight into how technology can be used in PBL to better understand how the learner learns by capturing forms of communications, ways of knowing, and means used to legitimise knowledge.

Perhaps what is really exciting about PBL and technology is not just how it can enrich learning by making problems more relevant to the workplace (i.e. using a microscope to describe the functions of a cell), but it, can also help to map the change in the learning processes that will occur with the use of more advance technologies, (i.e. how do you use a microscope to understand the functions of a cell) hence allowing educators to constantly discover and rediscover how students learn in a changing technological world.

What is significant about the predictions of the Centre for Strategic and International Studies is that they suggest the revolutions in technology, together with revolutions in population growth, allocation and distribution of resources, global integration, conflict and governance will lead to, in the space of just 25 years, a very different, almost an unimaginable world of which we hope a PBL education grounded in technology prepares both students and teachers. ■



Glen O'Grady,
Editor

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4. In what way does LEO support or align itself with the principles of PBL? To what extent do you think the pedagogical objectives have been fulfilled?

There are a number of ways in which PBL principles are actually convergent with a system like LEO. For one, LEO is not a learning content repository. At the heart of PBL, students seek their own answers! So LEO is relieved of having to link to predetermined bodies of knowledge stores.


Furthermore, PBL includes the need for frequent self-reflection, self-assessment and feedback. These are often thoughts and epiphanies that originate at various times and places and by different people -- e.g., through peer assessment or the facilitator's feedback. Such bits of information are quite difficult to capture, disseminate and collate using pen-and-paper means, but they are easily done over a web-based platform.

Again, our PBL method requires daily mini-quizzes, for both formative assessment (including students' own awareness of strengths and weaknesses) and summative assessment (where facilitators get an idea of what students are able to do). Moreover, the questions need to be frequently and quickly delivered to students, to be controlled in a flexible manner, to be efficiently marked, and to have their daily scores made available instantly if desired. These aims are all easily achieved on an online platform.

5. What is your vision for Leo in the next few years?

LEO cannot remain the way it is for too long largely because we are a progressive and learning community. Already we hear about a number of ideas for improvement in the pedagogy itself. These will invariably translate into system changes. Also, staff who use the system daily are constantly thinking about how their work can be done more effectively and efficiently, and many of these ideas are to do with Leo.

My over-riding wish for Leo is that it can have its interface transformed into a more visual and less textual one. The main workspace should be iconic, user-sensitive and context-sensitive, and functions should be so well thought-out that there is no need for any other help. Think of a Flash-type interface, or even a game-type interface, to see what I mean. It is not impossible, and we may get there soon. For those of you who agree, drop me an email in support! ■



Think
about
it.

Wired to Learning the Wireless Way

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Fancy attending school with no paper and pen, and better yet no books! How about the ability to access learning materials, email facilitators or discuss a problem online anywhere, anytime with a notebook? Here at RP, students are doing exactly just that!

At RP, we use LEO (Learning Environment Online) as a key learning tool for both staff and students. LEO is a total learning platform which allows students to access their problems, submit their presentation, do their quiz, evaluations and daily reflections. The systems even allows the students to take their Understanding Tests and check their grades online. This has provided much convenience for the students as all they need to do is to access LEO and everything they need for their lessons becomes available at their finger tips.

One of the other key uses of LEO outside the classroom has been the ability to allow students to link up with one another whether it may be for their classroom work or for CCA purposes, allowing for communication between students through discussion boards, instant messaging system, chat rooms, forums and emails.

With the Instant Messaging Board in LEO, students can easily post announcements which are urgent and require the immediate action and attention of the students. At RP, all students make it a point to check their emails daily to make sure that they do not miss out any important information that is useful to them.

The forum in LEO provides opportunities for Republicans to express their thoughts and views about issues happening within the Poly. Some use the forum to discuss certain issues and voice out their opinions on certain topics, as well as to suggest ways to improve programmes offered by RP. In our LEO forum, e-marketplaces have also been created for students to use as a means of selling some of their items, as well as finding items they want. That's cool, isn't it!

The best thing about LEO is its partnership with the wireless campus! Yes, at RP, students work wirelessly anywhere and anytime on the campus. Students are able to use their notebooks to access LEO everywhere on campus, creating a learning process that is definitely NOT restricted to the classroom.

Going wireless in RP is therefore a very central part of every Republican's life! Republicans certainly need no wires to electrify learning at RP! ▣

SIT Problem

Stop SPAM!

E-mail is one of the fastest and cheapest methods of sending information to another person or even a whole group of people. It has helped many save time and money. Learning how email as a system works is important in a diploma on Information and Communications Technology.

An online report entitled "Spam could ruin e-mail" by Reuters cited various government representatives in Washington lashing out against the damaging consequences of certain businesses who abuse email by sending unsolicited commercial e-mail messages, better known as "spam". Sending spam, or spamming, poses problems, which according to Internet experts, are so severe that it is threatening to overwhelm the Internet's most popular application.

The Reuters report, with its authenticity, brevity and its relevance to understanding how email as a system works attracted problem-designers from the School of Information and Communications Technology to incorporate it as part of the trigger for a PBL problem in their Computers and I.T. module. They came up with the following problem trigger.

Problem Trigger

"Spam is threatening to destroy the benefits of e-mail," reported Daily Times on 5 May 2003 (http://www.dailytimes.com.pk/default.asp?page=story_5-5-2003_pg6_2).

It has caused companies huge loss of profits and is an annoyance to end users.

Propose a solution and explain how it addresses the problem.

Using the current concerns people have with spam as an issue, the problem trigger is designed to help students to achieve the objective of understanding how e-mail systems work.

In the course of finding out about spam, students will look at resources that define spam. Students will typically find that spam refers to unwanted or unsolicited commercial e-mail. (They may even discover that it originally referred to canned meat from Hormel Foods Corporation.) So, the question that students have to ask themselves is how to stop unwanted e-mail. In their investigation of e-mail systems, students would identify some key technical components of e-mails like:

- E-mail originates from one sender, and has one or multiple recipients
- Special e-mail software is used for sending and receiving e-mail
- E-mail is routed by e-mail servers on the Internet
- There are at least two levels where e-mail can be "managed" - server and client.

Students will realise that very low cost coupled with the ease of sending to a large body of recipients have made e-mail susceptible to spamming. Students could already see some of the harm that spam does. Spam depletes precious network bandwidth as well as deprives genuine marketing messages from being read. Students will realise that spam poses both technological as well as socio-ethical problems. On the technological side, spam, which is normally sent in very huge numbers, strains the e-mail servers, i.e.: computers which forwards e-mail like post offices. On the socio-ethical side, spam repeatedly annoys recipients to the extent that commercial e-mails become summarily deleted. Honest businesses become victims when their e-mails never get read.

Now that students have found out what are the components of e-mail, they would be able to analyse how spam can be limited at the component level. So, for example, since e-mail must originate from a sender, governments could pass laws to ban the sending of an e-mail to a large number of people. However, this could penalize people who legitimately want to send such e-mails. Take for example, a University sending an email to all of its Alumni.

One other solution might be to use "filters" in the e-mail servers so that spam can be sifted out before it is routed further. Also, filters have been used by e-mail software to automatically delete spam for the recipients.

Students were expected to analyse the feasibility and effectiveness of each of the solution. For example, students found that filters used to pick out potential spam by their subject titles are easily defeated by deceptive titles like "urgent message", "your order" and so on. The difficulty is in distinguishing the genuine e-mail messages from spam.

As RP uses the Problem Based Learning (PBL) approach, students were not explicitly instructed on whether to focus on technological or socio-ethical approaches to combat spam. The students managed to discuss a variety of solutions, including using filters, being prudent in giving out e-mail addresses, fines for spammers and so on. Over and above, the students demonstrated an understanding that anti-spam approaches are ineffective when applied separately. Such appreciation is only possible when the students have understood how e-mail systems work.

By using the PBL approach to get students to engage in common problems like spam, students explore underlying concepts, in this case e-mail, as well as develop the ability to question and to explore creative solutions to solve real life problems. From the feedback received from the facilitators, the students have managed to accomplish the objectives for the problem very well. ■

Three 'C's of Technology



In his book, "The Power of PBL", George Watson discusses the relationship between PBL and technology in a chapter entitled "Problem Based Learning (PBL) and the Three 'C's of technology". In it, Watson commented that the availability of Internet and electric communications have empowered students to work more expeditiously and more efficient. Here is an extract from the chapter.

Technology has certainly changed the learning experience for today's students, and PBL challenges educators to provide the best opportunities for students to learn. An equally important challenge for educators is to embrace the use of instructional technology for providing effective opportunities for students to access and acquire information as well as to communicate with their peers and with instructors as they learn via PBL. The following is three ways in which technology and PBL can enhance the learning experience for students.

WEBSITES TO ORGANISE A PBL COURSE

Most instructors see the merit of using Internet resources in their courses and many are currently supplementing their courses with custom individualised websites. Significant attention has been directed to the creation and use of websites in teaching by numerous entities. Nevertheless, there are a number of features associated with using the web in teaching that should be emphasised specific to PBL.

Numerous PBL practitioners have written eloquently on the subject and have made their motivational material available online. With the author's permission, much of the PBL orientation in the course syllabus may be borrowed and incorporated in one's own website.

Organisation of (study) groups can also be facilitated by the creation of a course website. Group listings of individual names, e-mail addresses, links to personal homepages, and photos are useful for getting the permanent groups started. Furthermore, a number of Internet and web-based applications are also available to facilitate conversations and problem solving among the members of the group. These communication tools allow group members to share files, coordinating calendars, posting messages etc.

INTEGRATING ONLINE RESOURCES WITH PBL

Before the advent of the internet, students engaged in PBL would typically resolve their learning issues by relying on material in their textbooks or supplemental resources found at the library. Today, students routinely turn to the Internet for resources. As educators, we recognise that the web is full of misinformation, biased representation, and even flat-out lies. However, this provides an opportunity to work with students to develop their critical thinking skills in the context of evaluating online resources. Critical thinking skills are also exercised in the process of executing web searches effectively. Thus finding and evaluating the broad array of resources needed for resolving learning issues in the PBL classroom helps develop the critical habits of mind and the ability to learn to learn that is such an important part of PBL.

If finding and evaluating resources is not a significant objective for a course, the instructor may instead post relevant URLs for problem assignments. This can be conveniently done via a web page associated with each problem; many versions of e-mail software now also support embedded URLs in e-mail messages.

Setting a PBL problem in a current context is an excellent way to generate student interest in the problem. Newspaper articles that catch our attention often serve as

the basis for new problems or for updates of existing problems. The online availability of major newspapers, as well as many regional papers, facilitates a wider variety of perspectives on current events. Problem writing may be improved by turning to regional papers for the extensive local coverage of an event that receives moderate attention in a national newspaper. Students may similarly be directed to online newspapers as resources for solving problems.

PBL CLEARINGHOUSE

The web is also an excellent venue for sharing problems designed for PBL courses. One goal of the PBL clearinghouse is to make available field-tested problems in all disciplines. Problems are submitted online to an editorial panel for peer review. Supporting material such as Format of Delivery, Student Learning Objective, Student and Instructor Resources, Author's Teaching Notes, Assessment Strategies, and Solution Notes are associated with each problem. Problems published in the clearinghouse are electronically searchable by Keyword, Discipline, or Author. Through The peer-review process the clearinghouse aims to elevate the creative and scholarly aspects of problem writing to a more readily recognizable and rewarding level. In addition the clearinghouse will publish articles and tutorials to support its mission to demonstrate and disseminate PBL as a superior teaching methodology in short, we hope that the PBL online clearinghouse will become a one-stop shop for educators looking for PBL materials and resources. ■

Reference:
Watson, G, problem-Based Learning and the Three 'C's of Technology in: The Power of Problem-Based Learning -- A Practical "How to" for Teaching courses in any Discipline" Duch, B (ed.al), 2001, Stylus Publishing LLC, Virginia.

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Events

Problem-Based Learning: Opportunities for Exploration Conferences and Workshops

Conference / Workshop	Date	Location	Website
Global Conference on Excellence in Education and Training	May 20-22, 2004	Singapore Polytechnic, Singapore	http://www.sp.edu.sg/GCEET/
Gifted Education Conference	Jun 3-5, 2004	National Institute of Education, Singapore	http://geconf.edu.sg/
Lifelong Learning Conference 2004	Jun 13-16, 2004	Central Queensland University, Australia	http://lifelonglearning.cqu.edu.au/symposia-aldred.htm
PBL 2004 International Conference	Jun 13-19, 2004	Tecnologico De Monterrey, Mexico	http://www.cem.itesm.mx/pbl2004/
Problem-Based Learning: A Quality Experience?	Sep 15-17, 2004	University of Salford, Salford, UK	http://www.salford.ac.uk/news/details/219



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