

# **“What do you think?” The Art and Science of Questioning in the PBL Classroom**

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## *Abstract*

As we move from an instructor-led mode of teaching and learning to more learner-centred approaches, questions, rather than answers, play an increasingly primary role in shaping the socio-cognitive development in learners as they explore and make meaning in collaborative settings. In a problem-based learning (PBL) environment, a paradigm shift in the way learning takes place necessarily demands a change in the way classroom communication is played out between both teacher and student and among students. This paper examines how a group of first-year polytechnic students adapt to an inquiry-driven and self-directed learning environment through developing specific questioning skills to heighten metacognition and improve group learning strategies and dynamics.

## **Introduction**

The role of questions in promoting open discussion (Dillon, 1988) is vital to a successful PBL classroom because of the encouragement of divergent thinking that is achieved via group dialogue and critical reasoning. The “challenge of making students’ thinking visible” (Tan, 2004, 7) is confronted when learners are not only able to articulate their doubts and curiosity in the form of probing questions, but are also able to communicate to their peers the motivations and purposes behind these questions.

The struggle for many students who are new to constructivist learning contexts is that a customary deference to the teacher-authority is now replaced with unfamiliar ownership of the problem-solving process (Savery & Duffy, 1998). Students are entrusted with the responsibility of monitoring their learning by initiating discussions and engaging in critical peer and self evaluation. Ramsden’s (1992) research on how students’ perception of learning is shaped by the educational environment they are brought up in is especially relevant to the way learners used to traditional learning structures “balk at opportunities for real decision-making” (Marlowe & Page, 1998, 59). These students also perceive and respond to questioning as fulfilling a largely summative function in testing, not developing, understanding. In this sense, there is a mismatch between pedagogical objectives and learner expectations.

However, given the principle that learners “adapt to the requirements they perceive teachers expect of them” (Ramsden, 1992, 62.), this implies that students can be *re-taught* to *re-learn* in order to assimilate into a PBL culture in their post-secondary education. This entails more than learning how to ask good questions to trigger deep learning; students need to learn the “psycho-social” and “pedagogic role” of questions (Pollard, 2002, 286) and how they reflect a learning community.

## Theoretical Background

In attempting to understand the relationship between the cognitive aspects of questioning and the social environment in which it is manifested, we need to recall a key metaphor in learning – the notion of *scaffolding* (Wood, Bruner & Ross, 1976; Vygotsky, 1978). Scaffolds support learners by offering them structured and metacognitive processes they can then enact in a dynamic context. When erecting these learning scaffolds in the classroom, the teacher models desired behaviour and helps mediate gaps in communication and differences in perceptions and opinion.

Students facing new learner-centric climates need to learn the rules and norms of socio-cognitive behaviour in such contexts (Edwards & Mercer, 1987) in order for learning and group processes to be effective. Instead of being passive respondents to questions, they need to start asking what type of question is constructive to learning, how their peers will respond to their question and what manner of questioning is appropriate. Questioning becomes a form of classroom interaction for the development of rapport and trust (Pollard, 2002), rather than a mere evaluative tool to organise and assess content knowledge.

Teachers can *facilitate* the adaptation of new learners to their environment by designing learning contexts that validate meaning through transactional dialogue (Savin-Baden, 2000) and social negotiation (Savery & Duffy, 1998); they can also promote safety in collaborative learning (Lee & Tan, 2004) through cultivating healthy group dynamics (Bligh, 2000). The nurturing of transformative learners (Kasl & Elias, 2000) can be brought about when we alter the language, dynamics and learning culture of PBL novices.

## Case Context

The data from this project stem from a class of 20 first-year students pursuing the diploma in biomedical sciences at the Republic Polytechnic (RP), Singapore. The students studied a cognitive skills module<sup>1</sup> in their second semester which ran for

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<sup>1</sup> *G102 – Cognitive Processes and Problem Solving* is a general module for all first year students in the biomedical sciences programme. The curriculum is designed around the theme “Thinking and behaving

16 weeks from October 2003 to April 2004. All the students are Singaporeans between 18 to 19 years of age who have undergone their primary and secondary education locally, and completed their GCE ‘O’ Level examinations prior to enrolling at RP.

The class had experienced one semester of studying in a PBL environment. RP’s PBL process is an institutional pedagogy where curriculum is structured around a one-day-one-problem framework<sup>2</sup>. Students work on problems in smaller groups of five throughout the day, which is interspersed with class meetings and group breakout sessions. Groups share their approaches and solutions and learning is culminated in a final third meeting, where much of the evaluation and synthesis of understanding takes place through questioning and discussion.

## **Methodology**

The data collected included video recordings, journal entries, surveys, student feedback, classroom observations and informal interviews with students and teaching staff. Data interpretation was carried out in the course of the 16 weeks, focusing on the following:

- students’ perception of the role of questions in learning
- attitudes towards asking and answering questions and
- responses to peer questioning.

A comparison between pre- and post-intervention strategies was carried out over a 3-phase period. Strategies included using reflective restatements (Dillon, 1988), helping students become reflective about their questions (Pollard, 2002; Tan, 2004) and modelling cognitive socialisation (Edwards & Mercer, 1987; Kasl & Elias, 2000).

## **Phase I – Observation of Peer Questioning and Dynamics**

### ***Observation***

In the first 3 weeks of the module, students in the project group were given broad instructions to “ask questions when others are presenting their solutions” in the third meeting of the day. The purpose given for this emphasis on questioning was to “promote learning” so that students “will do well”. It was observed that students typically asked these types of questions:

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like a scientist” to help students appreciate the dynamism of knowledge in an evolving scientific and social climate and build confidence in their role as young scientists at the forefront of changes.

<sup>2</sup> For more information on RP’s PBL and one-day-one-problem framework, see [http://discovery\\_rp.edu.sg/home/CED/home/1-day-1-problem.htm](http://discovery_rp.edu.sg/home/CED/home/1-day-1-problem.htm)

- “Are you sure?”
- “What does that word mean?”
- “What our group discovered is actually different...so how is this the case?”
- “Do you really know what you are talking about?”
- “I don’t understand it. Can you say it again?”

Questions were often raised by the more dominant team members, and tended to target specific members of the presenting team. The questions were often met with statements of uncertainty (“I am not sure.”, “Maybe.” or “The website didn’t say that.”) or admissions of failure (“We didn’t have time to look at that.” or “We went off-track.”); there were also occasions when teams became defensive (“If you’re so smart, why don’t you just say the answer?” or “What’s your real point in asking that?”). By the time it came to the final two teams’ turn to present their findings, the class had stopped asking questions altogether, declaring that there was “nothing new to ask”.

### ***Reflection***

From a survey on questioning, informal interviews and reflection journals, students shared what they thought was the purpose of questioning:

- “To challenge my explanations.”
- “They don’t understand something.”
- “(Others) think that I am wrong.”
- “To make the teacher realise that they know certain things.”
- “To get an A for that day.”

They also cited their dislike for certain motivations behind questioning:

- “Asking questions as personal attacks.”
- “To show their superiority.”
- “Asking for the sake of asking.”

Interestingly, students unanimously agreed on the importance of asking questions in order to “learn better”. When queried further on the relationship between the two variables, they responded that “questioning helps us check whether we are on the right-track” and also to “confirm if what we know is correct”. They also prefer the teacher to their peers asking questions.

### ***Analysis***

It appears that students perceive questioning as threatening when it comes from their peers and evaluative when it comes from their teacher. The two are related via an interplay of classroom politics (Burch, 2001) and learner perceptions of assessment (Ramsden, 1992). When a learner perceives his teacher as

empowered to know and deliver (Kerry, 2002), he expects a validation of his learning from such a source; when that power of validation is given to his peers, both student parties are unprepared to handle the ensuing dynamics. Going by Edwards & Mercer’s argument that knowledge is constructed not only in individuals’ minds but through social and intellectual discourse (1987), the project group seems to be fulfilling only the former aspect of learning and relying on the teacher to assess varying levels of content achievement. Questions formulated by peers would then be designed with such a criterion in mind. This explains the close-ended and rhetorical nature of questioning observed in the classroom, as well as the reciprocal surface responses from student presenters.

The Singapore education system places a “high premium” on examinations (Chang, 1997, 168), and has only in the last decade started to move towards a pedagogical reform of curriculum, instructional strategies and formal assessment (Sharpe & Gopinathan, 1997). Students in the project group are part of this transitional stage, and therefore require *scaffolding* to help them adjust to the new concept classroom where multiplicity of responses, cognitive dissonance and shared learning take over convergent thinking, textbook answers and individual knowledge. Students who see questioning predominantly as a tool to measure the “right” answer need to “learn that it is all right not to have all the answers, and for them to ask questions and to have doubts” (Lee & Tan, 2004, 140).

## Phase II – Intervention

### *Scaffolding Strategies*

Kasl & Elias (2000) posit that transformative learning is the expansion of individual and collective consciousness; this transformation is facilitated when “a learner is confronted with a complex cultural environment because effective engagement with that environment requires a change in the learner’s relationship to his or her group’s identity” (233). In order to facilitate learners’ adaptation to a questioning culture, the psycho-social and intellectual obstacles confronting the group under study needed to be addressed. The following table summarises the intervention method and process employed:

*Table 1: Scaffolding learner questioning*

<b>Learner obstacle</b>	<b>Learner perception</b>	<b>Scaffolding strategy</b>	<b>Scaffolding examples from the teacher</b>
Unsure of how to ask questions that promote learning	Questions test and validate knowledge	Use reflective restatements to reframe, clarify and link questions	<ul style="list-style-type: none"> <li>• “You say you don’t agree. Can you help us see which part you don’t agree with?”</li> <li>• “From what I hear in your question, you feel/ think that...”</li> <li>• “That’s a good question.</li> </ul>

			<p>Let's see if we can break it down into more manageable bits."</p> <ul style="list-style-type: none"> <li>• "Can we explore how your question links with what X just said?"</li> <li>• "Someone asked a question like that earlier on – can we recall the response? Is that same response relevant here?"</li> </ul>
Unaware of the purpose behind questioning	Questioning checks whether the questioner and the respondent have the same answer	Use metacognitive questioning to make learners be responsible for their questions	<ul style="list-style-type: none"> <li>• "Why are you asking that question?"</li> <li>• "Why is that question important?"</li> <li>• "Which of the presenter's points is your question focusing on?"</li> <li>• What is going through your mind when you ask that question?"</li> <li>• "Are you making a comment or asking a question?"</li> </ul>
Unprepared for empowerment in collaborative learning	Peers do not have the jurisdiction to evaluate one another's learning	Model cognitive socialisation by establishing norms and mediating conflict	<ul style="list-style-type: none"> <li>• "Thank you for asking that question - it certainly gives us another angle to look from."</li> <li>• "It may not be fair for the presenter alone to answer that; what do the others think?"</li> <li>• "You have a different answer, I see. Was your approach the same?"</li> <li>• "Good observation about that error. Maybe we can ask the presenting team to explain how they might do it again."</li> <li>• "Okay, maybe you're right that they haven't explored that adequately, but that's a difficult concept – how can we help them make sense of it?"</li> </ul>

The interventions are designed to challenge students’ assumptions and perceptions of the role of questioning by setting up an environment where students feel safe to “make mistakes” as part of their learning journey. This can only be achieved by changing frames of reference to support new habits of mind (Kasl & Elias, 2000):

*Table 2: Changing learners’ frames of reference in questioning*

<b>Old frame of reference</b>	<b>New frame of reference</b>
Asking close-ended, rhetorical and confrontational questions are meant to test the other party’s knowledge.	We ask questions to clarify concepts, probe deeper layers of understanding and learn something better.
End-of-day presentations are about checking if we got the answer the teacher is looking for.	Getting the right answer is not as critical as getting my peers to accept and make sense of what I say.
Teachers have the right to ask questions because they are authorised to sanction what I know.	Teachers are there to generate and facilitate group discussion.
Each team gets its turn to present its solution and pose questions in order to get a grade.	When we share and analyse our collective solutions, we learn more and get a better grade.
It’s embarrassing when we don’t know the answer to a question.	It’s okay not to know all the answers, as long as we learn more in the process of questioning.

By setting up these scaffolds to facilitate more constructive and positive questioning attitudes, learners are initiated into a new learning system by re-examining their prior expectations and re-evaluating student-teacher roles in order to motivate the formation of a collaborative class community.

**Reflection**

In the 8<sup>th</sup> and 9<sup>th</sup> weeks of the semester, the project group responded to two specific reflection topics on the role of questioning. Extracts of students’ journal entries are cited below:

*Reflection journal question: “How did questions help you learn today?” –*

“The learning process would not have been that successful if there were no questions being asked...it came to my attention that the two teams presenting initially had confidence that their experiment was going to be successful, however they soon realised that they had missed out a factor or two. This is so as we are all learning and are bound to make mistakes, or there are things that we overlook as non-important.” – M.C.

“If there is something wrong with your slides, you can actually know it through questions and understand it better. So it is good to be the one being asked a lot of questions. But we need to analyse if the questions asked are logical or related to the problem, or just because you feel like “sabotaging” someone. Every question asked is a learning point for everyone of us.” – Y.J.

“The questions and suggestions that others asked and gave helped me to understand what they were unclear about and how the questions were answered let me understand what the team would like to share with us.” – Z.X.

“Today we got bombarded with questions and I think it is a good way to learn and realise our mistakes. It was quite confusing as we tried to answer their questions because we are not quite sure what they were talking about and also not confident of what our hypothesis really is. The questions showed us the small details we might not have paid much attention to and also to think about why we had them there in the first place.” – S.

*Reflection journal question: “Questioning is a vital part of PBL. What are some of your favourite questions (spoken in class or running through your mind) and why are these questions you often ask?” –*

“The questions that you ask must be valid and sensible. My favourite questions are “How reliable is your source?”, “Why did you choose to believe this information?” and “Whatever you’ve presented – how is it relevant to today’s topic?” – M.L.

“Another question is “How is this slide related to the problem?” Sometimes, one or two groups may go out of point. By asking them this question, it may help them in their understanding and also help the other classmates learn and know more.” – V.H.

“Many believe that it is the questions we raise in class and the suggestions and the way we answer that determine our grades. Having this myth constantly in our minds, some people in class would question for the sake of questioning...I would not purposely try to ask questions as you might end up asking stupid questions which make people laugh their heads off. I would wait and see if I have any doubts and questions I know that others did not present. Most of the time, before I ask those questions, I would think if it’s a good question.” – S.A.

“When I see good sources from other teams, I ask where they got their information from. It allows me to go on and look for new information so

that I will understand more and hopefully replace the information that I have with better ones.” – *J.A.*

The students’ reflections demonstrated a keener awareness of the intellectual and metacognitive aspects in questioning, as well as a more positive attitude towards peer questioning, especially its role in collaborative learning. Their enthusiasm in questioning was also more evident during third meetings, with a notable increase in group buzz and dialogue.

### ***Analysis***

Engaging students as both participants in and owners of the meaning-making process necessitates mediation from an adult whose primary role is to facilitate this transition by providing cues, acknowledging and modelling desired behaviour and empowering learners to critically evaluate one another constructively. Students in the project group shared that they were “less daunted” by their peers, and felt the pressure of “being right” reduced and re-articulated in the form of “learning from one another’s errors”. Notions of group conflict and competition were also perceived less negatively.

## **Phase III – Critical Reflection and Practice**

### ***Rise of a New Class Culture***

Changes in classroom dynamics became evident by Week 11 when adult mediation and scaffolding gave way to student-initiated learning. It is common practice for groups to take turns to present their consolidated findings in the third meeting of the day, but the students in the project group expressed that such presentations were “monotonous” and “did not stimulate learning.” They suggested more interactive group learning activities such as debates, role-plays and forums; groups also took turns to be the presenting and questioning teams. Initial apprehension over the unpredictability of a questioning culture versus that of a sequentially structured presentation style was replaced with more encouraging signals of assimilation from the students in a survey:

- “Questioning is not all about grilling the person/team but more about asking questions that probe oneself and others to think further.”
- “We get familiar with each other and questioning becomes more comfortable. Hence, the quality of the questions asked also improves as we improve.”
- “We learn from the way we ask. After many hits and misses, we know what to ask, so it is much clearer, and the ‘answerer’ knows what the ‘questioner’ is asking and is able to answer as best as he/she can.”
- “Sometimes I know the class is tired as it is troublesome to ask good questions.”

- “I get worried when my team does not get any questions from the class. It means we have done a perfect job, which is unlikely. I mean how are we to learn and find out if we make sense if the class is quiet?”

The class also responded in the same survey that they noticed their peers, rather than the teacher, asking significantly more questions; in addition, there was greater commitment to working out shared solutions endorsed by the class. Bligh (2000, 169) attributes this phase of group development to “productivity”, where an evolved sense of group identity helps support and drive collaborative learning. This is achieved when the responsibility and ownership of learning is transferred from teacher to student, and when learning scaffolds are given to support the new negotiation of student-to-student empowerment and dynamics.

### ***Reinforcement and Practice***

The metacognitive practice in questioning is both a curriculum and pedagogic objective in the cognitive skills module the project group studied. The larger module objective is to cultivate a “thinking” culture in science students, which implies transference of this learning mentality to their other biology and chemistry modules. Problem triggers in the cognitive skills module are designed to be contextualised in these disciplines in order to create opportunities for students to practise the *art* of asking questions in a *scientific* setting. These more formal types of questions focus on procedural steps in hypothesis-testing, evaluation of data and sources and analysing experimental effects. Feedback from colleagues in the school of biomedical sciences did reveal a favourable improvement in students’ cognitive processes in their core disciplines, although conceptual transference of scientific principles and core content was less evident.

This calls for more rigorous inter-departmental curriculum planning to support and reinforce collaborative learning across modules, so that the habit of questioning is internalised, regardless of discipline or context. The mode of scientific enquiry, for example, is premised on the notion that science is not infallible (Fisher, 1998) and that scientific “truths” are hypotheses that have been accepted by a scientific community; the idea that each discipline has a thinking process (Donald, 2002) that is enacted in the way a learning community approaches and makes sense of information in context also highlights the importance of a common questioning language learners can use when managing new knowledge.

## **Towards a Model of Metacognitive Questioning – Recommendations and Implications**

### ***Charting Learning Milestones***

As students become more attuned to learning in the PBL context, it is important that new habits do not stagnate and turn into formulas for banal replication. Higher-order questions that require learners to apply and synthesise information in meaningful ways can be prescribed through various questioning frameworks, but Pollard (2002) reminds us that it is “more useful to be clear about why questions are being asked, as well as how we think we are using them to develop thinking and support learning” (286). This is where the value of metacognitive questions comes into play:

*Table 3: Framework of metacognitive questions*

Type of metacognitive question	Examples
Psycho-social (dealing with group functioning, monitoring and regulation)	<ul style="list-style-type: none"> <li>• “How far have we progressed since our first draft?”</li> <li>• “What are our group goals and roles today?”</li> <li>• “What obstacles are we facing? How can we deal with them?”</li> <li>• “Did we start off on the same track? Can we revisit our differences?”</li> <li>• “How will others respond to our approach?”</li> </ul>
Conceptual (dealing with thought developments, linkages and applications)	<ul style="list-style-type: none"> <li>• “How are we going to start?”</li> <li>• “What does this reading have to do with the problem today?”</li> <li>• “What differences are there in the two approaches? Do the differences matter? How so?”</li> <li>• “Is this relevant to another context? How useful is this experiment outside of the laboratory?”</li> <li>• “Let’s go back to the basics – what is the underlying principle driving this process?”</li> </ul>
Epistemic (dealing with ways of knowing and the scope of knowledge)	<ul style="list-style-type: none"> <li>• “How do we know this?”</li> <li>• “Is this true?”</li> <li>• “Do we all believe this? Why?”</li> <li>• “What are we sure of at this stage?”</li> <li>• “How much more can we explore?”</li> </ul>

Metacognitive questions help learners make “logical connections between what is known (a person’s internal representation of reality) and what is new (“information heard or read)” (Weissenger, 2004, 50). As learners become more ready to engage in self-directed and collaborative learning, these questions help them become more reflective critical thinkers in the way they organise, evaluate and accept knowledge.

***Understanding Student Disposition***

When we appreciate the learning culture of our students, we can better anticipate their learning obstacles and motivations. Frustrations that teachers have with new learners are often a result of either an unwillingness to “let go of their responsibility” (Bligh, 2000, 111), or the willingness to give students ownership of the problem but dictating the process for working on that problem (Savery & Duffy, 1998). Teachers then vacillate between these polarities of control and freedom (when it should be the job of the learners to do so) in an awkward attempt to find a stable footing; when that stability is not found, they revert to methods that they are comfortable with. The conclusion implicitly drawn from their experience is that their students are uninterested in and unmotivated by PBL.

The first principle of transformative learning is that group development does not come about naturally or easily. As learners re-establish roles and group norms, feelings of hostility, withdrawal and rebellion (Bligh, 2000) towards peers and even the teacher are common as part of the transitive process. Secondly, learners who have been ingrained in a particular education system do not need to be brainwashed into a dogmatic acceptance of a new pedagogy; instead, they would benefit more from open dialogue and a negotiation of their place within the new system. Thirdly, questioning and thinking skills do not manifest automatically in a learner-centred context; these skills need to be harvested through creating opportunities and planning time for them to be nurtured (Kerry, 2002). These principles need to be articulated and reflected upon through constant dialogue and practice within the classroom, among teaching staff, during inter-disciplinary curriculum design, between management and faculty and during teacher-training workshops.

### ***Reflective Teaching***

Teacher-training programmes within such a context therefore need to address what Ho describes as “coaching principles” (2004, 109) in the facilitation of PBL classes. Coaches are cognizant of the strategies they are employing to help their learners; they are sensitive to the weaknesses and “blindspots” in their learners; they are constantly reflective of their own experiences so that they, in turn, learn and adapt to new norms in much the same way as their students.

Teachers need to learn to not only ask good questions, but more importantly help their students manage the questions that students themselves ask. Metacognitive questioning underpins an infinite number of content-related questions that can be asked – within and across various disciplinary domains. A reflective teacher who is also part of a reflective community of teachers and trainers is in a better position to empathise with students’ socio-cognitive paths of inquiry as they explore intra and inter-disciplinary issues using questions to trigger and manage group learning.

## Conclusion

There is extensive research on the various levels of questioning (Bloom, 1956; Dillon, 1988; Bligh, 2000) which can be applied as teaching and learning strategies in the classroom, but the focus of this study is on acclimatising students to the norms of a questioning class. This paper has explored the educational “baggage” that both learners and teachers need to confront and review in order to adjust to and optimise learning in a PBL context. By understanding the interconnectivity between learner disposition, perceptions of roles and the meaning-making process, we can use metacognitive questioning to negotiate and reflect on these relationships.

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## References:

- Bligh, D. A. (2002). *What's the Point in Discussion?* Exeter, England ; Portland, OR.: Intellect.
- Bloom, B. S. (Ed.) (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals: Handbook I, Cognitive Domain*. New York; Toronto: Longmans, Green.
- Burch, K. (2001). PBL, Politics, and Democracy. In B. J. Duch, S. E. Groh, and D. E. Allen (Eds.) *The Power of Problem-based Learning: A Practical "How To" for Teaching Undergraduate Courses in Any Discipline*. Sterling, Va.: Stylus Pub.
- Chang, A. S. C. (1997). Assessment, Grade Level and Learning. In J. Tan, S. Gopinathan & W. K. Ho (Eds.), *Education in Singapore: A Book of Readings*. Singapore: Prentice Hall.
- Cheah, Y. M. (1997). Shaping the Classrooms of Tomorrow: Lessons from the Past. In J. Tan, S. Gopinathan & W. K. Ho (Eds.), *Education in Singapore: A Book of Readings*. Singapore: Prentice Hall.
- Dillon, J. T. (1988). *Questioning and Teaching: A Manual of Practice*. London: Croom Helm.
- Donald, J.G. (2002). *Learning to Think: Disciplinary Perspectives*. San Francisco, Calif.: Jossey-Bass Inc.
- Edwards, D. & Mercer, N. (1987). *Common Knowledge: the Development of Understanding in Classrooms*. London: Methuen.

Fisher, Robert. (1998). *Teaching Thinking: Philosophical Enquiry in the Classroom*. New York, N.Y.: Continuum.

Ho, B. T. (2004). Teachers as Coaches of Cognitive Processes in Problem-based Learning. In O. S. Tan, (Ed.), *Enhancing Thinking Through Problem-based Learning Approaches: International Perspectives*. Singapore: Thomson Learning.

Kasl, E. & Elias, D. (2000). Creating New Habits of Mind in Small Group. In J. Mezirow, (Ed.), *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco, Calif.: Jossey-Bass Inc.

Kerry, T. (2002). *Explaining and Questioning*. Cheltenham, UK: Nelson Thornes.

Lee, M. G. C. & Tan, O.S. (2004). Collaboration, Dialogue, and Critical Openness through PBL. In O. S. Tan, (Ed.), *Enhancing Thinking Through Problem-based Learning Approaches: International Perspectives*. Singapore: Thomson Learning.

Marlowe, B. A. & Page, M. L. (1998). *Creating and Sustaining the Constructivist Classroom*. /Thousand Oaks, Calif.: Corwin Press.

Pollard, A. (2002). *Readings for Reflective Teaching*. London: Continuum.

Ramsden, P. (1992). *Learning to Teach in Higher Education*. New York, N.Y.: Routledge/ Falmer.

Savery, J. R. & Duffy, T. M. (1998). Problem-based Learning: An Instructional Model and its Constructivist Framework. In R. Fogarty (Ed.), *Problem-based Learning: a Collection of Articles*. Arlington Heights, Ill.: Sky Light Training and Pub.

Savin-Baden, M. (2000). *Problem-based Learning in Higher Education: Untold Stories*. Philadelphia, Pa.: Society for Research into Higher Education: Open University Press.

Sharpe, L. & S. Gopinathan. (1997). Effective Island, Effective Schools: Repair and Restructuring in the Singapore School System. In J. Tan, S. Gopinathan & W. K. Ho (Eds.), *Education in Singapore: A Book of Readings*. Singapore: Prentice Hall.

Weissinger, P. A. (2004). Critical Thinking, Metacognition, and Problem-based Learning. In O. S. Tan, (Ed.), *Enhancing Thinking Through Problem-based Learning Approaches: International Perspectives*. Singapore: Thomson Learning.

Tan, O.S. (2004). Cognition, Metacognition, and Problem-based Learning. In O.S. Tan, (Ed.), *Enhancing Thinking Through Problem-based Learning Approaches: International Perspectives*. Singapore: Thomson Learning.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge: Harvard University Press.

Wood, D., Bruner, J. S. og Ross, G. (1976). The Role of Tutoring in Problem Solving. I *Journal of Child Psychology and Psychiatry*. Vol 17, 1976, p 89-100.

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