The Role of Problem-Based Learning in Distance Education

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Problem-Based Learning

With the growing need to promote students' abilities to reason and apply knowledge, the use of problem-based learning (PBL) approaches in higher education has increased during the past decade. Consistent with current thinking, the term PBL has been given a broad definition for the context of this project. It encompasses any situation in which an initial problem, case or situation is presented to students as the catalyst for the learning that will occur. The problems are usually tailor-made for the situation so that the outcomes of the exercise will meet the course objectives. The students identify areas of skills and knowledge that need to be acquired and use this to guide their studies. Students are required to reason and apply this knowledge, and the learning that has occurred in working with the problem is integrated into their existing body of skills and knowledge

There are, of course, some disadvantages to using problem-based learning, one of which is that it can be time consuming, particularly in early stages when students are still uncertain how to go about the process (Edwards, 1997). Many lecturers have expressed concern about whether sufficient knowledge can be conveyed through a PBL format and whether students have sufficient prior experience to be able to benefit from the problem-solving situation (Trevitt and Grealish, 1994). Another concern is that when students are initially confronted with this approach many are suspicious about its value, particularly if they have previously been used to teacher-centred approaches (Ulmer, 1994; Felder and Brent, 1996). Nevertheless, research has indicated that students are usually more motivated to

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acquire knowledge in the context of solving a problem than they are if the content is delivered out of context (Idrus, 1993; Schiller et al., 1994). They are also more likely to be able to generalise that knowledge to new situations (Chappell and Hager, 1992). PBL approaches have successfully promoted higher-order thinking skills, such as analysis and synthesis (Idrus, 1993). Kemp (1995) reported that students were able to benefit from being able to apply and test the theory they had learned in real life situations. Furthermore, Schiller et al. (1994) reported that students seemed to think their long-term goals, including employment and success, are better met by PBL than by more teacher-centred approaches. Moreover, the advantages are not only to the students, there is also evidence to suggest that lecturers can be enriched by learning from the students' experiences and discoveries (Kemp, 1995).

PBL and Distance Education in Hong Kong

Recently PBL has been introduced into the university system in Hong Kong with considerable success. Nevertheless, some people still claim that a student-centred, time-consuming teaching approach such as PBL is doomed to failure in Hong Kong because it is so vastly different from the traditions of the Hong Kong learner - and particularly so with the adult part-time learner studying in distance mode. However, the challenge has been issued for distance educators to "be seen as the first agents of change both in the way they design their courses and in the way those courses are delivered and assessed" (Dhanarajan, 1998, p.15). Schiller et al. (1994) have indicated the potential to integrate PBL and distance education successfully.

It is true that there appear to be some discrepancies between the nature of PBL and the nature of distance education, particularly of adult Chinese learners. For example, Robinson (1998) stated that "Chinese education is firmly based on knowledge transmission with a single curriculum (often a single textbook). Making the curriculum relevant to everyday life has low priority" (p.371). This is of course clearly inconsistent with the notion of PBL, which depends on situations being presented in real world contexts. Another commonly acknowledged characteristic of Chinese students is that they prefer to be passive learners, with the teacher seen as the source of information and "success in learning often seen as the reproduction of what the teacher has taught" (Robinson, 1998, p.371). These learning styles may be at odds with the student-directed, enquiring and challenging nature of PBL. Furthermore, whereas PBL relies heavily on students' intrinsic motivation, many Chinese students are "mostly driven by extrinsic motivation to learn (rewards of qualifications, social status and salary)" (Robinson, 1998, p.371).

In Hong Kong, time is a massive constraint for distance education students, especially if they are in full-time employment and trying to cover the maximum amount of course requirements in the minimum amount of time. This again is at odds with philosophies of PBL that there needs to be time for discussion, reflection, and the location - by the students - of resources that can clarify the problem situation.

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Given the discrepancies between the nature of PBL and the acknowledged nature of distance education in Hong Kong, it is understandable that critics have doubts about its potential success. In the series of projects described in this paper, it is acknowledged that the characteristics of the distance education environment make it more difficult to implement alternative teaching approaches than it is in conventional face-to-face education, so we need to look at how the nature of distance education can be taken into account when designing a non-traditional learning experience such as PBL.

A research group at the Open University of Hong Kong (OUHK) has been exploring the role of PBL in the OUHK learning environment. One of the critical issues to be investigated is whether PBL environments will enhance the quality of students' learning, whether it is compatible with the needs and expectations of our students, and the factors that need to be considered if it is to be introduced successfully. The framework for this project is an action research model. Action research is based on the assumption that learning results from active experience and that learning and improvements occur through cyclic processes (Kember and Kelly, 1994). A typical action research cycle involves planning an innovation, taking action to implement it, fact-finding about the result of the action, and reflecting about the outcomes. Most action research projects go through several cycles, as the reflections from one develop into the action plan for the next.

This project consists of a number of small sub-projects that will be combined to give a holistic picture of the PBL experience at OUHK. This will enable the researchers to share pooled resources and experiences.

The First Cycle of the Project

From April 1998, a series of monthly lunch meetings was held. There were fourteen regular participants who are Course Co-ordinators in discipline areas including business management, accounting, English, Chinese, marketing, mathematics, nursing and health. After initial presentations by the project leader, and some open discussion about the rationale for PBL and examples of models used successfully by others, participants made informal presentations about the way in which they already used, or would like to use, PBL in their own courses, and to raise issues or questions of interest or concern to them. These issues and questions were used as the basis for group discussion, with a particular focus on what could be done to investigate or clarify them further.

In the semester that began in October 1998, participants conducted small-scale investigations enabling them to explore the issues and questions raised in the discussions. Some staff chose to work individually, and others to collaborate in small groups to investigate issues of common concern. As the projects progressed, parts of the lunchtime sessions were devoted to discussion of relevant research methodologies, and advice was given on a one-to-one basis to individual participants. Discussions were supported by a selection of relevant readings provided by the project leader.

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Five mini-action research projects were conducted, involving 10 of the 14 colleagues who had attended the workshops. Because of the scheduling of the courses in which they wanted to focus their research, two more participants were unable to carry out their own projects during the first year, but have developed projects for the second year based on their reflections during the workshops and questions raised in their own research. Bridget Swearse developed and implemented a series of situation-based assignment questions for Nursing students and monitored the key learning issues that arose from these. May Chan and Irene Siaw invited a group of Statistics students to express interest in attending a series of tutorials with a PBL focus that were additional to the other tutorial provisions made in the course. Eight of the students who accepted the invitation were randomly selected to participate in the tutorials. Questionnaires and interviews were used to collect evaluative data about the students' perceptions of the experience. Angela Leung, Peggy Kwok, Annie Lee and Susanna Chu also conducted a series of PBL tutorials with 44 students in a Chinese language course. Mabel Lam has been using a PBL-type approach to her tutor-marked assignments for several years in her Auditing course, in which students are given realistic work-based problems to solve as part of their assignments. She addressed the issues of whether her students really are self-directed as her approach assumes them to be, exactly what they think of the case study approach, and whether they believe it helps them to learn and retain the information more readily. In addition to this, she tried to elicit the nature of help that students typically seek from tutors in attempting their assignments and the extent to which tutors have had to modify their teaching approaches because of the problem-solving nature of the tasks. She asked students and tutors to reflect on their learning and tutoring processes in the course. The data were collected by questionnaire and interview. Seventy-seven out of a total of 121 students responded to the questionnaires, and three tutors were interviewed.

The fifth project of the first cycle was the monitoring and evaluation of the effectiveness of the project, participants' feelings about it, and their feelings and beliefs about PBL. Data were collected by individual semi-structured interviews and reflective diaries (Taplin and Leung, 1998; Leung, Taplin and Yum, 1999).

Outcomes of the First Cycle

The outcomes of these projects can be divided into three categories: those relating to the students, those concerned with the staff and their professional development needs, and those concerned with the development of appropriate tasks. The most common patterns resulting from the first cycle projects are summarised below

The Students

The majority of the students were positive about the knowledge and skills they developed from the problem-solving activities but adamant that it should be a component of their courses, rather than the only approach. There were some patterns in the aspects of their PBL experiences that the students responded to positively:

- opportunities for discussion and sharing of ideas with peers,

- achievement of success in solving problems that are challenging but within the students' reach,
- reflection on new knowledge and skills that have developed during the problem solving, so they are aware that learning is taking place,
- recognition that the tasks are relevant to their current or future "real world" needs,
- feedback and support from the facilitators to deal with their feelings of frustration and confusion when the problem-solving process became difficult.

As predicted, there were some tensions:

- students' dependence on the tutor, particularly in the early stages of the PBL projects,
- students' concern with the quantity than the quality of what they were learning and fear that they would learn less through PBL,
- students' concern that with PBL they might get "off track" and "waste time".

Instructors' Professional Development Needs

Some of the common responses from the participants are described below.

- Participants generally regarded PBL as a valuable educational strategy because it can equip students with critical thinking, creativity and the necessary knowledge, skills and attitudes to face problems,
- It is important to give support as they go through early stages of confusion and uncertainty about implementing PBL. Some participants admitted that they did not enjoy the workshops at first. In spite of their enthusiasm that the approach would be valuable for their students, they were unclear about the concept and nature of PBL. Some even expressed initial frustration, because they expected that the facilitator would give them answers in the workshop, instead of asking them to find their own answers through discussion and reading. However, as they began to find the answers that they needed in the discussions, they became more motivated in the workshops and were more willing to try out PBL in their courses.
- It is necessary to address and discuss strategies for overcoming potential obstacles to introducing PBL in distance education:
  - changing course materials is a complex process that requires the consensus of the whole course team and the external course assessor,
  - there are only four or five tutorials per course per semester and it is optional for students to attend these tutorials - it is necessary to create a balance so the adoption of a PBL approach will still allow time to cover the main objectives of the tutorials, namely to help students with their assignments and revision,
  - it is necessary to address potential resistance from students to PBL, particularly those who are typically passive learners who frequently express a need to be organised by others.
- A culture of collegial cross-discipline discussion and mutual support, as established in this project, is highly desirable.

Developing Appropriate Tasks

Participants reported that the careful design of an appropriate task is a critical component of a well-constructed PBL environment. They identified some key issues that should be considered in the design of tasks for all PBL environments, but particularly for students who are going to be working on these tasks in distance mode:

- the importance of identifying learning objectives and ensuring that the problem will encourage the students to meet these,
- the identification of the students' needs,
- guidelines to help the tutors who will be assessing the PBL exercise to understand the objectives of the tasks.

Implications of the First-Cycle Outcomes for Distance Education

As can be seen from the brief description of results, there were two main areas of concern for the project participants. About half of them had no previous knowledge about PBL, so a large part of the year was taken up with their coming to terms with what it is, how it can be implemented, and the strategies that need to be applied if it is to be used successfully. The other major concern was whether OUHK students would accept this kind of approach when they are typically accustomed to instructor-centred learning. It was necessary and important that these issues be investigated before further attempts to implement PBL could be made. From the outcomes of the first cycle, it is possible to make some recommendations about the application of PBL approaches in distance education in Hong Kong.

- The initial concerns that Hong Kong distance education students would reject attempts to introduce PBL approaches appear to be unfounded. However, due to their limited access to tutorials, it is recommended that PBL is combined with other appropriate teaching approaches. Also, due to the time constraints of adult part-time students and the limited time available for tutorials, it is recommended that some shortcuts be incorporated, for example the provision of appropriate resources from which students can draw the required information, and careful facilitation that prevents students from "getting off the track".
- While it is more difficult and complex to incorporate PBL into distance course materials than it is in conventional education settings, it is possible to utilise assignment questions and tutorial activities to create problem-based environments.
- Because tutors have a more prominent role in front-line interactions with students than in face-to-face institutions, careful professional development about the tutor's role of facilitator is essential.

With evidence of some success, measured by the generally positive responses from the students and tutors who experienced PBL in various ways, the participants now feel more confident to explore further how it can be used within the distance education environment.

Because the OUHK situation is unique in that the geographical distance separating students from the university is small, distance education at OUHK is a combination of "distance" and face-to-face delivery, so it is necessary to explore the role of PBL within this interface. Thus, in the first cycle, three of the projects were centred around the use of

tutorials to set up the PBL environment. At this stage there has not been very much attention paid to the establishment of PBL environments at a distance, for example through course materials or the appropriate use of technology. Now that the first-level questions have been answered with some degree of satisfaction, some of the second-cycle projects described below will all address these questions in various ways.

Issues to be Explored in the Second Cycle

The first cycle has addressed some important issues about whether students and tutors will accept PBL in their OUHK courses, but has raised further questions about how it can be implemented effectively. Issues currently under investigation in the second cycle include:

- the utilisation of on-line discussions to create PBL environments, and the nature and role of peer support and interaction in these environments,
- the potential role of PBL in tutorials designed to help students complete assignments,
- the role of the tutor in the PBL environment,
- students' metacognition of PBL processes,
- analysis of existing course materials to investigate opportunities for incorporating PBL.

Project 1: PBL Online
Investigator: Ms. Cecelia Tsui

One important area that needs to be investigated in distance education is how technology can best be utilised to create PBL environments for students working at a distance and not necessarily attending tutorials. The management course CE160 is suitable for using e-mail for aspects of the delivery. In this project, a series of four cases are being presented as a basis for tutor marked assignments. Work on each of these cases will last for 2-3 weeks. Each of the four cases will be facilitated by a guest on-line facilitator who is acknowledged as an expert on that particular topic. The course tutors' role will be to help the facilitators with the discussions. An important variable to be considered in this will be the nature and role of peer support and interaction (Visser, private correspondence, 1998).

Students will be divided into groups of 3-5 and they will decide how they will work together - whether in face-to-face meetings, electronically, or by telephone. They will be given clear guidelines about the expectations and responsibilities of each group and the learning objectives that they will be addressing. Each group will be responsible for posting progress reports on an electronic bulletin board at prescribed times, and it will be ensured that at least one member of each group has access to e-mail facilities so that this can be done. The guest facilitator will respond to these progress reports and will also be available to respond to the students' questions or requests for assistance. The way in which the facilitator will respond will depend on the nature of the students' postings and may include the delivery of an on-line lecture or advice about where the students can seek out further information for themselves. Students will submit their own individual assignments, but a component of the assessment will be based on records of the group's contributions to the e-mail discussions.

The project will be evaluated from the points of view of the course-co-ordinator, the facilitators and the students. Of particular concern will be the nature of the learning that occurs, the advantages and disadvantages of the on-line learning environment compared to more traditional tutorial environments, the quality and effectiveness of the peer support groups and the students' reflections on themselves as problem-solvers.

Project 2: PBL Online
Investigator: Ms. Angela Leung

This project will focus on the course 53510 Gerontology and will follow a similar approach to that described above, with Ms. Leung taking the role of facilitator.

Project 3: Restructuring the Tutorials to Create a PBL Environment
Investigator: Ms. Mabel Lam

PBL is already used to a certain extent in the course B406 Auditing, in that the assignments are already based on an audit case as well as featuring situation based questions. Currently, the role of the tutor in this process is to give assistance as and when the students require it. In the first cycle, the students' opinions about the use of case-based assignments were sought and were mostly found to be favourable.

One of the questions that arose from the first cycle was whether tutorials can be used more effectively to enhance the quality of students' learning and particularly to help them to focus more effectively on identifying the knowledge they need to be able to address the issues brought up in the case. For example, if the students are presented with the assignment question first, and have a purpose in mind as they work through the relevant course materials, will the learning be more effective, and how can the tutorials be capitalised on to help to enhance the effectiveness of learning? These questions will be explored in the second cycle. An extra tutorial will be included at the beginning of the presentation. Rather than using the traditional "question and answer" format, the tutors will set up the assignment case and have the students work in groups for an initial brainstorming about the information they will need to learn/find in order to be able to answer the question. After the first assignment has been submitted, questionnaires and interviews will monitor the tutors' and students' perceptions of the effectiveness of learning that has occurred from this approach. One question that will be of interest will be whether the students will use the groups established in the tutorials as a support structure as they continue to work on the problem, or whether they will prefer to work individually after the tutorial. The outcomes of this initial monitoring will determine the nature of the subsequent tutorials.

In order to give tutors an appropriate foundation in the use of PBL, they have participated in a professional development workshop designed to raise their understanding of the PBL process and their role within it.

Project 4: The Role of the Tutor in the PBL Environment

Investigators: Ms. May Chan and Ms. Irene Siaw

In the first cycle of the project, the course-co-ordinators undertook the role of tutors themselves to enable them to control the PBL environment that they were creating. However, this did not take into account the fact that in distance education it is the tutors who have the front-line contact with the students, and consequently their feelings and beliefs about PBL and their ability to implement in effectively are important considerations. Having explored their initial concerns about the students' reactions to PBL, the investigators have identified the next important step as being the tutors and their roles. The investigators, with the principal investigator, have conducted a professional development workshop for the tutors of the course M246 - Elements of Statistics. The tutors will then be asked to conduct four tutorials using PBL. Throughout this process interview, observation and reflective journals will be used to monitor developments in the tutors' confidence and ability to use PBL, their feelings and beliefs about its effectiveness, and their perceptions of the students' learning that occurs. Student questionnaires will also be used for triangulation of data. It should be noted that the outcomes of this project will provide valuable data to inform future professional development programmes for OUHK tutors, in PBL but also in other areas of development.

Project 5: Students' Reflections About Themselves as Problem Solvers
Investigator: Ms. Vanessa Mok

As the development of course materials for distance education is a long-term process involving a team of several contributors, it was not possible during the first cycle of the project to explore the feasibility of embedding PBL into course materials. Nevertheless, this is a critical component of distance education and an exploration of any teaching approach would be incomplete without considering it. CE010 (English) and CE060C (Chinese) are the two Pre-foundation Study Skills courses offered at OUHK. Although the course materials are not exactly the same, these two courses have the common aim of helping learners to acquire skills in problem solving that can be applied in their further studies. In fact, some problem-based activities are already provided in the materials and some tutors use a PBL approach in their tutorials. The two courses can therefore be used as a basis for investigating ways in which students approach PBL activities embedded in course materials. Of secondary interest, they can also be used to examine the effect of the language medium of instruction on the students' problem-solving processes.

As part of the course assessment, students are being asked to keep semi-structured journal reflections about their problem-solving experiences. These journals will be submitted at regular intervals to ensure that entries are being made formatively. In addition to the journals, a sample of 10 students (5 from each course) will be observed while they are working on at least two of the PBL activities and retrospective interviews will collect further data about their reflections on the process.

Project 6: Analysis of Opportunities to use PBL in OUHK Course Materials
Investigator: Ms. Annie Lee

Like Project 5, the focus of this project will also be the course materials. The investigator will undertake an in-depth analysis of the materials of the courses for which she is responsible. The purpose of the analysis will be to identify the teaching approaches that are used and places where there are opportunities to introduce PBL approaches.

Project 7: Factors Affecting Distance Educators' Professional Growth
Investigators: Dr. Margaret Taplin and Ms. Angela Leung

During the first cycle of the project, the investigators conducted regular semi-structured interviews with project participants. They were asked to identify aspects of PBL that were unclear to them and to reflect on their feelings about PBL in general and its application to distance education in particular, any significant issues that had influenced their feelings, and the potential pitfalls that they anticipated in implementing PBL in their courses. In the second cycle, the focus will be on the development of participants' knowledge about and skills to implement PBL, particularly with respect to task construction, the role of the facilitator, and tutor professional development.

Summary and Conclusion

The purpose of this paper has been to report outcomes of the first cycle of an action research project to investigate the implementation of PBL into distance education in Hong Kong and to describe the projects currently underway in the second cycle. The outcomes of the first cycle raised some implications and recommendations about
strategies for compromising so that busy part-time adult students can engage in PBL in a supportive environment. The outcomes of the first cycle also raised some further issues that are currently under investigation in the second cycle:

- the use of peer and other support networks, both face-to-face and on-line, to promote PBL;
- the PBL strategies used by students working alone,
- the way tutorials can be structured to promote PBL, given the constraints of tight time-schedules and part-time students,
- the problems that academics encounter during the application of new approaches to delivering distance education, and the strategies they use to address these problems.

From investigation of these issues, it is anticipated that further recommendations will be made that will enable distance educators to overcome the obstacles and constraints to implementing PBL environments in distance education and modify PBL approaches to suit the distance learning environment.

References

Chappell, C. & Hager, P. (1992). 'Problem-based learning and competency development'. *Paper presented at the Australian Association for Research in Education/New Zeasland Association for Research in Education Joint Conference*, Deakin University, Geelong.

Paper accepted for the 13th Annual Asian Association of Open Universities Conference, Beijing, China, October 17th-24th, 1999.

Dhanarajan, G. (1998). *Access to Learning and Asian Open Universities: In Context.* Plenary Address presented at the 12th Annual Conference of the Asian Association of Open Universities, Hong Kong SAR, November 4-6.

Edwards, R. (1987). 'Problem-based learning - an alternative teaching/learning strategy for TAFE colleges'. *Victorian TAFE Papers, No.6*, Melbourne: TAFE, 29-32.

Felder, R. & Brent, R. (1996). ' Navigating the bumpy road to student-centred instruction'. *College Teaching*. 44 (2): 43-47.

Idrus, R. (1993). Collaborative learning through teletutorials. *British Journal of Educational Technology*, 24 (3): 179-184.

Kember, D. & Kelly, M. (1994). *Improving the Quality of Teaching Through Action Learning Projects.* Hong Kong: Action Learning Project.

Kemp, S. (1995). Innovation in teaching case studies in tourism management. In Zelmer, A. (Ed.). *Higher Education: Blending Tradition and Technology. Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia*. HERDSA, 434-513.

Leung, A., Taplin, M. & Yum, J. (1998). *Problem-based Learning in Distance Education: Staff Development Through Action Research*. Paper presented at the International Conference on New Professionalism in Teaching: Teacher Education and Teacher Development in a Changing World, organised by Hong Kong Institute of Educational Research and Faculty of Education, The Chinese University of Hong Kong in collaboration with the International Research Network "PACT" (Professional Actions and Cultures of Teaching).

Robinson, B. (1998). Asian learners, Western models: Some discontinuities and issues for distance educators. *Proceedings of the 12th Annual Conference of the Asian Association of Open Universities, Hong Kong*. Part III, pp.370-375.

Schiller, J., Ostwald, M. & Chen, S. (1994). Implementing a problem-based, distance education undergraduate course in construction management. *Distance Education*, 15, 2, pp.300-317.

Taplin, M. & Leung, A. (1998). Learning about learning: a focus on problem-based learning in distance education. *The Asian Distance Learner: Proceedings of the 12th Annual Conference of the Asian Association of Open Universities*, The Open University of Hong Kong, 4-6 November, pp. 410-418.

Trevitt, C. & Grealish, L. (1994). Learning to crawl: development of problem-based learning as a teaching strategy, in Ostwald, M. & Kingsland, A. (Eds.). *Research and*

Development in Problem Based Learning. Newcastle, Australia: The University of Newcastle, 307-314.

Ulmer, A. (1994). Overcoming problems with problem based learning expectations. In Ostwald, M. & Kingsland, A. (Eds.). *Research and Development in Problem Based Learning*. Newcastle, Australia: The University of Newcastle, 315-327.

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