Utilizing Problem Based Learning in Pre-Service Teacher Education: Experiences of Prospective Teachers in Pakistan

Ms. Fouzia Ajmal[1], Professor Dr. Nabi Bux Jumani[2] & Professor Dr. Samina Malik[3]

Abstract

The quintessence of learning will be figuring out how to learn and think with a specific goal to meet the demands of the 21st century. Specifically, learners ought to be prepared to work in various situations with numerous unpredictable requirements. The present experimental study depicts the experiences of prospective teachers while studying a course through Problem Based Learning. The study was conducted by using a quasi-experimental design. The lecture-cum-discussion method was followed in the control group, whereas the lessons in the treatment group were implemented according to the 7-steps of Problem-Based Learning. A purposive sample of two groups (control and experimental group) of female prospective teachers studying the course of Educational Research enrolled in Department of Education, International Islamic University Islamabad was taken for the study. The experimental group (N=30) described their experiences of learning the course through PBL in interviews. The analysis was done through coding the responses and making themes.

Key Words: Problem Based Learning, Prospective Teachers, Experiences, Facilitation, Learning

1. Introduction

The National Policy on Education, Pakistan (2009) indicates that the curriculum should reflect the major social problems; provide more space for the development of critical thinking, problem solving skills, inquiry habits, self-directed learning abilities, and collaborative work among learners. There is a need for introducing reforms in teacher preparation programs as well. Prospective teachers struggle with theoretical issues and they feel less motivated to learn as there is gap between theory and practice paradigm and one reason may be that they are trained mostly through traditional methods. They are seldom prepared to solve and face the real problems of practical life. Therefore, there is a need for the educational environment that uses the real problems in which prospective teachers are exposed to problems which they have to deal with when they enter their professional life as teachers in private or public setup.

Problem Based Learning was designed for promoting various desired learning outcomes, which would help students to: develop skills to solve problems, development of self-directed learning skills, become effective collaborative learners, create a flexible knowledge base and become intrinsically motivated to learn (Barrows, 1986; Norman and Schmidt, 1992).Problem Based Learning is an approach to education in which complex problems act as a framework and motivation to learn. In PBL, students work in groups to take care of one or more perplexing issues related to real life. They develop skills in the gathering; blending and assessment of resources to characterize issues first and afterwards working on the problems to reach a conclusion or arrangement of the issue. Students also summarize the material and develop clear understanding of the concepts.

[1] Teaching and Research Associate, Department of Education, Faculty of Social Sciences, International Islamic University Islamabad, Pakistan. fouzia.ajmal@gmail.com
[2] Dean, Faculty of Social Sciences, International Islamic University Islamabad, Pakistan.
[3] Chairperson, Deptt of Education, Faculty of Social Sciences, International Islamic University Islamabad, Pakistan.

Unlike a traditional classroom, a faculty member is not the only deliverer of the huge bulk of knowledge, but his/her role is to facilitate the students in their search for adequate resources (Schmidt et al, 2009).

1.1 Statement of the Problem

Problem Based Learning is an effective strategy for teaching. In Pakistan, it is being used extensively in Medical Education. There is a need to adopt such student centered and innovative method for learning of prospective teachers so that they may be able to develop skills related to it and may be able to use this strategy in their future career as teachers. The study was conducted by using a quasi -experimental design which provided empirical indication on usefulness of PBL in a more controlled situation in Pre-service Teacher Education.

1.2 Objectives of the study

The study had the following objectives:

i.   To identify the activities this helped in preparing for Problem Based Learning.
ii.   To discuss about the facilitation received for individual and group learning.
iii.   To highlight the useful and difficult aspects experienced with Problem Based Learning.

1.3 Significance of the Study

It is hoped that the results of the present study have added to the existing body of knowledge related to use of Problem Based Learning (PBL) in Pre-Service Teacher Education. The results of the study have guided about the potential difficulties which could be faced during implementation of Problem Based Learning. This research can serve as a guideline for utilization of PBL in Pre-service teacher education in Pakistan.

2.   Review Of Related Literature

The embodiment of learning will be figuring out how to learn and figuring out how to think keeping in mind the end goal to meet the demands of the 21st century. Specifically, learners ought to be set up to work in various situations with numerous intricate necessities. Traditional lecturing method is content-driven and has been prevailing in many classrooms. These customary methodologies were seen to be suitable methodologies in the past but these techniques do not prepare learners with the abilities and qualities they require in their future workplaces. Conventional techniques for teaching neglect to motivate students in the learning procedure or support them to become dynamic learners (Duch, Groh, & Allen, 2001).

2.1 Problem Based Learning

Problem Based Learning (PBL) is an instructional method that confronts students with techniques of "how to learn?" through working in collaborative groups for finding the solutions to real world problems (Duch, Groh, & Allen, 2001). PBL uses problems of the "real world" as a context for students to learn critical thinking and problem-solving skills, and gain knowledge of the basic concepts of the subject. Through the use of PBL, students acquire the skills of lifelong learning, including the ability to find and use appropriate learning resources. Problem Based Learning (PBL) represents a major advance in educational practice that still affects the courses and disciplines all over the world (Werth, 2009).

The Problem Based Learning initiates learning from exposure to problems instead of the content knowledge. Students gain knowledge and skills through a series of steps in the context of the problems, along with accompanying educational materials and support from tutors who act as facilitators (Boud and Feletti, 1997). The problem is the first input for the students during the learning process. These problems arise in professional practice; in other cases, refer to events or problems typical to a particular field of study (Norman and Schmidt, 1992).

Problem Based Learning includes the development of curricula and strategies to develop the educational system to solve the problem on the one hand and disciplinary knowledge and skills on the other hand by placing students in an active role for the solution of ill-structured problems that reflect real-world problems (Finkle and Torp ,1995). Problems are structured in a way that students can retrieve their prior knowledge, work on the problems, and thus provoke discussions. Retrieval of prior knowledge is crucial for linking new information to it. Problems can incite debate when it contains references as opposing views, allowing students to generate arguments for and against each view and discuss which the best opinion is. Literature referred to what extent the problem can generate debate is the distinction between the well-structured and unstructured problems (Bruggen and Kirschner, 2003).5

Learning difficulties created in the group and activities guide students' self-study in Problem Based Learning. Problem Based Learning is not suitable when huge quantities of knowledge have to be delivered to students. The exercise of exposure to problems is essential to bridge the gap between formal institutional learning and more practical activities the learners may encounter in real practical life (Hmelo, 2004). A key element in the PBL approach is the level of cooperation in small groups. Groups usually consist of tutorial of 6-10 students who meet 2 to 3 hours per session, usually twice a week (Schmidt et al, 2007).

In PBL, learning is instigated by the students. The most common function at the level of the student in PBL is the self-directed learning (SDL). Savin and Claire (2000) noted that the feeling of being in charge and having an impact on learning situation is the main ingredient in the SDL. As for the learning tasks are concerned, easy to complex tasks sequence is used in the design of Problem Based Learning to solve problems, so that students begin from the easier problem and move gradually to more complex problems or similar experts. It's easy to sequence complex optimization of load reduction for the core with greater experience, allowing students to gain knowledge in the simplest tasks that reappear in more complex tasks, along with new information, to stimulate development (Van Merrienboer and Kirchner, 2007).

In order to maintain the balance in the PBL, institutions must take into account the changes in the schedule of teaching, class size, and the form of delivery and installation. PBL implementation has effects on the students' learning. These include using the method of PBL in most schools and universities, medical and engineering colleges ,using PBL and globalization in professional colleges of Pakistan which is in line with international standards , internationalization of private medical schools are also using PBL in Pakistan which is also a challenge to the medical colleges in the public sector to compete with the pace and place of equivalent education, and it is expected that the education system in Pakistan was adopting this new culture and make the rise in learning outcomes and outputs of education in the country (Yeo, 2005).

Problem is the description of a set of phenomena or events that require an explanation in terms of the basic process, and the mechanism or principle. A group of students work together to explain the phenomena or events specified in the particular problem. Small group discussions in Problem Based Learning enhance interaction among peers. Students answer a series of questions and give explanations and discuss the differences in opinions and understanding the concepts. These processes stimulate a deep knowledge of the subject. The cooperative and collaborative work in small groups also increases the ability to work in teams, a necessary skill in professional practice (Norman and Schmidt, 1992).

2.2 Steps in Problem Based Learning

The Problem Based Learning can be implemented through utilizing different approaches but one of the most widely used processes is 7 Steps (sometimes called 7-jump) Maastricht PBL approach. This approach provides the application of the principles of education in a systematic way to guide students to generate learning difficulties of this problem.

Maastricht approach of Problem Based Learning has the following steps:

1.   Illustrating concepts (defining terms)
2.   Defining the problem
3.   Problem analysis / brainstorming
4.   Classification
5.   The formulation of learning difficulties
6.   Self-study
7.   Discussing new knowledge

The first phase includes step 1-5 and it lasts 1-2 hours. This phase starts with definitions of terms and concepts which helps the group to start with a clear understanding of the terminology and concepts common to the problem. Then the students identify the problem or put a specific definition of the problem. The problem is clearly defined which helps to establish the limits of the problem under discussion. After that, analysis of the problem is done to update the current knowledge of the group and activate prior knowledge.

The students interpret important points contained in the classification and it helps to identify the interrelationships between the concepts and problems. Group builds a coherent description of the operations of logic and reasoning in the group. Learning disabilities may develop at this stage. The second phase includes self-study and it helps the students to locate the relevant literature and provides students with a list of items that are related to the problem. Students prefer to make a selection from a list of suitable materials. They connect the prior knowledge with new knowledge and prepare a report. The third phase includes the discussion of the newly acquired knowledge and generally, this phase is scheduled after a few days to allow time for personal study. This session lasts 1-2 hours. In this step the participation of all members of the group is required to respond to the learning issues generated previously. Students can ask questions and clarify the details of the new knowledge and test the depth of understanding and insight into these issues (Schmidt, 1983).

At the end of the tutorial groups and the reactions of the strengths of the group process and the issues that need to be improved are discussed in the group. Providing information and being well organized and timely feedback helps fruitful cooperation and aids to get more in-depth discussions. It is assumed that learning is an active process of building knowledge, rather than passive memorization process. In PBL, students are encouraged to build their own knowledge, because students are actively discussing the topic at hand, asking and answering questions. The interaction of an active group encourages students to a deeper understanding (Endrogen, 2014).

In the context of the problems in learning, PBL, students are free to study and identify resources and relevant literature (i.e. internet resources, articles, books or book chapters) in the library and / or electronic databases. Search of the literature and other resources is an important skill for professionals, and is a constituent of Self Directed Learning skills students must master especially in higher education. The scaffold is provided for students through a limited set of resources that can be selected. It is expected that more advanced students rely increasingly on their own skills to find relevant resources (Jeong & Hmelo-Silver, 2010).

2.3 Effectiveness of Problem Based Learning

Researches on PBL in medical like Albanese and Mitchell (1993), Vernon, and Blake (1993), and others mentioned mainly a comparison between the results of PBL methods with more traditional teaching methods. Research has continued on the PBL as a means to prepare professionals. These studies provide an idea of how PBL may be compared with traditional methods. However, PBL presents some unique challenges for evaluation. Because the focus of PBL is primarily to learn how to learn and less on mastering a body of knowledge and traditional methods of evaluation, such tests may not be very effective (Major, 1999). If traditional assessment is a good measure of traditional pedagogy, it is logical that the alternative assessment techniques can be a better measure for assessment in PBL setting. The use of alternative assessment in the case of PBL can help in bridging the gap between education and evaluation (Nightingale, T Wiata, Toohey, Ryan, Hughes and Magin 1996). There are some signs of a movement in this direction. Recent studies have begun to investigate the results of PBL, such as teamwork and presentation skills that cannot be associated with traditional classroom methods. Cockerill, Caplow, and Donaldson (2000) conducted a study on the prospects of the students in their learning as members of the cooperative groups. The researchers, using interpretive methods, found that cooperative groups promote a sense of ownership of the knowledge that was created during the semester for the students. The researchers also indicate that within the groups, the leadership moved from one student to situations as they arise and resolve.

3. Research Methodology

3.1 Research Design

The present study was a quasi-experimental study and experiences of the students of treatment group were sought through interviews. Two groups of students enrolled in Educational research course were taken for the study. The groups either were randomly assigned to as experimental or control group. Both groups had not studied this course earlier and their previous knowledge level about Educational Research was same before treatment.

Problem Based Learning was practiced through multiple group meetings as depicted in seven steps of PBL throughout the semester. Prospective teachers were allowed to change their roles as leader, recorder, moderator board writer or discusser during their weekly group discussions based on Problem Based Learning using 7 step approaches. The whole course of Educational Research was taught in complete semester (16 weeks, total of 48 hours) to prospective teachers enrolled in Department of Education, International Islamic University Islamabad for the course of Educational Research.

3.2 Sample and sampling Techniques

A purposive sample of 60female students studying in Department of Education International Islamic University Islamabad was taken for the study. Two groups of students were taken and they were assigned to the control group and experimental group randomly. Each group had 30 students.

3.3 Data Collection and Analysis

The experimental group (PBL Group) was interviewed in which they will describe their experiences of learning the course through PBL. It consisted of questions related to their overall experience, skill development, facilitation received, curriculum and assessment of the course. The face validity of the interview was estimated through expert opinion. The Course Experience through Problem Based Learning was administered to only Experimental Group (N=30) after the completion of experiment. The interviews were conducted after the completion of the course before their final exams. The interviews were recorded and then transcribed. The data were analyzed keeping in mind the objectives of the study by developing themes after coding the responses. 5

4.   Findings

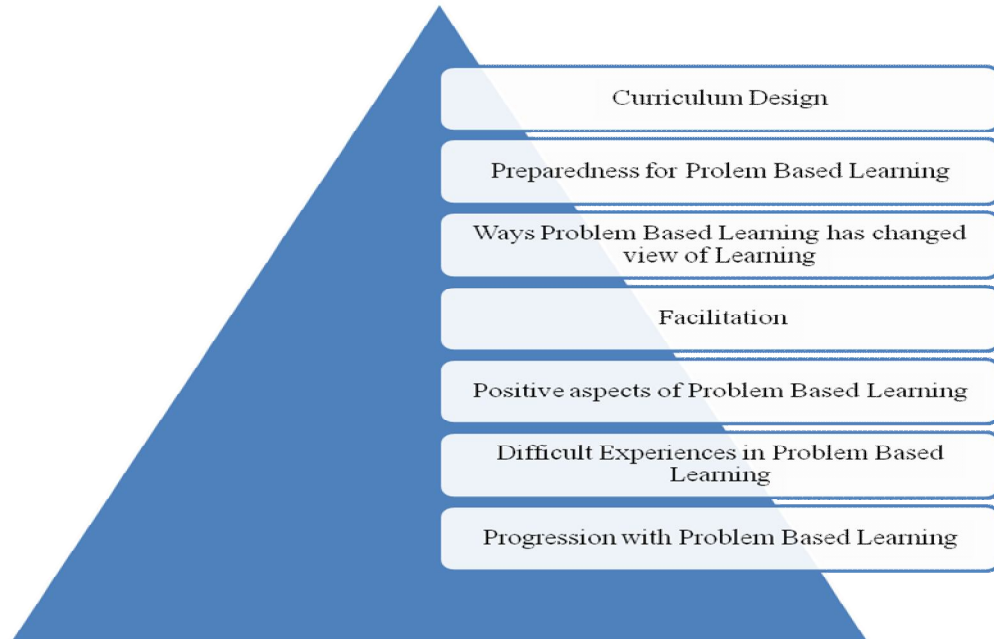The following areas are identified for the experiences of prospective teachers:

Curriculum Design

Preparedness for Prolem Based Learning

Ways Problem Based Learning has changed view of Learning

Facilitation

Positive aspects of Problem Based Learning

Difficult Experiences in Problem Based Learning

Progression with Problem Based Learning

Figure 1: Major Areas of Course Experience through Problem Based Learning

4.1 Curriculum Design

The respondents were overall satisfied with the curriculum design followed through Problem Based Learning. They were of the view that the curriculum design implemented was activity based, Practical and Psychometric.

Some of the respondents commented:

'Overall design of course was sequentially well prepared and all topics and activities were related with the course'.
'This course provided fruitful knowledge which is very appropriate for us'.
'The course design was excellent and effective'
'It was good according the course and also according to the mental level of students'.
'It was very good design. It helped students to solve problems'.
'The course provide useful learning and information, it created confidence and enhanced creative skills of students'.

4.2 Preparedness for Problem Based Learning

One of the questions in interview was about the preparedness for problem Based Learning. As this was very first experience of prospective teachers regarding course with Problem Based Learning, there were some important factors which helped prospective teachers in being prepared for the PBL.

The respondents discussed that:

'My creative ideas prepared me for Problem Based Learning.'
'The teacher's cooperation and activity based on problem based learning prepared me'.
'To solve problems with dignity helped me in getting prepared for the course learning'.
'The team work, others' help, motivation, and discussion with others helped in going through the course'.
'The method of this learning prepared us for the future learning through PBL'.

4.3 Ways Problem Based Learning has changed view of Learning

He respondents were inquired about the ways Problem Based Learning has changed their view of Learning and they responded:

'It has changed by thinking of creative ideas'.
'Activity based learning manually and physically involved me in different tasks'.
'It has changed my thinking skill'.
'It helped to solve problems which has changed our view of learning'.
'Class discussion and presentations are the ways which helped in PBL and changed way we learned usually'.
'Class participation is very much important in learning and it motivated the students'.
'It enhanced the discussion which motivates the students and it often solves the issue.'

4.4 Facilitation

The question about facilitation received by teacher was responded in the following way:

'She helped us in solving problems, provided us directions, and gives us new ideas'.
'The teacher guided and encouraged us to search for various resources.'
'The teacher facilitated through various ways like through email calls etc. and was there for help during consultancy hours'.
'Every learner is different from others. Teacher facilitated in individual learning. And difficulty faced by every individual is different from others. So teacher facilitated everyone.'
'Teacher distributed us into groups and also discussed with us about the learning problems and took opinion from all of students. She supported and motivated us in learning.'
'Teacher helped us in course by lectures and through discussion and materials where we were stuck'.
'She influenced us in way to explore the ideas in a group.'
'Teacher provided us opportunity in which the learning activities occurred in groups.'

4.4 Positive aspects of Problem Based Learning

The learners responded about the positive aspects of the PB by exclaiming:

'Leaning through PBL was creative and helpful in developing mutual cooperation, group discussion and good communication'.
'The best thing about our experience with PBL is that positive things happened, like different activities with groups and at individual level. All learners participated actively n their activity and assigned role.'
'We come across the process how research should be done as this course was related to practical life so it will be helpful in our future.'
'It helped us to solve the problems. It was very helpful for all individuals because everyone has given opportunities. Working in groups was exciting and we thought of innovative ideas about our future research.'

4.6 Difficult Experiences during the Course

An item in the interview was about the difficulties encountered during PBL. The prospective teachers told:

'Sometimes it was difficult to explore material independently and then bringing it in our group. '
'Sometimes relevant material was not found and we faced difficulty.'
'I don't have any problem or difficulty during this course'.
'In the beginning it seems somehow difficult but then with the help of group members we made it.'
'Sometimes group members distract other leaner's and create dispute while making independent study'.

4.7 Progression with Problem Based Learning

At the end, the prospective teachers were asked how they progressed through Problem Based earning throughout the semester. They shared their experiences with the interviewer:

'Progressing through the course I developed creative thinking and developed my research proposal in an effective way'.

'PBL is far better than other methods as it creates creativity among learners I was fully comfortable throughout this whole course with PBL.'

'As we progressed through the semester with PBL, we developed some skills and confidence and became comfortable with this method. I want another course due to the effective and long lasting learning if possible.'

'as I progressed with PBL I felt that science course should also be taught through this method as I do not understand some of the concepts of science.'

'in beginning I was bit confused that how I will be able to do work through PBL, but then I felt very comfortable and I would like to take other course with PBL because I solved my problems of learning through this method.'

5.   Conclusions

The respondents were overall satisfied with the curriculum design followed through Problem Based Learning. They were of the view that the curriculum design implemented was activity based, Practical and Psychometric. As this was very first experience of prospective teachers regarding course with Problem Based Learning, there were some important factors which helped prospective teachers in being prepared for the PBL like creative ideas ,teacher's cooperation and activities, team work, others' help, motivation and discussion with others. Problem Based Learning has changed view of Learning by thinking of creative ideas, helped to solve problems. The prospective teachers were satisfied about facilitation received by teacher. The prospective teachers gained many skills while experiencing problem based learning but sometimes it was difficult for them to explore material independently and then bringing it in our group. The learners told that as they progressed through the semester with PBL, they developed some skills and confidence and became comfortable with this method.

6.   Recommendations

The following recommendations are made after the study;

   i.   As prospective teachers had good and valuable experience of the course through problem, Based Learning so it is recommended that it may be utilized in all teacher education programs for the subject of educational research.
  ii.   As some of the prospective teachers felt difficulty in beginning while managing with Problem Based Learning, so a little more guidance and preparatory sessions may be arranged before PBL sessions.
 iii.   Sometimes the prospective teachers could not find the relevant material related to activity, so more books of the subject may be made available in the library.

7.   Suggestions for Future Researches

Similar studies may be conducted for gauging the effectiveness of teacher education programs through:

   i.   Utilizing PBL in different levels of learners
  ii.   Utilizing PBL in different courses
 iii.   Using true experimental design, and
  iv.   Making gender wise comparisons

References

Albanese, M.A. (1993). Problem - based learning: A review of literature on its outcomes and implementation issues. *Academic medicine: Journal of the Association of American Medical Colleges, 68* (1), 52-81.

Barrows, H. S. (1986). Taxonomy of problem-based learning methods. *Medical Education, 20* (1), 481–486.

Boud, D and Feletti, G (1997) *The Challenge of Problem-based Learning,* London: Kogan

Cockrell, K. S., Caplow, J. A. H., & Donaldson, J. F. (2000). A Context for Learning: Collaborative groups in the problem-based learning environment. *Review of Higher Education 23* (3), 347-363.

Duch, B. J., Groh S. E., & Allen D. E., (2001) *The Power of Problem-based Learning: A Practical "how to" for Teaching Undergraduate Courses in Any Discipline,* Stylus: Sterling, VA.

Endrogen, T. (2014)Problem-based Learning in Teacher Education: Its Promises and Challenges *Procedia - Social and Behavioral Sciences.* 5th World Conference on Educational Sciences 16, 459–463

Finkle, S. L., & Torp, L. L. (1995). *Introductory documents.* Available from the Center for problem-based Learning, Illinois Math and Science Academy, 1500 West Sullivan road, Aurora, IL 60506-1000.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16,* 235–266.

Jeong, H., & Hmelo-Silver, C. E. (2010). Productive use of learning resources in an online problem-based learning environment. *Computers in Human Behavior, 26,* 84-99.

Major, C. (1999). Connecting what we know and what we do through problem-based learning. *AAHE Bulletin, 51* (1), 7-9.

Nightingale, P., Te Wiata, I., Toohey, S., Ryan, G., Hughes, C., & Magin, D. (eds). (1996). *Assessing learning in universities.* Sydney: UNSW Press.

Norman, G. R., & Schmidt, H. G. (1992). The psychological basis of problem-based learning: A review of the evidence. *Academic Medicine, 67,* 557-565.

Pakistan, G. o. (2009). *National Education Policy.* Ministry of Education.

Savin –Baden, Claire H (2000). *Foundations of Problem-based Learning,* McGraw-Hill International

Schmidt, H. G. (1983). Problem-based learning: Rationale and description. *Medical education, 17*(1), 11-16.

Schmidt, H. G., Cohen-Schotanus, J., & Arends, L. R. (2009). Impact of problem-based, active learning on graduation rates for 10 generations of Dutch medical students. *Medical Education, 43,* 211-218.

Schmidt, H. G., Loyens, S. M. M., Van Gog, T., & Paas, F. (2007). Problem-based learning is compatible with human cognitive architecture: Commentary on Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42,* 91–97.

Van Bruggen, J. M., & Kirschner, P. A. (2003). Designing external representations to support solving wicked problems. In J. Andriessen, M. Baker, & D. Suthers (Eds.), *Confronting Cognitions: Arguing to learn* (pp. 177-203). Dordrecht, the Netherlands: Kluwer Academic Press.

Van Merriënboer, J. J. G., & Kirschner, P. A. (2007). *Ten steps to complex learning.* Mahwah, NJ: Lawrence Erlbaum.

Vernon, D. A., & Blake, R. L. (1993). Does problem-based learning work? A meta-analysis of evaluative research. *Academic Medicine, 68* (7), 550-563.

Werth, E. P., (2009).*Student perception of learning through a problem-based learning exercise: an exploratory study.* Idaho Police Officer Standards and Training, Meridian, Idaho.

Yeo, R. (2005). Problem-based learning: lessons for administrators, educators and learners. *International Journal of Educational Management. 19* (7), 541-551