

# Implementation of Problem Based Learning (PBL) - in a Malaysian Teacher Education Course: Issues and Benefits From Students Perspective

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## Abstract

The paper describes an employment of a Problem Based Learning (PBL) approach in a Malaysian graduate teacher education course. The discussions focus on how PBL was introduced, the PBL tasks and explore issues and benefits perceived by students. Data were obtained from journal reflections, interviews and field note of observations. All types of data were analyze using inductive analytical approach. The result indicated that students were struggling at the preliminary phase of PBL, require more time in PBL learning process and link the acquisition of skills and group working process as benefits of participating in PBL class. The study also reiterated the important to align different curriculum elements and to address contextual elements in designs in effort to achieve designs that sensitive to local elements.

**Keywords:** Curriculum design, teacher education, issues, benefits.

## 1. Introduction

There has recently been a shift in teaching and learning approaches in higher education from behaviourism to cognitive and generic skills (Murray-Harvey et al., 2004). According to Casey and Hawson (1993), the focus of the cognitive approach to education is more on the thinking processes quality, rather than the accuracy of the answers the learners produce. PBL is a student-centred learning that assumes the idea of a student have the ability to “learn by doing” and therefore acknowledges that they play an active role in their learning as problem-solvers, and think in critical and creative ways (Barron et al., 1998). PBL is an instructional methods that centralized the content of learning around the problems, rather than a series of pre-determined content in conventional teaching approach, in which group of students are presented with an ill-structured problems or case which they work collaboratively to deal with the problems, usually for a week or longer, depending on the complexity of the problem scenarios. PBL encourage learners to apply problem solving skills, critical thinking and content knowledge to the real-world issues and problems. Students assume more responsibility in the learning compared to the conventional approach as they need to find the information they need to solve the problems given, which in turn inculcate the self-directed learning. PBL was first initiated in the late 1960s at McMaster University and has since spread around the world mainly in medical education. There are variety of PBL models practiced worldwide and across variety of fields since its initiative at. However, in general all PBL approaches share six core characteristics as described by Barrows (1996):

Table 1. Characteristics of PBL approach

Learning is student-centred
Learning occurs in small group tutorials
Teachers are facilitators or guides
Problems form the organizing focus and stimulus for learning
Problems are a vehicle for the development of clinical problem-solving skills
New information is acquired through self-directed learning

Source: After Barrows (1996).

PBL represent the constructivist theory where knowledge is individually constructed and socially co-constructed from interaction with the environment (Hung et al., 2008). Constructivist learning approaches emphasize learning and how to think and understand. A constructivist classroom setting involves authentic learning activities and a real-world context where students learn how to question things and apply their natural curiosity to the world. As a result, constructivism gives students ownership of what they learn and encourages higher retention, as learners seek meaning for themselves and not the meaning constructed by their teachers (Hmelo and Evensen, 2000).

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Entailing these issues, Malaysia's Ministry of Higher Education has called universities to adapt outcome-based education (OBE) in their teaching strategy. OBE is a student-centred approach to education focuses on the learning outcome from instruction. In OBE, students is not only expected to possess knowledge, but also equipped with skills and qualities upon the graduation. Hence, teaching and learning in higher educations should be steered in accordance with the desired outcomes. Responding to this trend, PBL has been adopted in Malaysia within a variety of fields and has become one of the promising innovations in Malaysian higher education teaching and learning settings and has gained considerable prominence in field of engineering, ICT and multimedia, physics, and medical and dental education, (eg: Barman, 2005; Mohd-Yusof et al., 2005 and Said et al., 2005). PBL was introduced in the Malaysian education context, particularly in health sciences, in the early 1970s (Achike and Nain, 2005), yet its growth was slow and scarcely documented. However, by the 1990s, a growing number of medical and non-medical schools began to introduce PBL; for example, the Universiti Teknologi Malaysia (UTM), a public, technology-based university spearheaded PBL within its various engineering schools. Aiming to produce more high-quality graduates, it was argued that an engineering graduate should be equipped with skills in communication, team working, problem solving and life-long learning (Mohd-Yusof et al., 2005). Said et al., (2005) likewise posit the need for electrical engineering graduates equipped with analytical skills, critical and lateral thinking, technical skills, team work and time management. Overall then, PBL in Malaysian higher education is more integrated into engineering and medical schools, than in other subject areas including in teacher education fields.

From favourable collective research outcomes regarding PBL implementation, it appears to be a good reason to introduce PBL in teacher education. Like any other profession, teachers are urged to be more responsive and relevant to ever-changing issues regarding schools and students. In particular, the role of today's teachers is not merely limited to teaching and classroom matters, but also to involve in multiple roles like researcher, curriculum planner, team leader and decision maker. As Dean (1998) posits, issues like inclusive classrooms, diversity of student's group, and emergence of new technologies that present a tremendous challenges to beginning teachers. Therefore it is imperative to develop beginning teachers with necessary skills and competences deemed relevant to face the reality if classrooms. From literature review, PBL gains attention in teacher education field and has been associated with positive change of knowledge, skills and competences (Merseth, 1996). This paper report on the PBL employment in a graduate science teacher education course in Malaysia. The paramount objectives of incorporating PBL in the course was to empower them to make transition from learning to research since students will embark on their research projects in the proceeding semester. They need to be able to apply the knowledge they have gained in the current course to solve problems and serve as the fundamental information in doing their research projects. Science teacher education programs are compatible with the PBL approach as there are a lot of problem scenarios from practice of teacher professions, as well as literature related to the practice of science education in school settings (Peterson and Treagust, 2001). Therefore, PBL was used so that they could learn the skills and competences needed to solve problems and embark on research projects. In relation to the design and implementation of PBL as an instructional approach, the goals of redesigning the course to PBL were 4 folded: to experience and understand PBL in practice, to contribute to the knowledge base of student-centred approach in higher education, to provide a variety of opportunities exploring issues related to science teaching and learning in school and to expose and engage teachers in authentic learning experiences, that would stimulate them to adopt student-centred learning in their own classrooms. However for the purpose of reporting, we converged the aims of the paper to:

1. Describe the PBL implementation process including the course design, the assessment procedures and roles of facilitators
2. Elicit student responses of their participation in the PBL class particularly on issues and perceived benefits.

## 2. Course Background

The Master of Education (Science Education) degree in Universiti Pendidikan Sultan Idris (UPSI) is either a 1.5-year programme for full-time students, or a 2-year programme for part-time students. This course is designed to enable students to analyse the management of learning in science education. In particular, the course objectives for learners were to:

- Analyse management theories in terms of their characteristics and purposes as well as their relevance in science education;
- Evaluate the effectiveness of various types of management models;
- Discuss critically the best practices to maximize learning and teaching;
- Discuss and develop instruments to assess learning;
- Collaborate with group members to perform assigned tasks.

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Topics include theories of management, school leadership with an emphasis on constructivist leaders, management of assessment, and management of science department. The intellectual scope of discussion covers perspectives such as teaching and learning contexts, service quality, assessment and how management can foster science learning. Before the commencement of the semester, the course was redesign to a PBL approach, a student guide developed to assist students learning in a new constructive learning environment, and a set of assessment procedures determined. Generally, we are adopting a Design Based Research (DBR) approach to redesign the course into a PBL approach. DBR accelerates the link between theory and practice, in which our intention in designing the course is to retain the rigorous theories and principles underlying PBL and address the contextual elements. Another important concerns in designing the course into PBL approach is the alignments of different curriculum elements. Kolmos *et al.*, (2009) proposed seven elements in the curriculum that need to be aligned prior to the PBL implementations; objective and knowledge, types of problem and project, progression and size, students' learning, academic staff and facilitation, space and organization and assessment and evaluation.

### 3. Methods

The study employed semi-structured interview, semi-structured participant observations and students' reflective journal as the means of data collection techniques. The in-depth, open-ended nature of semi structured interview was conducted with 8 randomly volunteered students at the conclusions of the semester. The purpose of the interview was explained verbally before the session started and participation was voluntary. The interview explored background information about the participants, their previous experience of group work, benefits and challenges of participating in PBL exercise in terms of collaboration with peers, the problem solving process and facilitation process. The interview was loosely structured to give opportunity to participants to form the interview from their own views and experiences (Seidman, 1998). Depending on the willingness of the participants to share and talk, each conversation lasted from 20 minutes to as much as 70 minutes and took place either in researcher's office or at the campus location the student selected for their convenience. All fifteen interviews were tape-recorded and fully transcribed. Interview transcript were analyzed using inductive analytical approaches, a qualitative data analysis technique that use detailed readings of raw data to derive, theme, concepts or model through interpretations made from the raw data by a researcher across the interviews (Thomas, 2006). Each transcript was listened repeatedly to determined topic and sub-topics, which were then coded as categories. The list of categories give rose to themes after refining it by read comparatively against each transcript to seek for commonality and contradictions.

Observations were made when the PBL groups meet to deal with the tasks: identifying the facts, their ideas from the facts identified, learning issues and hypothesis and their action plan for problem solutions. During these sessions, we recorded our observations as written notes that were organized into field note journal. Field notes were used to gather, record and compile events happening in group discussions. The fields note describes information as to what we have directly seen or heard on-site through the course of the study. There is also a reflective part of the field note. The reflective part represents our reactions to the observations, experiences and thoughts during the observation sessions. The observation were used to create a rich description of the classroom environment and also help us to understand the development of some of the students' conception. Students' reflective journal was administered in specific weeks during the semester. Reflective journals consisted of individual reflections and group reflection. Generally, the reflective journal aims to get insight on how students learned through PBL, to make them aware of their own learning, and to enhance their metacognitive awareness about how learning occurs and which part should be improved. To analyze data from both observation and reflective journals, we adapt the content analysis technique. Content analysis were used to individually sort and organize data to achieve themes. In the final stage of analysis, themes from the interview transcripts, reflection, and field notes were compared to locate general pattern of similarities, points of clarification and points of contradictions using grounded theory (Strauss and Corbin, 1990). Multiple data collection strategies and data sources lead to a complete picture of our variables and also in such a way the strength of one particular strategy compensate for the weakness of another.

### 4. Description of the Course

#### 4.1. The Students

32 Master of Education (Science) students signed up for the course that runs 14 weeks for 3 hours period per week, once in a week. The students assigned themselves into 7 groups. Thought students were informed about active and student-centred learning, and whilst they may have participated in group work previously, they were not familiar and

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had never experienced PBL in which the group work is highly collaborative. Hence the first class meeting in the first week was devoted to introduce PBL to students. Pre-course notes on PBL were given prior to the commencement of the first class. Pre-course notes consist of introduction to PBL, characteristics of PBL, rationale for learning through PBL, depiction of PBL process, proposed steps to approach the problems, expectation to students and walk the class through a sample case as an introduction to the PBL process.

#### 4.2. The PBL Tasks

PBL is a “problem first” learning approach, i.e. the starting point of learning is a realistic and contextualize problems scenario. Unlike the traditional curriculum content that was arranged according to the topic, theme and disciplines, PBL content is organized around problems. As students are new to PBL, it is reasonable for us to arrange the PBL scenarios in gradual manner- from simple problem scenario to a more complex problem scenario towards the end of the semester. Each problem scenario in the PBL class is designated for students in discussions to construct their own understanding, they shared their individual experiences and each group member makes a distinctive contributions (Wood, 1994). In our class, groups of students completed three PBL cases during the 14-week course.

Table 2. The PBL scenarios for the course

Topics in the course	Duration to complete the task	The ill-structured problems or scenarios presented as	Groups' deliverables
i. Constructivism in science education	3 weeks	Video of a teacher teaching a group of primary school students on <i>Body Part</i> topic	Evaluation tools used to assess a constructivist in class
ii. Alternative conceptions in science topics	3 weeks	Research findings sample of <i>alternative conceptions of light</i> properties, and an invitation letter to publish a review article from a publisher	A review article about alternative conception among students in a chosen topic
iii. 21 <sup>st</sup> century science learning skills	2 weeks	A competition poster to design a school science laboratory corresponds to the <i>21<sup>st</sup> century learning</i>	A layout plan for the 21 <sup>st</sup> century science school laboratory.

To correspond to the PBL principles in designing the PBL scenarios, the above PBL scenarios are not so rigidly defined that there is only a simple and single ‘right’ answer to. It is expected that each group will develop different approaches in dealing with the problems and students will learn more and expand their perspectives by critiquing and arguing with other group members while presenting their findings. Depending on the difficulty level of the PBL scenarios, students deal with the tasks in different time frames, from 2 until 3 weeks.

#### 4.3. The PBL learning process

The class started with a short tutor introduction to the issues, followed by the scenario presentation for group discussions. Then a group representative will take tutor-prepared learning materials to their group and mutually work towards addressing the problems and issues. Generally in the first group discussions, students in groups brainstormed about the case given to them; listing out information they could find from the case, what are their thoughts and opinions on it, questions or inquiry they had and finally come out with the learning issues. Learning issues will guide students to do further research to answer the case. To facilitate students to be more concrete in articulating information during discussions, we suggested students to use the following headings in Table 3.

Table 3. Headings suggested to students to deal with the PBL cases

Fact	Idea	Learning Need/Issue	Action plan
What do we know?	What do we think?	What do we need to know?	What should we do?
-Information extracted from the problem scenario	-Possible causes/effects/ideas/solution based on the fact identified	-Phrase as questions that lead to the problem solution	-Activities to be carried out to answer the questions
-Identification of term and notion	-consider to use own experience and previous knowledge	-Determine which question is worth researching and list out those irrelevant	-Possible resources to consult to answer the questions
-Ambiguous notion			-Task division

Source: adapted from Dean (2001), pg 11.

As students are novice and newly exposed to PBL, the headings are imperative for them to determine the fact of the case, develop feasible hypotheses underlying the problem, identify and finally divide learning issues for individual and independent research. Students take on different roles during each discussion like team leader that steer group direction, scribe to write and compile all the important information discussed, and regular members looking for the resources related to problems under scrutiny. Before the class is dismissed, each group is expected to divide the tasks among

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respective group members for the individual studies period. Between problem-based tutorials, students engage in self-directed learning to deal with the tasks given. Students will carry out their individual studies period in the week before the second meeting of the sequence. In individual studies, students will mainly search for the resources relevant to the learning issues given to them, and prepared drafts for the next group discussions. Since most of them are part-timers and live apart, the students use email and internet extensively to connect to each other. They share and critique resources, and keep journals to support the group process during individual studies. Then during the second class meeting, they presented their findings to members of the group, both verbally and with drafts prepared. At this stage, some students may draw illustrations, clarify unclear parts and draw connections between prior knowledge and the tasks under discussions. Based on the collective works from each group member, the groups will decide a solution to the problems after reaching consensus. Upon reaching the consensus, the whole-class discussions are carried out. The aims of the whole-class discussions is to expose students with other groups' solutions, and broaden their perspectives on the case. Table 3 succinctly laid out steps of learning process for each PBL cycle in our class. Table 3 succinctly laid out steps of learning process for each PBL cycle:

Table 4. Seven steps of learning process in PBL

Step 1:	Clarify terms and concepts not readily comprehensible
Step 2:	Define the problem
Step 3:	Analyse the problem
Step 4:	Draw a systematic inventory of the explanations inferred from Step 3
Step 5:	Formulate learning objective
Step 6:	Collect additional information outside the group
Step 7:	Synthesize and test a newly acquired information

Source: from Schmidt (1983), pg13

#### 4.4. Facilitator's Role

Throughout the course, my role was to facilitate and guide rather than provide information. In particular, my task is to consult with each group to assist them to clarify the PBL cases, consider variety types of resources, make sure they are still on the right tracks, suggest a better approach in group work and help them to meet the deadline. During the early semester, the facilitator can take a more dominant role in tutorial activity to guide students towards self-direction, and gradually reduce the facilitation and scaffolding as students become more and more familiar with the academic expectations being made of them (Ryan, 1993). In a more recent study, Mohd-Yusof et al., (2011) proposed more motivation and encouragement is given to students who are new to PBL than experienced students. This could be done by having more scaffolding and guidance in the preliminary PBL cycles, and gradually decrease the amount of facilitation as the semester increase. Unlike in medical settings which allocate one tutor for each of the PBL groups, but in my class we adapt the floating facilitation style. We went around the groups to facilitate group work, and probing students' group with questions that lead students to activating their prior knowledge and experiences. Each group is also required to keep group's logbook to monitor periodically their progression and to determine further scaffolding needed by each group. In the early semester, intense and more structured facilitation style was adopted to help students in their learning, and more independent and less structured of facilitation took place as students become more accustomed with PBL. Although we are not planning to conduct any formal lectures throughout the PBL sessions, we are still prepared for it, depending on the need or only when it is necessary. Furthermore, it may be necessary to introduce topics or provide overview information for higher level subject materials related to PBL scenario.

#### 4.5. The Assessment Procedures

It is imperative to note that change in educational goals, content and approach in teaching and learning of a course will also require change in assessment methods since these educational elements are mutually interdependent, i.e. if one element is changed, this will lead to the change in other elements (Holgaard and Kolmos, 2009). Assessment procedures should be able to assess students learning in a way that reflects the PBL philosophy. PBL emphasize not only the acquisition of knowledge but also attributes, such as teamwork, communication skills, self-directed learning and information sharing. Hence, assessment in PBL should go beyond solely rely on factual recall. As Woods (2003) proposes, assessment in PBL should adopt the fundamental principles of testing the student in relation to the learning outcome and range of assessment methods.

Table 4. Assessment procedures lead to the final grade

Types of assessment	Detail	Weightage (%)
i.) PBL1: Constructivism	-Presentation	10.0
	-Evaluation tool	10.0
	-Final deliverables	5.0
	ii.) PBL2:	
	-Critical review article	20.0

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Group assessment	Alternative Conception	- Group Reflection	5.0
	iii.) PBL3:	-Presentation	10.0
	21 <sup>st</sup> Century Learning	-Group Reflection	5.0
		-Final deliverables	10.0
Individual assessment	i.) Reflection 1 and Reflection 2		15.0
	ii.) Attendance and Participation		10.0
Overall percentage			100.0

For assessment purposes, we divided the assessment into 2 categories; group assessment and individual assessment. Since students involve substantially in group working throughout the course, it is imperative to highlight our emphasis of group assessment to students. Furthermore, group assessment represents a bigger percentage than the individual assessment (in this case, group assessment represent 75% of overall assessment). To assess *presentations* (during both PBL1 and PBL3), we develop a rubric to assess group performance in three main traits; verbal, non-verbal and content. In verbal traits, we rated the enthusiasm and elocution. In non-verbal traits, we observe the eye contact, body language and poise. Although this is a rubric, we still emphasize on content delivered during the presentations. We assess the subject knowledge, content organization, key elements of content, and the mechanics. To assess group artifacts (e.g. *evaluation tool* and *critical review articles*), we are using rubrics. Rubric is an evaluation tool that describe the criteria for performances that deemed accurate to reflect content skills, process skills and learning results.

Reflection is an opportunity for students to reflect on the way they learn, and how they could improve as a team member to enhance collaboration and efficiency of group work. Furthermore, opportunity for reflection on learning process is an important aspect of PBL (Holen, 2000). In addition, the information from the journal reflection serves as a valuable resource for us to re-structure or revise the following PBL cycles. For grading purposes, the reflections (both individual and group reflections) represent 25% of overall assessments. In *Individual Reflection (Reflection 1 and Reflection 2)*, each student recorded their thinking about the group processing, what they have learned, peer evaluation of how individuals contributed to the overall effectiveness of the group, what roles do they take up, and issues, frustration and difficulties. To write a *group reflection*, students need agreement with the rest of the group members. In a way, group reflections could enhance their collaboration. In group reflections, students will describe how they start the discussions, strategy to enhance group collaboration, evaluate the PBL cases, how do they address the learning issues, resources used to deal with the tasks, and any prior preparation before attending the discussions. Both individual and group reflections were executed at the different time intervals. *Final deliverables* (in PBL1 and PBL3) marks are only granted for groups completed their presentation sessions and submit their related group works. The assessment of *attendance and participation* was based on students' contribution to group and class discussions, and their active involvement in the learning process.

## 5. Result and Discussions

Analysis and coding of the data from three qualitative data collection techniques (semi-structured interview, participant observations and reflective journal) resulted in two categories for *Issues*, namely *initial anxiety and struggle*, *time insufficiency* and two categories for *perceived benefits* namely *skills improvement*, *development and acquisitions* and *group processing*. The results are presented and discusses through the use of quotes and narratives. The different type of sources were marks as follows; Individual Reflection (IR2\_#), Group Reflection (GR1\_#) and Interview (ES\_#).

### 5.1. Issues

#### 5.1.1. Initial anxiety and struggle

The anxiety and struggle in the early period of class was echoed by most students in both interviews and individual reflections. Uncertainty and difficulty in dealing with the task are among the prevalent comments. Here are some written comments and interview extracts:

- Hard to deal with the task at the beginning (IR2\_25)
- "Unsure about what is supposed to do in the early semester"(ES\_4).
- "At the preliminary week of the class, it was very difficult to deal with the tasks, it is like a big burden....we can feel the hardships." (ES\_2).
- "Do not sure what to do at first, but later on familiar learning in PBL environment" (ES\_6)

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Schmidt et al. (1992) reported that student needs at least 6 months to adapt to the new instructional method. As Lieux (2001) stated, students' anxiety during the PBL is partly contributed from their concern about the sufficiency of content coverage. Some students clearly laid out to which phases of learning process they are struggling at the first tasks of PBL:

"During the latest PBL tasks, we are now sure what to do, and convince on it. But at the first tasks, we are a kind of unsure of what we should do, a bit confuse...We do not know how to fill in the FILA chart, during the second tasks, we are still not so sure yet. We do not sure where should we go, to which direction we should headed for." (ES\_5).  
 -"During the first PBL tasks, we misunderstood of what we should do. Initially, we thought that we need to scrutinize on the content of the video or the content of the lesson the teacher teaches. During the first task (in the Constructivism topic), we are still ambiguous on what to do, however we are actually become more comfortable while we know on what to do ." (ES\_6).

This finding is supported by a study of students' assessments of PBL. In the introduction phase of PBL, Pereira et al. (1993) found that students are cautious about PBL, and to some extent condemned on the approach. Nonetheless, over time the students are more positive towards PBL, partly contributed by the support and commitment from the faculty.

The results are similar with Lai and Tang (1999) research on students response towards PBL. From the interview excerpts, students were reported of being frustrated at the beginning of the course, largely contributed by their uncertainty and unfamiliarity with PBL approach.

From above comments, it suggest that as students get familiar with the PBL learning approach, they become more comfortable and confident. Similar observations were also reported in a study by Schultz-Ross and Kline (1999). The authors found that the students' dissatisfaction level decreased significantly by the end of a PBL in psychiatry course. To alleviate this issue, the PBL facilitators should play appropriate role at the preliminary phase of PBL implementation. This is particularly important for students who are new to new teaching approach like PBL. This claim is prevalent from the following comments:

- Misconception at the beginning, but later on can work on the task confidently by the guide of the facilitator (IR2\_8).
- Feel very awkward at the beginning, but with the guidance of facilitator, I became familiar with the preceding tasks (IR2\_5).
- "When I get entered into the class, during the first problem scenario, I'm totally unable to think about the learning issues. At first, I don't not feel good for the first tasks, but for the second and third tasks, I feel so ebullient, because I already knew....Because Dr Sophia (the facilitator) make it like multiple perspectives, not the subject matter one." (ES\_7).

Originally, we are planning to give the groups complete autonomy to decide what they want to research on. However, they are actually asking for more direction, reassurance and help them narrow the scope of investigations. We should expect this since this is their first exposure to PBL. Hence we made our self available all the time while they are doing the discussions, and offered them to meet with beyond the class time.

### 5.1.2. *Insufficient time*

Time constraints are among the most prevalent issues raised by students. Comments like '*insufficient time*' are typical in students' individual reflections while we are asking for the barrier in PBL learning. In addition, some students particularly stated in which stage of learning process that they exhibited lack of time. Here are some written comments and interview extracts from students claimed that the time is insufficient to deal with the tasks, to do the discussions, to understand and to complete the tasks:

- "Not enough time to deal with task. However, it is worthwhile to invest such amount of time because this is the first PBL task for the course." (GR1\_3).
- "I always feel guilty while doing the group work..because of the late submission of the works. We do not have sufficient time to deal with the task and it is quite difficult for us to meet physically beyond the class time to do the discussions". (ES\_5).
- Need more time for discussions. (IR2\_1 and IR2\_6).
- Big or higher level problem tasks required more time, at least need 2 sessions of discussions. (IR2\_20).
- Insufficient time to complete the task. (IR2\_22).
- "Sometime we expect that we can complete the tasks within 2 weeks, but actually we are unable complete it." (ES\_2).

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- Require more time and support to understand a specific PBL tasks. (IR2\_7).

Time insufficiency is a recurring issues among the PBL groups. The following comments are extracted from group reflection and it occurs in all three PBL tasks:

For PBL1

- Not enough time to deal with task. However, it is worthwhile to invest such amount of time because this is the first PBL task for this course (GR1\_3)
- For PBL2
- No (time is not sufficient), because there is a lot of readings that need to be done (GR1\_1)
- For PBL3
- No, we need more time for discussions (GR1\_6)
- No, we do not have enough time to deal with the task. We felt that we can do better if we can have a bit more time on the tasks (GR1\_3).

To add further, some students justified why time is insufficient. The reason is related to cognitive ability of the learners in the student centred learning approach and geographical boundaries:

- No experience to deal with the task, hence need more time to completed the assignments. (IR2\_2)
- Limited time to discuss face by face with group members since all of them are part-timers and stay apart from the university. (IR2\_24)

So and Kim (2009) echoed the finding by reporting that 20 students in their research see PBL as a time-consuming approach and require a lot of time in solving the problems/tasks. In Lai and Tang (1999) research, students also commented that the time allocate for them is limited and would prefer more lectures to tell them the ways to deal with the problem tasks in PBL.

## 5.2. *Perceived benefits.*

Students found PBL as satisfying and their perceived benefits of participations in the PBL were classified into two categories; Skills acquisitions, development and improvement; knowledge and and group processing.

### 5.2.1. *Skills acquisitions, development and improvement*

Students were well aware of the variety of skills they acquired throughout the course. Apparently, the common related skills were communication skills, skills to deal with the variety of resources, creative and active thinking skills, probing the questions:

- Enjoyed, get feedback from peers and improved communication skills (IR2\_1).
- Encourage creative and innovative thinking, enhanced collaborative and self-directed learning skills, and increase motivation (IR2\_19).
- Learn a lot even for only one PBL task, content and skills learned simultaneously, improved communications and develop presentations skills (IR2\_6).
- Group collaborations, gained ideas from different people, searching for the resources from several perspectives, improved skills in dealing with a specific problem (IR2\_2).
- Active learning environment, gained stimulate active and creative thinking skills, encourage students to discuss, evaluate, analyze, giving opinions and decision making. Also improved communication skills and flexibility in information processing (IR2\_3).

These perceived skills acquisition, development and improvement s are consistent with fundamental aims that characterize PBL, which is to inculcate skills and competences. From the comments, it indicated that student learnt and used the skills through their engagement in PBL learning process ( during discussions and resource findings). In addition, PBL is not only served to inculcate skills, but also hone the skills of the learners.

### 5.2.2. *Group processing*

Significant evidences were found about how students perceived benefits in the PBL class from the group processing point of view. From the analysis, students claimed that group processing in PBL serve as an opportunity for them to

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validate arguments, and exchange and expand ideas which results in better resolutions towards tasks. Here are some of the related claimed:

- "Sometime we are unsure whether what we understand is correct or not, so by getting the feedback from our group peers, we could validate our understanding..we will be more confident since we get the feedback from our group members...become more confident about what we are suppose to learn in our class. Getting the feedback from our group members, we can know about our weakness."(ES\_5)
- Easier to deal with the task since it is group works, get different view from each group members, a more proper ways to complete a task, and inculcate innovation and creativity. (IR2\_23)
- Students become more independent in solving the problems, increase the understanding of students due to the exchange of the ideas among group members, encouraged collaborations among students, the skills obtained in the class could be apply in the daily life. (IR2\_27)
- "Learn more in group rather than learning individually, because we got much more ideas from our group members rather than merely having our own ideas in the individual studies. the ideas or the responses are varied and diverge, sometime it never across in my mind that learning issues could be develop in very good way, because I could only think about one aspect, but my friend could contribute ideas which is totally different aspects from mine, so we could accumulate variety of answers while learning in PBL. I learned many new things. compared to my previos education. In PBL, we are sharing the knowledge, that is so good to do."(ES\_7).

In addition, students relate the group process as the way to ease the burden in the tasks:

- "Stimulate to ask questions further and deeper, will get different kind of ideas, and can get better ideas, save a lot of time in learning since the burden is divided among the group members." (ES\_1).
- "When we get together during the group discussions, we can feel enjoy,we completed our works together..when we seat in a group, we do not feel the hardships that we feel when we seat alone." (ES\_2).

Students positive thoughts about teamwork and group learning process features like sharing knowledge ideas and resources reflect the effectiveness of PBL in developing and maintaining the group learning behaviours.

## 6. Summary

In designing a PBL learning environment, we are adopting the DBR framework to guide the whole process of the designs. The rationale of using DBR is the emphasis of contextual element in the design. The three PBL tasks were designed in a way that group of students can experience the interdisciplinary learning, enhance their generic skills and at the same time address the acquisition of content knowledge. We also specified the PBL learning to students to facilitate them throughout the course. To align the assessment with PBL, we emphasize on continuous, and formative assessment, with the significant weightage on group assessments. It is a certain that this PBL learning environment is far from perfect. Rooms of improvement from variety of perspective is always welcome. So in this paper, we eliciting students' perceptions of their participation in the PBL class, particularly focus on issues and benefits. From data analysis, *initial anxiety and struggle* and *insufficient time* were two main issues raises by students. The results also suggest that facilitators could play significant roles by guiding and coaching to ease the anxiety and struggles of students during the early PBL tasks. In terms of time insufficiency, students specified that they have insufficient time during discussions, dealing and complete with the tasks, meet group members and in understanding PBL tasks itself. Students need time to accustom with PBL approach, especially if they are the novice learners in the active learning environment like PBL. For perceived benefits, we classified students response into two; *skills acquisitions, development and improvement and group processing*. Students see PBL as the way to acquire and hone their skills and value the process of group working to make reasoning on knowledge, and expansion of thoughts and ideas.

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