How does learning (not) take place in problem-based learning activities in workplace contexts?

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How does learning (not) take place in problem-based learning activities in workplace contexts?

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The paper discusses problem-based learning (PBL) as a mediating factor in generating a variety of learning networks in workplace contexts. It is argued that informal learning in experiential circumstances can be systematized to encourage deep learning at the individual and collective level. Given the distinct problem-solving opportunities in PBL, learners can increase their capacity to acquire new knowledge through self-inquiry, reflection and dialogue. The repositioning of learning attitudes also leads to an enlargement of communities of practice wherein double and triple-loop learning cycles intersect to create rigorous learning. An integrated model is proposed to explain the dynamics of PBL operating within the constraints of workplace contexts.

**Keywords:** problem-based learning (PBL); double-loop learning; communities of practice; workplace learning; human resource development

Introduction

It's not that I'm so smart. It's just that I stay with problems longer...

The important thing is not to stop questioning.

— Albert Einstein (Hale 2006, 4)

In the above quote, Einstein expounds two key concepts that are critical to learning and development: problem solving and questioning. In today’s changing times and contexts, people are challenged to approach problems as opportunities for self-inquiry, dialogue and continuous learning. It is through the constant questioning of underlying issues that existing problems hold a great many learning points for the problem solver, essentially the intrinsic learner. Einstein’s quote also suggests that learning does not necessarily take place in a formalized and structured manner. For instance, research by Marsick and Watkins (1990) found that of all employee learning, only 20% learn from structured training programmes. A key discovery is that employees tend to engage in personal strategies to handle daily tasks and challenges. These strategies include questioning, listening, observing, reading and reflecting on their work environment as part of problem solving. A more critical discovery is that about 80% of employee learning occurs through

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informal means. This type of informal learning is usually unintentional and not highly structured, including such examples as self-directed learning, networking, coaching, mentoring and performance planning, which involves the reviewing of learning. A crucial feature of informal learning is that it ‘can be deliberately encouraged by an organization or it can take place despite an environment not highly conducive to learning’ (Marsick and Watkins 1990, 12). Hence, it is an inductive process of reflection and action, often linked to the learning of others and integrated into daily routines.

In another example, Stonyer and Marshall’s (2002) study revealed that learning in workplace contexts is driven largely by a community of practice through peer learning and sharing. It is evident that mentoring roles provide opportunities for peers to help ‘apprenticed’ novices become practicing ‘experts’ of the community. In fact, the notion of problem-based learning (PBL) is built on the premise of these practices, suggesting that learning is intimately bound in the process of problem solving and inquiry (Bridges 1992; Speck 1999). PBL requires that the facilitator create an appropriate learning space for collaborative learning, and guide participants to construct and share knowledge within a particular context. In contrast to conventional trainers, PBL facilitators need to increase the delivery power and spontaneity through the reduction of ‘expertise’ involvement. In a PBL setting, the participatory boundary between the facilitator and learner is also narrowed, providing optimal opportunities for the learner to inquire, reflect and analyse an identified problem (Barrows 1985; Woods 1997). Given the wider application of learning beyond the classroom, I ask the following question to guide my argument: what is the relevance of PBL to workplace contexts?

PBL in workplace contexts

I first provide an overview of PBL, followed by discussion of its importance to workplace contexts. Starting out in the educational setting, PBL became an important learning approach in medical school curricula. An example of a successful PBL programme was developed by McMaster University in Canada over 30 years ago. In the medical field, it was first found that scenarios of clinical situations served as catalysts for discussion very effectively. As opposed to traditional clinical case studies, these scenarios subsequently became the trigger problems in PBL where a deeper level of learning was involved through small-group conference teaching (Barrows 1985). However, I believe that PBL is quite different from common problem-solving skills, although such skills are often the by-products of PBL (Savin-Baden 2003; Woods 1997). PBL involves a greater level of learning dynamics requiring individual responses to pressing issues and group sharing of phenomena.

I further discuss the wider nature of learning in PBL through the notion of ‘context’. Contexts are important in workplaces as they help to integrate work and learning within dynamic and changing conditions in an environment (Owen 2002). Mowday and Sutton (1993, 198) define context as the ‘stimuli and experience that surround and thus exist in the environment external to the individual’. Categorically, elements in the external environment may refer to the social and physical dimensions of a context (Scott 1992). For instance, context provides the basis, as either constraints or opportunities, for the modification of behaviours and attitudes in workplace settings (Johns 1999). Consideration of context, therefore, is crucial to the appreciation of individuals and their interactions with their environments. According to Johns (2001), context offers the opportunity and capacity for the explanation of complex workplace phenomena. On this basis, I propose that the context for this paper would be any mid- to large-sized organization in the global setting.
I now highlight several examples of the importance of PBL in workplace contexts. Firstly, a study by Tynjälä and Hakkinen (2005) discovered that PBL promotes adult learning by drawing on learners’ experience and involving them in reflective and social processes. Of importance is the utility of e-learning tools as a means of facilitating the wider presentation of individuals’ ideas and explication of their intuitions. Ultimately, technology can be used to help store knowledge, build ideas and share decisions, serving as a tool of organizational memory. This type of problem-oriented learning leads to both personal development and workplace learning (Streumer and Kommers 2002; Torraco 1999). In other studies, researchers realized that learning is purposeful and less incidental if it takes place simultaneously in the context of use and application (Poikela 2004; Stonyer and Marshall 2002). Learning, therefore, takes effect in a concrete way if learners are engaged in problem solving by examining issues that are embedded in daily workplace practices (Lohman 2002; O'Connor 2004). However, I also acknowledge that there is much debate and discussion on the relationship between PBL and workplace contexts in the last decade (e.g. Bridges and Hallinger 1995; LaRue, Childs, and Larson 2004; Poell and Van der Krogt 2003; Speck 1999). For instance, empirical studies have shown that cases in PBL are often either multidisciplinary in nature or ill structured, causing employees to struggle with their learning process (O’Connor 2004; Tynjälä and Hakkinen 2005). In addition, employees require the knowledge and skills they need to identify, understand and solve problems they encounter but are often not trained appropriately to accomplish these tasks (Lohman 2002). In other cases, it was found that employees are not sufficiently engaged and confident in the PBL process, hindering them from achieving positive and useful outcomes for themselves and the organization (Stonyer and Marshall 2003). Further, learning outcomes concerning reflective and social knowledge are often assessed inappropriately due to the complexity of the problems and the lack of experience of the PBL facilitators (Poikela 2004). Hence, observations from these empirical studies have led me to identify a gap in the literature, motivating us to reconsider my earlier question: how does learning (not) take place through PBL activities in workplace contexts?

**Theoretical discussion**

Two theories can help to explain the relevance of PBL to workplace contexts adequately. Firstly, socio-cultural theories of learning are based on the belief that cognition is both a distributed and social entity (Hutchins and Klausen 1996). For instance, cognition should not be viewed entirely as the sole property of the minds of individuals; rather, cognition should be regarded as a shared entity that is often distributed to other people, even the physical environment. As an example, many of the cognitively complex tasks are usually completed through collaborative efforts instead of mere individual contributions. Hence, the collaborative nature of PBL suggests the need for a collective cognition within a context where individuals combine human and physical resources to accomplish a task. As such, I propose a working definition of PBL for workplace contexts: PBL is an interactive learning process that is motivated by a real-life problem, bringing people together to conceptualize, investigate, reflect and share emerging issues. The ultimate aim is to provide practical solutions with a wider influence on the workplace. This definition has been developed with reference from an adapted PBL framework of Wee and Kek (2002), which is presented in the appendix. It illustrates an iterative learning system where activities are both structured and spontaneous, allowing participants to engage in reflective action taking.
I further discuss the relevance of PBL to workplace contexts by examining an activity theory that focuses on the influence of complex structures under which work activity operates (Engeström, Miettinen, and Punamaki 1999). Activity theory provides an analysis of contexts at two levels: the way organizational structures influence everyday action and the way interaction contributes meanings to participants. The goal-related and purpose-directed nature of PBL is in many ways congruent with the tenets of activity theory where a variety of tools and means are required to mediate action undertaken by participants. Here, the theory posits that work is organized by the observation of rules, the formation of community of practice and the division of tasks. All of these elements relate to the key aspects of PBL, which encourage learning to develop both personally and collaboratively through individual and shared cognition (Poikela 2004; Savin-Baden 2003). In short, PBL is both a structured yet interactive process that promotes spontaneity and creativity within a context that connects mind (cognition) to action (activity).

The importance of PBL to workplace contexts is reinforced further in the descriptive strand of research involving social and cognitive psychology, both being extensions of socio-cultural theories. This strand of research mainly deals with a variety of processes in workplace contexts (Fiol and Lyles 1985; Huber 1991; Weick 2001). I adopt a normative approach to address the relation between social and cognitive psychology further. This approach is concerned with the way organizations adapt to their environment and the manner in which problems are solved, including reasons why these problems may have been ignored or solved badly (Robinson 2001). Here, learning in workplace contexts begins with adaptation to the environment by detecting and correcting errors, a process that promotes experiential learning. Learning is based on experience through the interpretation of feedback from prior actions. According to Kolb (1984) and Robinson (2001), the underlying assumption is that retrospective evaluation of past actions promotes a high degree of continuous learning for the anticipation of future actions. This principle operates when learning is contextualized adequately with reference to an organization’s capacity to learn specific things rather than an overall capacity to learn. In this respect, PBL plays the critical role of refining the scope and direction to which learning occurs based on a specific purpose, as reinforced in activity theory.

In many ways, context plays a critical role in facilitating and integrating experience and individual control in the learning process. Essentially, the individual's mental representation is situated in the learning as well as the perception of that experience. ‘Situated’ suggests that context is pivotal to the successful acquisition of knowledge and skills from other members. Utilizing the embedded knowledge requires the retrieval and interpretation of social experience through verbal interaction. As individuals engage in sense-making, it gives rise to a shared understanding of that knowledge (Brown, Collins, and Duguid 1989; Wilson, Goodman, and Cronin 2007). Consequently, competence is required for individuals to adapt the learning to a specific context in pursuit of an expected outcome. According to Torraco (2002), the social context for learning is fundamental to communities of practice where employee relationships form the basis for expert knowledge and practices to be appreciated and applied. Central to the process of social learning is legitimate peripheral participation of which PBL is characteristic (Lave and Wenger 1991). Mediating the diverse interpretations of contexts and paradigms is a condition Wenger (1998) refers to as ‘alignment’, which seeks to coordinate perspectives and actions to reach a shared goal. This feature of learning within communities of practice is related largely to the constraining (systematized) yet amplifying (interpretive) nature of PBL.
How does learning (not) operate in PBL?

I suggest that learning does not necessarily begin with the existence of a contextual problem; it intrinsically occurs through the individual and collaborative analysis of the problem, and the identification of specific learning objectives. Consequently, learning is intensified when participants engage in personal reflection and collaborative investigation to illuminate problem solutions. Such activities as peer teaching, knowledge sharing, feedback and inquiry are characteristic of PBL and crucial for the expansion of communities of practice in workplace contexts (Kofoed and Kolmos 2001). In the overall process, every participant needs to be equipped with task-specific knowledge and expertise to work efficiently with people of all levels. From the perspective of learning theories, PBL provides the dynamism for single-loop, double-loop and triple-loop learning through the integral process of questioning and reflection. For instance, single-loop learning occurs when participants start asking, ‘Are we doing things right?’. This is due to feedback from an immediate outcome, which prompts them to reconsider their strategies in problem solving. On the other hand, double-loop learning involves a second feedback loop when participants begin to evaluate their personal goals with that of the organization’s expectations. Here, the complexity of situation prompts them to ask, ‘Are we doing the right things?’. When the awareness of the dilemmas involved in problem solving has reached the collective consciousness of individuals, a higher level of learning begins to operate. At this stage, participants will be asking, ‘Is rightness supported by the management or otherwise?’. Hence, the interactive process of PBL constantly influences the learner’s state of (more or less) reflexive consciousness, leading to a combination of learning loops, reinforcing the principles of socio-cultural theories (Flood and Romme 1996; Romme and van Witteloostuijn 1999). In line with social learning theory, critical reflection is fundamental to PBL where feedback is a mechanism that facilitates the transfer of reflection to action taking (Reynolds 1998). Here, information serves as the catalyst for current and desired behaviour to be compared, allowing changes and adaptation to take place in the learning process (Russ-Eft 2002).

In my literature review, I further discovered that PBL is not widely utilized as a learning activity within workplace contexts (e.g. Bridges and Hallinger 1995; Kofoed and Kolmos 2001; O’Connor 2004; Yenja¨la¨ and Häkkinen 2005). This is due largely to the resistance of workplace participants as they struggle to be familiarized with diverse learning activities and issues. For instance, in an earlier study (Yeo 2007a) I highlighted two cases of how a bank and a legal firm tried using PBL for customer service training and legal induction respectively. One of the obstacles was the lack of shared goals, preventing alignment to be achieved. More importantly, PBL has taken an adverse effect on both participants and even facilitators to some extent. For instance, participants no longer have the privilege of simply receiving explicit knowledge and facilitators, of merely providing information. There is a constant demand for exploration and inquiry with no immediate answers on hand (Bridges 1992). However, there has been increasing attempts by organizations to re-examine their training curricula to focus more on independent and collaborative learning (Bridges and Hallinger 1995). Organizations are beginning to accept PBL as an emerging approach to workplace learning. This trend is triggered by the changing external environment – the ‘global’ workplace for which organizations are preparing their employees. As Gold et al. (2007) would argue, the internal processing of external events induces learning, particularly when this experience can be used as a reference for future practice. Ultimately, it is the ‘moment’ that determines what is really learnt (Shulz 1998). As such, it can be assumed that collective learning and action occur in
transitory moments of PBL although, accumulatively, these ‘moments’ will lead to deeper learning and long-term competitiveness.

An integrated model of workplace PBL

After considering the different facets of learning that take place in workplace contexts, I develop an integrated model to depict the structuring of learning activities. The juxtaposition of complexity and systematization is realized in the dynamics subsumed within each distinct phase of problem solving, illustrated in Figure 1. Here, individual cognition seems to create amplifying effects that discourage the organizing of collective learning-oriented behaviours. At the collective level, learning can be enacted only through open discussion and an acceptance of differences in opinion. It is through the explicit realization and negotiation of conflicting mental models that a shared theory-in-use can be achieved (Argyris and Schön 1996; Edmondson 1999). Consequently, as the problem situation increases in difficulty, the learning cycles increase in complexity but the diversification of learning is kept in focus at each problem-solving phase. It is through the interplay between double-loop and triple-loop learning cycles that a new form of strategy in the problem solving emerges. This strategy ultimately helps to create for the workplace an intrinsic source of competitive advantage believed to be a wealth of organizational knowledge (marked as ‘X’ in Figure 1).

I explain organizational knowledge further by associating it with intellectual capital which is necessary for survival in changing times. According to Stewart (2001), intellectual capital can be categorized into human capital, structural capital and alliance capital. It is assumed that human capital is achieved by turning individual tacit knowledge into explicit action with specific applications. Explicit knowledge is translated frequently into competencies and capabilities of individuals enabling them to approach multifaceted problems. On the other hand, structural capital is the outcome by which an organization captures, develops, codifies and shares knowledge in order to solve problems effectively. Thirdly, alliance capital refers to knowledge associated with integrated systems and processes.

Figure 1. An integrated model of PBL in workplace contexts. Source: Adapted from Kolb 1984 and Cockerill et al. 1996.
This is achieved by drawing on the human and structural capital of partner organizations and customers. As organizational knowledge is the desired outcome of PBL in workplace contexts, it needs to be created, built upon and strengthened strategically (Nonaka and Takeuchi 1995). Combined them all, it is the social capital that transcends learning wherein such tangible substances as goodwill, sympathy and social intercourse operate to allow a more equitable distribution of resources, helping communities of practice gain competitiveness in terms of knowledge sharing (Storberg-Walker 2007). It is therefore essential to develop a greater flexibility in the learning structure in addition to an appropriate system of reward and recognition to encourage collective learning. Further, there should be an appropriate positioning of technological infrastructure and an effective communication network to support the diversification and complexity of learning (Cunningham, Dawes, and Bennett 2004; Owen 2002). It is only through the cooperation of a mixture of dynamics and initiatives that PBL can be purposefully and successfully developed in any workplace contexts.

Implications for human resource development

I present various considerations and some practical steps to provide HRD practitioners with a head-start in developing appropriate PBL programmes for their workplace contexts. Table 1 is the result of an empirical study (Yeo 2007b) which I conducted using Kolb’s (1984) experiential learning theory to provide a social dimension to PBL. Data were gathered by means of semi-structured interviewing from 10 PBL specialists and 50 working professionals who had utilized PBL in one way or another in their workplaces.

Applying Gibson’s (2004) exposition of social learning theory based on internalization of goal setting and reinforcement mechanisms to PBL, I suggest the following implications for HRD.

Employee socializations

PBL provides the opportunity for employees to engage in interdisciplinary communication where cross-functional activities converge on shared problems. In order to facilitate a common understanding of what it takes to be involved in PBL, a fundamental function of HRD is to create a strategic communication system through which essential information can be disseminated promptly. Here, the objectives and value of PBL should be articulated clearly to encourage a strong buy-in from the employees. Uppermost is the need to create diverse learning networks through random socialization facilitated by HRD personnel. Using problems as a leitmotif of learning induces dialogue that creates a different dimension to employees’ intrapersonal and interpersonal life.

On-the-job training

Institutionalizing PBL requires the collective consciousness and participation of employees. However, this could begin through channels of on-the-job training where the transfer of knowledge and skills is no longer the sole responsibility of the supervisors; it is the responsibility of both the internal and external customers to whom the trainee is (in)directly related. Being involved in actual situations allows the trainee to be involved in the perceived and lived-in experience of the dialectic between theory and practice. The problems that the trainee encounters along the way will set the tone for what needs to be
Table 1. How HRD practitioners can develop PBL programmes in their workplaces.

<table>
<thead>
<tr>
<th>Key PBL phases &amp; characteristics</th>
<th>Factors</th>
<th>Necessary skills</th>
<th>Implications for workplace practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I) Problem analysis: reflective observation</strong></td>
<td>Observes: 1) Deeper issues 2) Questioning 3) Past experience 4) Ownership of problem 5) Accountability to self and organization 6) Mistakes and failures as potential for growth 7) Error-correction and reduction</td>
<td>1) Critical thinking 2) Reflective questioning 3) Multilevel conceptualizing</td>
<td>1) More flexible yet challenging personal and corporate learning plans 2) A more progressive reward and recognition system 3) More dialogue, feedback and focus group sessions to feel the pulse of the ground</td>
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<tr>
<td>1) Group setting</td>
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<td>2) Problem identification</td>
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Table 1. (Continued).

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<tr>
<th>Key PBL phases &amp; characteristics</th>
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<th>Necessary skills</th>
<th>Implications for workplace practice</th>
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<tbody>
<tr>
<td>6) Self-directed learning</td>
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<td>7) Facilitator-led learning orientation</td>
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<td>8) Peer teaching and learning</td>
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<td>9) Synthesis and application</td>
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<td>10) Reflection and feedback</td>
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Source: Adapted from Yeo 2007b.
unlearned and relearned. HRD personnel can also assist in the monitoring and evaluation of the trainee’s progress and performance during and after the probationary period.

Cross-cultural training

PBL promotes learning through diversity where varied views and paradigms are celebrated. On this basis, PBL can serve as a platform that helps bridge cultural differences during an induction or exchange program. This concerns the assimilation of expatriates into a local culture as a result of strategic alliances involving foreign partnerships, mergers and acquisitions, outsourcing and/or offshoring. The role of HRD is to create opportunities for cross-cultural communication through work-related issues on a periodic basis. HRD personnel could facilitate dialogue sessions and identify potential problems for collective problem solving and decision-making. They could also serve as sounding boards and be involved in shaping short-term goals as well as consolidating the proposed solutions.

Conclusions

In this paper, I offer some starting discussion on the importance and relevance of PBL to workplace contexts. I suggest that as informal learning takes place haphazardly in these contexts, PBL can serve as a platform for learning to be more systematized and rigorous through a variety of purposeful activities. The paper sheds some light on the positive effects of PBL as contributing to individual and organizational development. I discussed these effects by examining how PBL has led to the cognitive competitiveness of individuals and the collective knowledge of the organization. I proposed an initial framework that illustrates the development of PBL in workplace contexts and explains that the various phases of problem solving have contributed to the understanding of single-loop, double-loop and triple-loop learning. These learning loops are operative in complex structures and systems of typical workplace contexts (Argyris and Schön 1996; Flood and Romm 1996). I related the dynamic process of self-inquiry and collaborative know-how as characteristic of workplace learning where the spontaneity of learning is driven by problem situations (Fuller and Enwin 2004; Gibson and Earley 2007). I subsequently developed an integrated model that provides a starting point for future empirical research to determine how organizational and strategic contexts may shape communities of practice. I also believe that this paper will encourage HRD practitioners to redefine roles of peers, reshape feedback loops and reconsider boundaries to develop wider learning networks in workplace contexts. The fundamental consideration is evaluating who can solve what problems and how.

I conclude by suggesting some empirical directions for further research. The role of PBL in the perspective of communities of practice is worth exploring. I propose that exploratory in-depth case studies concerning PBL in workplace contexts be conducted to examine how roles can be redefined, feedback loops be reshaped and boundaries be reconsidered to provide a more socio-cultural, political and motivational perspective of how learning is to be institutionalized. These studies should focus on how a collective mindset and a strong belief in the intrinsic value of PBL might achieve the desired outcomes. Workplace structures and systems are important factors that will have an influence on the way learning develops. For instance, unnecessary rules need to be removed and work processes streamlined to create conducive learning spaces for individuals. In this respect, the unique contexts offered by different workplaces will
make case studies a worthwhile empirical endeavour. At the core, researchers will be
interested in finding out the key success factors of PBL in a variety of workplace contexts.
I further suggest that success depends on far more than the demonstration of expert
knowledge and understanding of management concepts. The scope of case studies will
allow researchers to examine such factors as politics, culture, human influences, the ability
to take responsibility, and the courage to learn from mistakes and unlearn old habits as
having significant influences on the learning process of PBL (Cunningham, Dawes, and
Bennett 2004; Teare 1997). In this paper, I used learning and organizational theories to
explain that learning in workplace contexts is indeed multidimensional. The importance of
PBL to these contexts is the focus on learning (as opposed to instruction) by challenging
individuals to think of how it can be supported when there are no answers.

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References
Argyris, C., and D. Schön. 1996. Organizational learning II: Theory, method, and practice. Reading,
PA: Addison-Wesley.
Barrows, H.S. 1985. How to design a problem-based curriculum for the preclinical years. New York:
Springer.
Oregon: ERIC.
Educational Researcher 18, no. 1: 32–42.
Cockerill, S., G. Stewart, L. Hamilton, J. Douglas, and J. Gold. 1996. The international
management of change: a problem-based/case study approach. Education + Training
38, no. 2: 14–7.
Cunningham, I., D. Dawes, and B. Bennett. 2004. The handbook of work based learning. Vermont,
VT: Gower.
Edmondson, A. 1999. Psychological safety and learning behavior in work teams. Administrative
Cambridge University Press.
10, no. 4: 803–13.
personal development. In Workplace learning in context, ed. H. Rainbird, A. Fuller, and A.
Munro, 126–44. London: Routledge.
Gibson, C.B., and P.C. Earley. 2007. Collective cognition in action: accumulation, interaction,
examination, and accommodation in the development and operation of group efficacy beliefs in
in the legal profession: a practice-based learning perspective. Management Learning 38, no. 2:
235–50.
Leadership Centre Winter: 1–10.
Organizational Science 2, no. 1: 88–115.


Appendix
A problem-based learning framework (adapted from Wee and Kek 2002).

Stage 1: Group setting
- Introduce members
- Establish ground rules
- Define roles of facilitator and members

Stage 2: Problem identification
- Present the problem
- Identify and clarify the problem
- Describe the problem

Stage 3: Idea generation
- Inquire about the possible ideas to understand or solve the problem

Stage 4: Learning issues
- Determine what needs to be learnt in order to understand or solve the problem
- Generate learning issues and action plan
- Inquire about the research sources

Stage 5: Self-directed learning
- Seek and summarize relevant information

Stage 6: Synthesis and application
- Evaluate sources of information for credibility and validity
- Conduct peer sharing of information
- Apply relevant knowledge to the problem
- Develop more learning issues if necessary
- Discuss, develop and justify solution and explanation

Stage 7: Reflection and feedback
- Conduct self and group feedback on group functioning, individual problem-solving process, knowledge gained, solution and level of facilitation