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Problems as Building Blocks for Organizational Learning: A Roadmap for Experiential Inquiry

Roland K. Yeo¹ and Michael J. Marquardt²

Abstract
This article explores the practice of problem-based learning (PBL) in organizational contexts and its contribution to organizational learning. It proposes a learning that is context dependent based on the collective participation of individuals through structured and spontaneous processes. A theory-elaboration approach was adopted by means of an interpretivist methodological paradigm. Rich data were collected from 10 PBL experts and 50 PBL users through convergent interviewing and a qualitative survey respectively. Findings suggest that looking within for answers is a first step to generating more questions for subsequent collaborative inquiry. The process is one of problem–question–reflection–learning–action requiring individuals to handle amplifying and restraining feedback loops for double-loop learning. PBL induces reflective practice and seeks an integrated epistemology.

Keywords
problem-based learning, double-loop learning, organizational learning, situated practice, Singapore

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We can’t solve problems by using the same kind of thinking we used when we created them.

—Albert Einstein

We live in a world with ever greater and more complex problems. These challenges can be developmental or destructive, either providing opportunities for individuals to learn and grow or generating overwhelming and destructive forces that cause us to stagnate and withdraw. According to Einstein, a problem can excite an individual with a variety of perspectives from which learning begins to take place almost unconsciously. The above quote also suggests that problem solving and learning can occur simultaneously and spontaneously in constant changing contexts. This observation is further supported in a study by Marsick and Watkins (1990) who found that only 20% of employees learn from structured training programs whereas 80% learn through informal means such as problem solving. A key discovery is that employees often engage in personal strategies to handle daily tasks and challenges. These strategies are often spontaneous involving a less formalized repertoire of such learning activities as questioning, listening, observing, reading, and reflecting (Roberson, Kulik, & Pepper, 2009).

We further posit that problems can serve as a stimulus for turning unmotivated operations into result-oriented practices (Skinner, 1972). For problem solving to produce learning, it has to be supported by participatory actions in achieving a shared cognition (Engeström, 2001; Leont’ev, 1981; Marquardt, 2004, 2005). A key discovery by Engeström (2001) of Nonaka’s (1994) work on knowledge creation suggests that problems and participation are critical to any learning process not discussed by Nonaka. As such, learning should not be viewed merely as a transmission of knowledge; it should capture individuals’ understanding of what they need to acquire as a response to a recognized problem. Hence, emphasis is given to the interactions between mental models and context that comprise situated cognitions in organizations, including such theories-in-use as problem definition, self-perception and choice decisions. Problems can lead to temporally bounded interactions that involve the simultaneity of cognitive processes, contexts, and time (Lave & Wenger, 1991; McCarthy, 2008).

We argue that problem solving increases the potential for learning to be situated in a practice such that solutions are actualized through doing rather than thinking. Druskat and Pescosolido (2002) further reinforce that learning has to first take place within the individual and subsequently through the influence of peers in different communities of practice. Through mentoring roles, these peers help “apprenticed” novices become practicing “experts” of
the learning community. In this respect, we introduce problem-based learning (PBL) as a potential means of promoting individual and organizational learning through both structured and spontaneous learning roadmaps that help optimize organizational development. The dominant use of PBL, however, relies on a platform that incorporates an approach with strong emphasis on collaborative learning and on understanding context as a driver for learning (Gijselaers, 1996; Savery & Duffy, 1995). PBL is built on the premise that its facilitator has to develop a variety of essential skills in order to guide learners in the construction of knowledge within an immediate context (community). 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 narrowed, providing maximum opportunities for the learner to inquire, reflect and analyze an identified problem (Barrows, 1985; Woods, 1997). Given the dynamics of problem solving in organizational contexts, we raise an overarching question which serves as the research problem: *How is PBL facilitated in organizational contexts and what is its contribution to organizational learning?*

**Relevance of PBL to Organizational Contexts**

We first provide an overview of PBL and discuss how it is applicable to complex organizational contexts. PBL first started out in the educational setting, making its prominence in medical school curricula. In the medical field, it was found that learning was most effective when clinical scenarios were used as catalysts for discussion. These scenarios, as opposed to traditional clinical case studies that were often used in small-group conference teaching, consequently became the trigger problems in PBL. However, PBL should not be confused with general problem-solving skills, although such skills are often the byproduct of PBL (Hanke, Kisenwether, & Warren, 2005).

Despite the growing recognition of PBL, it is not readily adopted in many organizations (Kloppenborg & Baucus, 2003). As found, PBL may produce uncomfortable effects on participants and facilitators, as participants are required to *explore* rather than *receive* knowledge passively whereas facilitators are expected to *manage* the learning process rather than *give out* information (Bridges, 1992). In recent years, there has been a trend that training curricula are gradually directed at independent and team learning, opening up opportunities for PBL to be experimented in organizations as part of their efforts to implement organizational learning (Bridges & Hallinger, 1995; Cunningham, Dawes, & Bennett, 2004).
We identify PBL as a type of learning that can take place at any level: individual, team, and organizational. It involves different degrees of formalized learning activities to encourage individual and collaborative learning (Terlaak & Gong, 2008). The less formalized aspect of PBL provides the impetus for an even more dynamic interaction between participants to obtain help, learn alternative viewpoints, gain ability to give better feedback, consider alternative ways to think and behave, reflect on processes to assess learning experiences, and make informed choices based on specific organizational outcomes. In this perspective, PBL offers participants the opportunity to challenge daily routines and norms by articulating questions that are motivated by their lived and perceived experience (Beer & Eisenstat, 1996). This is where the context they are in serves to trigger some form of learning through feedback loops.

One source of empirical findings on the importance of PBL to organizational contexts can be found in the series of Educational Innovation in Economics and Business published by Kluwer, now Springer. The consulting firm, Center for Leading Competence (CLC) in Helsinki, for example, has been practicing organizational PBL, project-based, and inquiry-based learning approaches for several years (http://www.clc.fi/eng/etusivu.php). Furthermore, 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 illustration of their intuitions. Ultimately, technology can be used to help store knowledge, budding ideas, and shared decisions, serving as a tool for building up organizational memory. This type of problem-oriented learning leads to both individual development and organizational learning through a shared purpose (Streumer & Kommers, 2002; Torraco, 1999). In another study, Hallinger (2005) examined a PBL computer-based simulation program aimed at helping leaders learn to lead change. A total of 24 participants were enrolled in the program to learn and implement new information technology in their organization. Through virtual teaming and conceptualization it was found that divergence in strategies became opportunities for subsequent synthesizing of ideas that could lead to potential practice. Yeo (2007) also investigated the effectiveness of PBL as a leadership development model for a manufacturing company. He discovered that the experiential and reflective nature of PBL had increased leaders’ potential for modifying their mental models when framing a practice. They were concerned about the construction of social meanings as they developed identities within different communities of practices when problem solving (Slaughter & Zickar, 2006).
Despite these examples, we also acknowledge the much-debated utility of PBL in organizational contexts (see, e.g., Bridges & Hallinger, 1995; LaRue, Childs, & Larson, 2004; Poell & Van der Krogt, 2003; Speck, 1999). For instance, empirical studies have shown that PBL programs are often either multidisciplinary in nature or ill-structured, causing employees to struggle in their learning process (O’Connor, 2004; Tynjälä & Häkkinen, 2005). In addition, employees adopting PBL approaches are not sufficiently trained to accomplish various learning tasks and many are left to their own devices (Lohman, 2002). In other examples, it was found that employees lack the motivation to be engaged in PBL, reducing the potential benefits for themselves and the organization (Stonyer & Marshall, 2003). More important, learning outcomes concerning reflective and social knowledge are often inappropriately assessed because of the complexity of the problems and the lack of experience of the PBL facilitators (Poikela, 2004).

Given the socially constructed nature of PBL, we regard PBL as a spontaneous and flexible entrance into an organizational system where its dynamism is motivated by an actual problem that resides in a specific context. This perspective supports our assumption that human learning behaviors occur almost anywhere as much as it occurs within the confines of a classroom (Brown & Duguid, 1991). As such, learning in the PBL system can be said to be both an ongoing process and a momentarily bounded outcome. As an ongoing process, it describes the importance of sense making as well as the contextual understanding and familiarity of problem scenarios. Participants then engage in interpretation and reflective action taking to produce a working and workable perception framework in response to specific issues (Weick, 2001). In examining the transitory characteristic of PBL, we argue that learning is realized through a timely theory-in-use for a desired experience. In this instance, participants are required to demonstrate a readiness for self-inquiry and collaborative engagement to develop further enriching experiences (Marquardt, Leonard, Freedman, & Hill, 2009; Sherwood, 2004). According to Handley, Clark, Fincham, and Sturdy (2007), participation involves more than the heart and mind as well as a desire to belong; it encourages mutual responsibilities and an understanding of the meaning of behaviors and relationships.

The PBL contexts in which learning operates are subject to rapid and radical restructuring often appearing exogenous to participants (Keck and Tushman, 1993). As a consequence, they will approach knowledge through the creation of social relationships by capitalizing on semiotic resources as a means of meaning-making and meaning-signifying to identify social structures including their subcultures and norms (Lave & Wenger, 1991).
doing, PBL participants begin to construct their realities by sharing with others their experiences and conceptualization of problem solutions. Here, social structure plays a critical role as a contextual cue in allowing “patterned or regularized aspects of the relationships existing among participants in the organization” to develop (Scott, 1992, p. 18). We further suggest that organizational learning resides in within organizations that have communities of practice where individuals can benefit from multiple perspectives to engage in creative actions (Lave & Wenger, 1991). The extent to which individuals are able to acquire new knowledge depends not only on their exposure to information sources; it draws on the cognitive participation of various individuals through dynamic feedback loops, as evident in the reflective and collaborative nature of PBL. The social construction of experience is an important aspect of organizational learning that is governed by systems thinking and a shared vision (Senge, 1990). PBL thus brings to light an extended dimension of organizational learning through formalized and cooperative behavioral structures.

**Theoretical Proposition**

In any system, the haphazard interaction between individuals and activities causes structural tensions that are accumulated through defensive routines. These tensions function as contradictions that produce immense potential for learning (Edmondson, 1996). However, contradictions alone do not give rise to an immediate learning avenue; they must first be recognized as potential problems before they can be dealt with beyond defensive routines. If properly managed, these problems function as both resources and catalysts for learning that involve participants in a rigorous process of sorting things out (Engeström, 1987; Sewell, 1992). In this instance, problem solving energizes a variety of learning patterns where errors are viewed as important sources of information for improving current performance (Michael, 1976; Schein, 1993; Sitkin, 1992). This situation facilitates self-directed and reflective learning, motivating participants to identify and develop appropriate theories-in-use. Persistent problems not only allow participants to reassess their learning potential, they promote a continuous commitment to learning through a proactive drive and a cognitive openness to face failures (Knowles, 1975; McCarthy, 2008; Oddi, 1986).

As much as error detection and error reduction are part of organizational learning (Argyris & Schön, 1996), so too is problem solving, which promotes feedback that leads to double-loop learning (Marquardt, 1999, 2004). For instance, the lack of feedback in an activity is akin to a type of incomplete
learning cycle that March and Olsen (1976) term learning ambiguity. This happens when there is a lack of mutual responsibilities between problem solvers. To encourage feedback in PBL, an overt readiness for participation is essential to the understanding and interpretation of problem scenarios (Frese & Zapf, 1994). However, too narrow or excessive a participation might work against the process, leading to a fix that fails (Senge, 1990). This condition suggests that although short-term effectiveness might be achieved, long-term consequences could be hampered by persistent control that immobilizes learning. Hence, participation needs to be sufficiently spontaneous so that it will reenergize learning patterns to engage individuals in the wider interpretation and sense making of experiences (Ellström, 2001), as illustrated in the PBL cycle (Figure 1). These expectations in PBL will challenge participants to reconsider their Model I theory-in-use and modify their learning patterns leading them to incorporate different feedback loops for double-loop learning (Argyris & Schön, 1996). In so doing, they will counteract their defensive behavioral routines by being involved in rigorous interpretive processes to enforce a readiness for learning (Duncan & Weiss, 1979; Weick, 1991).

As a contribution to organizational learning theory, we argue that PBL can be a key driver in connecting organizational work and learning (Marquardt, 2002). PBL is the inherent unifier that directs organizational members’ learning capacity in ways that bring them closer to the organization’s strategic objectives where the focus is on the improvement of organizational

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Figure 1. A problem-based learning framework
Source: Adapted from Wee and Kek (2002, p. 93).
As organizational learning is often triggered by the external environment with a need to outperform competitors in the long run, PBL sets the platform for participants to respond to complex, open-ended daily problems that motivate them to think about wider issues that would have an impact on organizational performance. As the propeller of organizational learning, PBL encourages collaborative learning allowing participants to seek and evaluate information sources they constantly need to improve organizational systems, processes, strategies, and purposes (O’Connor, 2004; Yeo, 2007).

Given the interpretive nature of PBL that optimizes participants’ potential for capturing concrete experiences that reside in various conditions, we posit that it is a process that resonates with the tenets of Kolb’s (1984) experiential learning theory. As illustrated in Figure 2, the underlying principles of experiential learning suggest that the conceptualization of a new problem is triggered by reflection on a past concrete experience. According to Kolb (1984), “learning is the process whereby knowledge is created through the transformation of experience” (p. 26), essentially an experiential dimension of double-loop learning.

We further explain the relevance of PBL to experiential learning by discussing several propositions of Kolb (1984) that characterize the transformation of experience, forming the theoretical basis of Figure 2. First, learning should best be conceived as a process rather than merely an outcome. Driven by a problem, ideas in PBL are normally constructed and reconstructed
through experience, and this process motivates inquiry and skill in knowledge acquisition. Second, *learning is a continuous process grounded in experience*. If PBL begins by bringing out the learner’s beliefs and assumptions about a problem, testing them and integrating the new will result in ideas that are more refined. This process, according to Kolb (1984), is the intrinsic facilitation of learning. Third, *the process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world*. In PBL, participants assume different roles in varying degrees, moving in and out between being actors and observers, sometimes from “specific involvement to general analytic detachment” (p. 31). Fourth, *learning is a holistic process of adaptation to the world*. The underlying process of PBL involves the integration of thinking, feeling, perceiving, and behaving. Fifth, *learning involves transactions between the learner and the environment*. As PBL requires individual as well as collaborative and shared learning, there is a strong interrelation between internal experience, such as the state of joy, anxiety and satisfaction, and external or environmental experience, such as inter and intra-group social meaning. Sixth, *learning is the process of creating knowledge*. This is largely achieved through the interaction between subjective personal experiences and more objective group experiences based on problem solving.

PBL is highly dependent on experience and the social construction of knowledge. We now summarize our theoretical underpinnings of the proposed framework in closer relation to Kolb’s (1984) learning theory. We believe that experience needs to be seen as constructed, shaped, contained, and maintained by social relations, as evident in the communities of practice initiated by PBL. In addition, it is expected that complex and unequal relations based on knowledge building are constructed between participants as an integral part of the learning process. With the need to focus on the “current” experience because of the pressing need to solve an identified *problem*, the mirroring process between the problem-solving environment and the organizational context increases in importance. This process is characterized by group dialogue and knowledge sharing in PBL. As a result, learning becomes more engaging when participants constantly find ways to deal with their underlying and unconscious processes, paying particular attention to defense mechanisms. Finally, the overall essence of learning in PBL integrates the various second-order or meta-processes to each aspect of the cycle through the synthesis and application of knowledge as a response to reflection and feedback (Vince, 1998).

Against the theoretical backdrop, we develop the following research questions in support of the research problem:
Research Question 1: What are the characteristics of PBL that might be applicable to organizational learning?

Research Question 2: What are the factors that influence PBL in organizational contexts?

Research Question 3: What are the implications of PBL on organizational practice?

Method

We employed two distinct qualitative techniques to several issues relating to PBL and organizational learning: convergent interviewing and a qualitative survey technique called Ideas Unlimited (IU) developed by Krone (2007). Our research inquiry was guided by an exploratory theory-building paradigm (Lincoln & Guba, 1985) as we gathered views from PBL specialists and employees who had firsthand experience in PBL in their organizational contexts. Our research execution is as follows:

- In the first stage, we conducted convergent interviewing with 10 PBL specialists, that is, four practitioners and six academics; three are male and seven are female. They have between 3 and 9 years of PBL consulting experience, that is, a mean of 5.2 years.

- In the second stage, we used the IU to collect data from 50 PBL practitioners in Singapore, 18 through face-to-face interviewing and 32 through online means. Of the 50 interviewees, 27 are female and 23 are male. The age ranges between 23 and 45 years, with a mean of 35.6 years (see Table 1).

- As a follow-up triangulated phase, we conducted telephone interviewing to clarify doubts with 15 respondents mainly from the 32 online IU respondents.

For the convergent interviewing, we adopted a purposeful sampling approach as the interviewees were chosen based on their capability to contribute insights and their understanding of the issues being investigated (Eisenhardt, 1991). To qualify as possible subjects for this stage, we narrowed our selection to only specialists of PBL, who either served as certified facilitators or consultants. They needed to satisfy two fundamental criteria: content knowledge of and practical experience in PBL. We conducted convergent interviewing as it sought to use a broad-based interview protocol to refine and narrow views that would provide relatively focused answers based on the research objectives. Convergent interviewing is a dialectic process that looks
at two types of patterns in the emerging data: one is the *convergence* that arises through agreement whereas the second relates to *discrepancy* or disagreement in the emerging data (Dick, 1990). We used both the structured and unstructured interviewing format. For instance, during the early stages, the content of the interview was unstructured and flexible during which the interviewee told his or her story about PBL, out of which data emerged. However, as the interview progressed, the interview became more structured as we converged on specific issues (Sekaran, 1992). We used between 40 and 60 minutes to complete an interview based on a general question: *Why is PBL practical?* We also developed five probe (P) questions to provide some structure to the interviews, as follows:

*P1:* How can a PBL problem be relevant to employees?  
*P2:* What aspects of the PBL process are useful to employees?  
*P3:* To what extent can every employee be involved in PBL?  
*P4:* What must organizations be prepared to do to incorporate PBL?  
*P5:* What are the wider applications of PBL?

For the second stage involving IU qualitative surveys, we adopted a snowball method of sampling such that the subjects interviewed were identified through social networking among local professionals. Each respondent was then asked to recommend one or more colleagues or friends (Singleton & Straits, 1999). As PBL is not widely practiced in Singapore organizations, it was difficult for us to narrow our selection to subjects who had extensive experience in PBL in a single organization. As such, we reduced our criteria

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**Table 1. Job Categories of Respondents**

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior executive</td>
<td>10</td>
</tr>
<tr>
<td>Executive/officer</td>
<td>8</td>
</tr>
<tr>
<td>Manager</td>
<td>7</td>
</tr>
<tr>
<td>Administrative assistant</td>
<td>6</td>
</tr>
<tr>
<td>Systems analyst/programmer</td>
<td>6</td>
</tr>
<tr>
<td>Graphic designer</td>
<td>5</td>
</tr>
<tr>
<td>Lawyer</td>
<td>3</td>
</tr>
<tr>
<td>Director/general manager</td>
<td>2</td>
</tr>
<tr>
<td>Businessmen/entrepreneur</td>
<td>2</td>
</tr>
<tr>
<td>Medical doctor</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>
to accepting subjects who had been trained and/or had direct or indirect experience in PBL in their organizations. We believe that views from these people would extend our current understanding of the positive and negative effects of PBL application in actual organizational contexts.

We chose the IU technique as it is a powerful qualitative survey method to gather views and perspectives on an emerging phenomenon in written form. This can be done through face-to-face or online “interviewing.” Essentially, respondents will be briefed either personally or through phone calls and are expected to provide their responses in written form through key words, statements and or anecdotes in whichever personal or flexible way they wish. Krone (2007) has found that allowing respondents to reflect their “answers” in written words ensures a more truthful repertoire of their thoughts and feelings on issues concerning them. The IU method, unlike face-to-face interviewing, uses targets as a springboard to promote debate and reflection in a highly individual way. A target is a problem statement encouraging participants to base their responses on daily or prior experience. In a typical IU session, not more than 15 targets are used to ensure clarity and focus of problem issues. If for whatever reason a respondent is unable to attend a “live” IU session, he or she can still participate in an online method provided a briefing on the intent and scope of the research has been given by the researcher.

Generally, the IU technique collects and organizes ideas from individuals to solve policy, program, task or procedural problems. In this study, we first conducted three meetings when we briefed the respondents about PBL using a simple framework developed by Wee and Kek (2002); see Figure 1. We then asked them to write target reflections independently, spontaneously, and anonymously through small pieces of paper based on the target (T) statements provided. Specifically, we asked them to respond to each statement using “why?/why not?,” “how so?,” and “what are they?” questions, as follows:

\[
\begin{align*}
T1: & \text{ PBL can be implemented in any organization} \\
T2: & \text{ PBL motivates me to learn at work} \\
T3: & \text{ There are distinct factors that influence PBL in my organization} \\
T4: & \text{ Specific skills are required to facilitate PBL in my organization} \\
T5: & \text{ PBL encourages me and others to learn continuously}
\end{align*}
\]

Because of the difficulty in gathering sufficient people to participate in an IU face-to-face session, we used an alternative approach. Equally effective,
the online IU technique required participants to respond to targets using email. The participants would first receive an email and a call from us, followed by verbal and written instructions on how to respond to a target. Like the manual system, all five targets were sent in separate emails for the participant to respond to each target individually. The IU technique aims to capture the aggregation of know-how, ideas, problems and recommendations, and reduce the qualitative data obtained into a document capable of improving performance for the subject of its focus (Krone, 2007). We subsequently conducted telephone interviews to triangulate data and clarify unclear target responses especially those that required further substantiation.

Data Analysis

We analyzed the data of both stages using content analysis and we evaluated the overall qualitative data for salient trends, themes and patterns (Patton, 1980). Content analysis requires the selection of a unit of analysis. According to Krippendorff (2004), a recording unit is the specific segment of content that is characterized by placing it into a given category. In this study, we separated the data by each research objective, so that all responses to each objective were listed together. In addition, we used the IU data to create categories efficiently as we did not have to transcribe the responses as did the interview data. The logic used in the creation of categories was inductive as the content of the data responses was the datum that triggered the category name. Subsequently, reduction to super categories occurred where the logic was switched to deductive as we considered the problem gaps to be narrowed. Finally, we prioritized and refined the super categories until the logic became dialectic. At this stage, we applied the thesis, antithesis, and synthesis thinking to the refinement process until key themes and categories emerged (Krone, 2007). We also used a software program, nVivo, to assist us with data analysis and interpretation.

In summary, this data collection procedure is governed by a process known as “theoretical sampling” where the coding and analysis done at the initial stages (interview data) determine the subsequent IU data to be collected. In this study, the interview data confirmed the theoretical proposition, which guided the IU stage. As the research develops, there is a reduction of data collection and coding, and an increase in theory building (Strauss & Corbin, 1990). Concepts that emerge from the data and from the literature are compared and contrasted to establish research issues, which are then refined and elaborated to develop theory (Lincoln & Guba, 1985).
Findings

Characteristics of PBL and Organizational Contexts

Among the 10 PBL specialists interviewed, 8 strongly felt that PBL could and should be implemented in organizational contexts as a means of facilitating collaborative and continuous learning. Only two had some reservations as they felt that “the process of PBL would be too complex” and that “people need discipline to follow the PBL process” truncating the dynamics for collaborative inquiry. This implies the responsibility of knowledge agents in communities of practice to ensure continuous knowledge construction. We highlight two successful PBL implementation stories as recounted by two PBL specialists.

Case 1: . . . One department in a legal firm tried using PBL to let their new lawyers learn about actual cases as they (senior lawyers) don’t have the time to train them. The partners [of the law firm] learnt about PBL from us (PBL consultants) and tried it out with a small group of young lawyers . . . They built PBL into their induction and on-the-job training [program]. Instead of telling them (new lawyers) specific legal practices, they were posed specific case questions one at a time. They then went away to think about problem and learning issues, and came back with new questions [for clarification] and potential solutions . . . Their mentors (senior lawyers) would then give feedback and ask deeper questions [about the case]. The learners then came up with a learning plan with timeline and all . . . they had to do two things: ask around for more answers and look up legal documents for confirmed answers. The seniors would check their answers periodically in 20-minute review sessions and either offer confirmation on answers or suggest new directions for deeper answers. To ensure strong participation from both sides (senior and new lawyers), learning outcomes . . . that is, how much learning took place . . . whether the learner was inquisitive, resourceful, or dependent on handholding . . . were tied in to their probation evaluation. After six months of “trial,” the partners were quite satisfied with the overall PBL experience . . . it allowed the seniors to guide as opposed to train . . . in short durations of no more than 20 minutes per [review] session, leaving the legwork to be all done by the learners . . . which is an effective way of gaining good grounding for the job and letting them feel the pulse of the ground . . . so that they know just how hard it is to be good lawyers.
Case 2: There was this local bank that wanted to improve their customer service. The top management felt that traditional training methods (i.e., formal classroom training) were no longer effective (compared with other emerging methods). Thirty-six bank officers were first trained using PBL. We (external consultants) helped to identify solvable actual scenarios pertaining to customer service. We used lots of role play to enact scenes that serve as problem settings. Observers were asked to rate their patience level and their willingness to go the extra mile to assist the difficult customer(s) individually. Then we asked them to write down three things they would do spontaneously to handle the customer(s), find out three things from the book (concepts on consumer behavior) and write down three important questions they wanted answers for. Examples of questions could range from anything relating to performance to bonus to how much authority they have over customers. We also sent them to different outlets (bank branches) to observe customer behaviors. They had to make notes, raise questions and create a “theory” (identify a trend/pattern) out of their observations. We even organized dialogue sessions with “star” officers (those who have received many compliments from customers) to find out how they would deal with difficult customers. The process (PBL cycle) took about 12-15 weeks. At the end of it all, they were invited to a personality test administered by trained psychologists and were given a report. We wanted them to match their responses recorded in their learning process to their personality traits. Each had to compile a report on their philosophy on customer service and key learning points. With the report, the HR department would follow up with dialogue sessions with each of the 36 officers and provide options for those whose aptitude does not lie in customer service. This involves job realignment or job rotation. HR then went on to chart specific training plans for these officers to take them to “star” performance.

As reflected in these two cases, several salient themes pertaining to PBL implementation have emerged. These include “learning from prior and new experiences,” a key component in Kolb’s (1984) experiential learning cycle; optimal opportunities for “feedback and inquiry,” the underlying principles of double and triple-loop learning (Lant & Hurley, 1999); the need for an appropriate “reward and recognition system,” an essential motivating factor in human resource management (Price, 2000); and implications for “professional development and lifelong learning” by tying in to the “potential
appraisal of employees,” the key aspects of human resource development (Marquardt, 2002; Raelin, 2000). In addition, slightly more than half of the IU respondents reflected that they had benefited from PBL in their organizations directly or indirectly, as evident in some of some of the representative comments:

... going to work should not be just working and nothing else ... in our company (dealing with cargo freight) our management encouraged us to open our mouths to ask [questions] and even gave us incentive for the best questions asked, just like “staff suggestion scheme” . . . PBL makes us more aware of what we don’t know (particularly existing problems the company faces).

... our company (dealing with electrical products) organized learning festivals, seminars and a lot of programs to get us to think [out of the box] . . . I like it because it’s like we’re going back to school again . . . only difference is, we learn, work and get salary as usual . . . PBL opens our mind(s) to a small problem but with big solution(s)

However, there are also some aspects of PBL that do not contribute to individual and organizational learning, as reflected in the following quotes:

... not everyone can learn ... there are many types of learners ... those who can learn fast find PBL useful because it’s challenging [for them], but those like me (aged 47, food & beverage industry) is too old to learn new things . . . If the company employs many young and fresh people (graduates), they can implement PBL successfully . . . it all depends on how willing people are.

... Cost is one thing companies are very concerned [about] . . . PBL is one form of learning that is continuous . . . like my company (shipping industry) is very small (about 70 employees) . . . it’s easy to do PBL as there’re so few of us working in the office (i.e., about 60% of employees work on site) . . . imagine you have a company with 700 people, it will be quite hard . . . for us, the company used PBL to replace [formal] training . . . to cut cost I think.

... and the rules of PBL are complex . . . there are personal and group involvements . . . people who are not social will have a problem.
Based on the findings, we have identified several key characteristics of PBL that could function as contextual factors for individual and organizational learning: (a) problem conceptualization, (b) feedback and inquiry, (c) self-directed learning, (d) investigative action learning, and (e) apprenticeship. These would require the collective participation of cognition in order to induce learning-oriented behaviors at both the individual and organizational levels (Wang & Lee, 2009).

Influences of PBL on Organizational Contexts

As organizational context is composed of structures, systems, and processes, it serves as external stimuli to individuals influencing the way they frame prior and existing experiences through multiple cognitive maps (Edmondson, 1996). Our data show that in much of PBL, learning patterns present themselves as amplifying and restraining effects through different feedback loops. As observed, PBL promotes situated practice where incidental learning occurs during transitory moments of sense-making activities leading to collective emotions and double-loop learning.

The implementation of PBL requires in most times a top-down approach such that it is “decided at the management level” and that “supervisors must play an important role in managing the learning process.” Leadership is regarded as a critical agent in facilitating the different dimensions of learning and the emotions that occur as a result of the participatory expectations of PBL. PBL users view their involvement in different communities of practice as experiencing change from their routines and norms (Gagne, 1970). In resisting change, they generally respond with anxiety and fear through a cognitive mechanism that helps them to distinguish potential stressors as being threats or as benign experiences (Baruch & Lambert, 2007; Tse & Dasborough, 2008; Vince, 2002). A possible way for the management to respond to such emotions would be to acknowledge individuals of their anxieties about the uncertainty of PBL and recognize their involvement as part of organizational learning and change, as illustrated in the following quotes:

There must be incentive for us to break away from our routines (i.e., to take part in PBL activities) . . . so that we won’t feel afraid of doing things differently . . .

I believe PBL requires participation . . . at a more complex level . . . so what is in store for me [compensation] to feel good about learning?
In addition [to] our daily tasks . . . we [now] need to share ideas and reflect [on] experiences. I know it [will] all work out well for us [and the company] . . . but will we be assured for getting out of the comfort zone?

As PBL is designed to promote individual and collective inquiry through a variety of experiences, a critical component is feedback and inquiry. Through multiple feedback loops, participants begin to question existing norms and practices providing alternative pathways on how problems can be approached (Argyris & Schön, 1996; Marks, Mathieu, & Zaccaro, 2001), as illustrated in the following quotes:

. . . I seldom sit down and think about deep issues related to my work in the office . . . PBL encouraged me to think [about] what I do right and wrong . . . then I keep asking questions about what is right and wrong . . . slowly I realize(d) [that] I’m learning new things . . . especially when a lot of us (in group settings) question one another.

. . . people have the habit of keeping quiet when things don’t seem right . . . the usual passive [work] culture here . . . when one starts asking fierce questions (that have a direct impact on the organization), the management wakes up . . . PBL is quite useful because I can be bold to question “stupid” rules and work process(es) that make people unproductive . . . PBL solves actual problems [that] nobody dare(s) to ask . . .

Double-loop learning is an externalization of deep thoughts that are internalized through critical reflection. It projects itself through a greater exchange of cognitive cues based on the alignment of specific goals. In this perspective, PBL engages individuals at the organizational level through a shared vision bridging individual learning and organizational learning (Marquardt, 2002; Senge, 1990). It is through the collective cognition and participation of individuals that double-loop learning can take effect at a level where organizational purpose and strategy are at the epicenter of organizational learning (Moldoveanu & Bauer 2004).

Based on the findings, we have identified the following PBL factors as having an influence on individual and organizational learning: (a) leadership, (b) reward and recognition, (c) time, (d) structure of learning, and (e) alignment of goals. The overarching motivation is a shared vision that guides learning processes and expectations, an important catalyst of organizational learning (Marquardt, 2002; Senge, 1990).
Applications of PBL in Organizational Contexts

As an extension of collective emotions and double-loop learning, our findings reveal several key attributes that catalyze PBL in organizational settings. Communication is identified as the most critical attribute that promotes trust and mutual responsibility among participants (Barell, 1998). There is an intra-personal and interpersonal aspect of PBL that requires a metacommunicative engagement to promote individual and organizational learning. The “talk-to-self” characteristic of critical reflection and self-directed learning serves as a precursor to double-loop learning of which active questioning and reflective listening are a part (Savin-Baden, 2003), as evident in the following quotes:

There is a quiet and noisy side to PBL. On the quiet side, we make “noise” within ourselves to tease out various perspectives and question assumptions. On the noisy side, we need to sometimes remain “quiet” to extract useful information from [a] critical exchange of viewpoints. Sometimes the noise creates opportunities for creative ideas to spark.

I have learnt [through PBL] the power of communication . . . I have learnt to be flexible with suggestions, firm with objectives and values . . . and specific with decisions and ideas. I have also learnt to ask useful questions and be supportive to not-so-good ideas . . . creating a safe environment for all to learn.

In summary, we have identified several key attributes that have an influence on the application of PBL in organizational contexts: (a) communication, (b) team dynamics, (c) trust, (d) mutual responsibility, and (e) questioning technique. Of importance is creating a learning culture that is both reflective and participatory governed by spontaneity and a specific purpose (Han & Williams, 2008).

Discussion

What Are the Characteristics of PBL That Might Be Applicable to Organizational Learning?

The experiential learning opportunities of PBL provide immense potential for situated practice as a result of informal learning that occurs through intra- and interpersonal participation (Terlaak & Gong, 2008). Situated learning
refers to the transitory effects of knowledge capturing that may be applied to actual organizational contexts. The greater utility of that “situated” knowledge is often demonstrated in a cycle of reflective action where abstract conceptualization and concrete experimentation operate simultaneously (Hargadon & Bechky, 2006; Kolb, 1984). An important consideration is to capture informal learning patterns through the recognition of a learner’s mental modeling capacity and his or her theory-in-use (Marsick & Watkins, 1990; Senge, 1990). Creating a safe space for learning releases a psychological freedom for learners to capture their practice in a much more spontaneous manner. This psychological mechanism produces interpretive mental paradigms from which sense making takes its cue and through which meaning making takes effect (Edmondson, 1999).

PBL can be a critical and valuable element in developing a learning organization. Learning while solving problems demonstrates to the organization that learning and organizational success are intertwined (Marquardt, 2002; Marquardt et al., 2009; Senge, 1990). Nearly every leadership skill can be developed with problem solving, especially when questions are encouraged (Marquardt, 2005; Raelin, 2000). Leaders can provide important mentoring while working with a PBL group as well as serve as a model that recognizes the importance of continuously learning.

One of the important aspects of organizational learning is the institutionalization of collective emotions (Tse & Dasborough, 2008). Because of the amplifying and restraining effects of learning patterns associated with PBL, collective emotions are frequently generated to restore blurred boundaries of identity acknowledgement and role responsibility. The production of any emotion, whether joy, dreariness, anxiety, or fear, in organizational contexts is often the result of change in organizational structures, systems or processes as affecting work boundaries (e.g., Baruch & Lambert, 2006; Bateson, 1971; Vince, 2002; Weick, 2001). PBL induces multiple learning patterns through a community of practice and this necessitates working outside one’s familiar zones. The learning networks created for the different stages of a PBL cycle often times lead to learning defensiveness where participants attempt to preserve familiar cognitive structures that truncate actual learning. Hence, it is essential that organizational leaders appreciate the diversity of individual emotions to reinforce and institutionalize these emotions where fear and anxiety are acknowledged as a leitmotif of learning. In this perspective, the collectivity of emotions creates an identity in the problem-solving process and provides an impetus for organizational learning (Tse & Dasborough, 2008; Vince, 2002).
What Are the Factors That Influence PBL in Organizational Contexts?

[The principles of] PBL can be traced back to medieval times where apprenticeship was an art as well as a science . . . years of slogging and learning under the master so that he or she can master the art of XYZ.

The above quote from a PBL specialist points to the importance and relevance of apprenticeship in today’s organizational contexts where on-the-job training and cross-cultural training could be a function of PBL (Barell, 1998). A key feature of PBL is the provision of creative guidance where the facilitator empowers PBL participants as change agents through a series of modified actions. Experiencing error detection and error reduction is a first step in framing a learning that requires further cognitive participation to bring about risk taking and experimentation, as illustrated in the following quote:

If people do not acknowledge the existence of a prior problem, then learning may not have taken place.

In the process, the mental models of participants generate a capacity for dynamic communication, questioning, reflection and action. It is through the interplay of reciprocal influence in power asymmetry during intra and interpersonal interactions that double-loop learning develops (Argyris & Schön, 1996).

Through double-loop learning, participants create opportunities for improvement rather than performance. The focus on improvement releases learners from the fear of being trapped in mistakes thereby increasing their capacity for greater experimentation (Kolb, 1984; Levinthal & Rerup, 2006). On the other hand, the focus on performance generates a cautiousness to learning that leads to predictable traps of self-imposed pressures to excel and achieve error-intolerant results (Edmondson, 1996).

Proposition 1: Error detection and correction does not necessarily lead to true problem solving; it constructs a reality for actors to acknowledge organizational tensions as opportunities for individual and organizational learning engaging them at a much more complex cognitive level to bring about actions that lead to organizational improvement.
As discussed, solving new problems using past actions or retrieving propositional knowledge based on memory does not necessarily lead to true learning (Lichtenstein, 2000). Instead, it is through a deeper engagement of cognitive collaboration that new mental models will develop to activate deeply seated tacit knowledge for organizational learning (Nonaka & Takeuchi, 1995).

**Proposition 2:** Sense making the diverse opportunities for learning in PBL projects a language that informs actors of a shared meaning in their collective theories-in-use. The interaction between each actor’s perceived and lived experience is characteristic of PBL as a social construction of learning.

In PBL, participants become more explicitly aware of the opportunities for learning offered by work situations (Williams, Parker, & Turner, 2007). They develop an individual learning system within a larger community of practice through a process of organizing that helps them order and structure the chaotic external environment:

To improve [the] quality of a product, we have to look at the possible problems that cause it (leading to defects). We analyze the cause(s) . . . make recommendations [on processes], implement them and evaluate the outcomes. If they (outcomes) are positive, the workers [will] have learnt the techniques of solving this problem [meaningfully].

PBL is assumed to be an organization of activities that are bound by complex systems. The learning patterns in each activity are expected to produce amplifying and restraining effects as participants engage in simultaneous stimuli and responses that create opportunities for a ‘rupture’ in learning (Engeström, 2001). This “rupture” causes learners to be awakened from familiar cognitive patterns to allow new cognitive structures to take shape thereby increasing the power to inquire and appreciate existing changing phenomena. The overall PBL process can be evaluated in terms of how participants view their learning capacity, the problem under investigation and the relevance of the possible solutions to their immediate context. Through the different learning networks within a larger community of practice, a central system for organizational learning begins to develop (Yoo, Boland, & Lyytinen, 2006):

**Proposition 3:** PBL requires a learning orientation that promotes openness, trust, and a shared vision. The productiveness of learning is
enhanced through the collective cognitive participation of actors within a community of practice igniting the passivity of tacit knowledge into actionable knowledge.

What Are the Implications of PBL on Organizational Practice?

This article is predicated on the assumption that organizations behave in many respects like organisms, that is, their behavior is not static; rather it is governed by a set of dynamically active processes of organizing that rely fundamentally on human cognitive process (Bennis, 1969; March & Simon, 1958; Morgan, 1997). PBL requires both employee competence and organizational culture to work hand in hand, involving the necessary level of commitment, trust and understanding to ensure possible productive cooperation (McCarthy, 2008; Watson, 1994). As such, PBL can be regarded as being reflected in the observable extent to which changes are manifested in individual expressions of attitudes, improved knowledge and use of specific skills to meet organizational needs leading to organizational learning.

PBL is closely aligned to action learning which has recently become a widely-used organizational tool for development leaders as well as building teams and transforming organizational culture. As one of the participants noted,

The starting point of action learning is akin to PBL. How we work out the problem needs a little tweaking and modification [from different perspectives] to suit the workplace. The team looking into this (problem solving activity) has to consider all aspects of PBL at the conceptualization stage.

PBL, like action learning, helps create an organizational culture that is seeking to continuously learn and to continuously improve (Raelin, 2000; Revans, 1982). It can be extremely valuable in tackling and resolving complex and urgent problems that organizations face as they seek to globalize, when a merger occurs, or when financial or personnel crisis emerge (Marquardt et al., 2009). Just as PBL can create a culture that supports learning, the corporate culture, in turn, must support learning.

There are many examples of PBL [being used] in the workplace; for example, PBL for educational administrators, training nurses for practice... preservice nursing education. In order for it (PBL) to work, we need a community of practitioners who believe in the structure, system, and process [that support learning].
Table 2 illustrates the possible applications of PBL in organizational contexts and their impact on human resource management and development. It also highlights managerial implications for practice through a series of actionable questions that organizational leaders might use to facilitate organizational learning and development.

The use of PBL in an organization can lead to a number of managerial implications. Considering a management policy of using employees from different disciplines and different departments provides the diversity to creatively solve problems while at the same time to “break down the silos” that may exist in the organization. Managers should be encouraged to look outside of their employees and outside of expertise only in PBL (Raelin, 2000). PBL can be considered the primary tool for developing the social and leadership skills as well the best way of transferring tacit knowledge across the organization as the knowledge and skills acquired in PBL can likely be used many times in other parts of the organization (Marquardt et al., 2009). Management policy includes an expectation that members of PBL will transfer the knowledge gained to the organization’s knowledge management system as well as personally given to employees who can best benefit from this wisdom.

Building high-performance teams is essential to any organization’s success (Han & Williams, 2008; Senge, 1990). PBL can become an effective way in which teams are chosen, formed, and succeed. As a group of people successfully understand, solve and implement a PBL project, all the dimensions of a great team emerge – solid communications, trust, common purpose, commitment, success, and support (Marquardt, 2004; McCarthy, 2008).

Conclusions

In this article, we offer a theoretical explanation on the relationship between PBL and organizational learning. We also discuss the possible applications of PBL in organizational contexts through the cognitive participation of individuals within a community of practice. Through a qualitative methodological paradigm, we gathered views from PBL experts and users to gain a better understanding of the characteristics of PBL as contributing to individual and organizational learning. We theorized a learning that is context dependent where shared meanings are socially constructed through multiple interpretations of feedback loops. We proposed that the success of PBL is highly contingent on the social consciousness and collective emotions of participants. Success also depends on the complexity of learning networks that needs to be supported by organizational structures, systems, and processes. The underlying motivation for implementing PBL in organizational contexts is the operationalization of a shared vision through individual and
### Table 2. Practical Applications of Problem-Based Learning (PBL) in Organizational Contexts

<table>
<thead>
<tr>
<th>Key Stages in PBL (Based on Figure 1)</th>
<th>Attributes Required for Workplace Learning</th>
<th>Critical Factors Influencing Problem-based Workplace Learning</th>
<th>Implications for Workplace Practice</th>
<th>Managerial Implications: Questions That Managers Would Ask to Promote Organizational Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem identification</td>
<td>Conceptualization, Questioning</td>
<td>Consolidating past experiences</td>
<td>(HRD) More flexible yet challenging personal and corporate learning plans</td>
<td>“How can we celebrate diverse experiences as a way of reconstructing our identities to facilitate the integration of communities of practice?”</td>
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<td>Recognizing and accepting mistakes and failures as potential for growth</td>
<td>(HRM) A more progressive reward and recognition system</td>
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<td></td>
<td>Rewarding efforts in error correction and reduction</td>
<td>(HRD) More dialogue, feedback, and focus group sessions to feel the pulse of the ground</td>
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<td>Problem solving in small chunks</td>
<td>Teamwork, Shared responsibility, Empowerment leading to trust</td>
<td>Increasing decision-making capacity</td>
<td>(HRM) Better technological infrastructure in support of systems</td>
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<td></td>
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<td>Refining systems structure and work processes</td>
<td>(HRM) Flatter reporting structure</td>
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<td></td>
<td></td>
<td>Reevaluating training structure</td>
<td>(HRD) Tighter linkage between learning needs and expected competencies</td>
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<td>Facilitator-led learning orientation</td>
<td>Facilitation, Communication</td>
<td>Leaders as coaches and mentors</td>
<td>(HRD) Leaders focused on action and process management</td>
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<td></td>
<td>Consultative approach, Alignment of goals</td>
<td>(HRM) Better communication of shared vision, mission, and goals</td>
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<tr>
<td>Peer teaching and learning</td>
<td>Communication</td>
<td>Formalizing learning units</td>
<td>(HRM) Stronger repository of data for shared learning</td>
<td>“How should the social structure of learning be institutionalized to capture knowledge distribution and redeploy human capital to enhance the strategic competence?”</td>
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<td>Group dynamics</td>
<td>Creating learning spaces</td>
<td>(HRM) Alternative avenues of learning, e.g., e-learning</td>
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<td></td>
<td>Empowerment leading to responsibility</td>
<td>Expanding knowledge-sharing base</td>
<td>(HRD) Better communities of practice for knowledge co-construction</td>
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<td>Personal and team reflection</td>
<td>Questioning</td>
<td>Enforcing a sense of accountability</td>
<td>(HRM) An improved staff suggestion scheme to capture personal voices</td>
<td>“To what extent should individuals be conditioned for circumstances of ambiguity and uncertainty to operate at a level of continued experiential inquiry to confront unstable actions and outcomes?”</td>
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<td>Reflective inquiry</td>
<td>Formulating new strategies based on emerging issues</td>
<td>(HRM) More dialogue and feedback sessions</td>
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<td>Recognizing personal voices</td>
<td>(HRD) Tighter linkage between personal reflections and opportunities for professional development</td>
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<td>Rewarding bold suggestions</td>
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Note. HRM = human resource management; HRD = human resource development.
organizational learning within a community of practice to achieve organizational improvement and competitive advantage.

We recognize several limitations of our study. First, we explored only perceptions from PBL specialists and various users of PBL from different organizational contexts. The lack of extensive practical PBL experience from the 50 respondents might have affected the validity of this study to some extent. Furthermore, the practical implications of PBL would have been much more rigorous had we selected a purposeful sample for the second stage. However, this sample would have been very difficult to locate as PBL was at its infancy in Singapore’s organizational contexts. We also acknowledge the possible downside of PBL as a potential deterrent to learning as “PBL . . . may not work for intuitive and spontaneous people,” a quote from an IU respondent.

For future lines of study, we propose that in-depth case studies involving PBL-driven organizations be conducted to provide a more balanced perspective of PBL implementation challenges. Ultimately, PBL requires a strong buy-in, concerted effort and a persistent belief in its intrinsic value for its successful implementation in organizational settings. Future studies could focus on the deeper level of organizational dynamics such as organizational politics, culture, social structure, human capital, unlearning, and relearning as potential catalysts of PBL implementation (Cunningham et al., 2004; Friedman, Lipshitz, & Popper, 2005). These organizational considerations will provide a wider dimension to the study of PBL in organizational contexts. Instead, we focused our study on learning and organizational theories to help us understand the different learning patterns and networks that operate within the organizational contexts. As PBL provides the focus on “learning” rather than “instruction,” its importance to organizational learning is determined by the repositioning of mentoring roles and the shifting of individual mindsets. For PBL to be integrated into complex organizational systems, individuals ought to recognize that problem solving sometimes does not lead to profitable solutions; instead, they should appreciate the experiential inquiry embedded in the problem process as an opportunity for individual and organizational learning, as encapsulated in the starting quote of Einstein’s.

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