CREATING INTEREST AND EXPLORING IMPLEMENTATION OF COOPERATIVE LEARNING (CL) OR PROBLEM-BASED LEARNING (PBL) IN THREE DISCIPLINES

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ABSTRACT

Reports on the observations and data collected over 2 (two) years from faculty development workshops on Problem-based Learning (PBL) in three disciplines. This paper describes experiences on (a) strategies for training tertiary teachers to become skilled in the methods and approach required to help implement PBL, (b) helping to adapt existing methods used in these institutions to train teachers as skilled facilitators and case designers and (c) developing a flexible model for curriculum development to accommodate the varying levels of individual readiness and acceptance of PBL. The workshop sessions helped to inform teachers about the distinctive pedagogical characteristics of PBL and trained them in a variety of skills associated with course development and delivery processes. These included designing problems and block construction, specifying and organising learning objectives, facilitating and assessing students’ learning, skills development and resource provision. Following the workshops positive developments have occurred with respect to curriculum development, teaching-learning experiences, student learning outcomes and performances. However reflection on the intensity of emotions expressed by the participants, both teachers and students, raises a concern that the emotional dimension of change must be factored into the implementation process of complex educational reforms.

Keywords: PBL; staff training; facilitation, case-design

INTRODUCTION

Student-centred learning is becoming a dominant theme in higher education. An increasing number of institutions and educators in Malaysia are planning or beginning to adopt a more student-centred approach. Problem-based learning (PBL) embraces the principles of student-centred learning yet neither the theoretical principles of PBL or student-centred learning have been clearly established for practitioners. Substantial research on student learning demonstrates that it is the students’ perception of the learning environment that influences their approach to learning and the quality of the learning outcomes (Ramsden 1992). Students who perceive that learning requires active knowledge construction will adopt a deeper approach to learning. Corresponding studies on teachers have found that science teachers maintain a variety of conceptions of teaching, ranging from teaching as transmitting concepts to teaching as an approach to helping students change their conceptions (Trigwell et al 1994). They also showed a link between the teachers’ perceptions of teaching (focus of teaching) and teaching approach (how they teach), in that those with learner-focussed conceptions of teaching tend to use more learner-focussed approaches in teaching and thereby creating a higher quality learning environment for their students.

PBL involves a form of teaching that focuses on how the students are learning, what they experience and how they engage in the learning context. Greater students’ activity and participation is often associated with PBL. Thus, switching to PBL requires educators to reframe their fundamental beliefs in the teaching and learning process and their teaching role. To reduce negative perceptions and attitudes teachers need to be well informed
about the distinctive pedagogical characteristics of PBL and trained in a variety of skills associated with course development and delivery process. Institutions such as University of Malaya (Azila et al. 2001a), Universiti Teknologi Malaysia (Khairiyah and Mimi Haryani 2003), International Islamic University Malaysia (Farah Nini 2004), and Universiti Putra Malaysia, have been actively taking steps to expose or educate their academic staff to various concepts and principles in teaching and learning. The approach used at the initial stages before implementation is to create interest in PBL through “exposure” workshops followed by various workshops to train staff on aspects of PBL and other teaching and learning approaches to improve their competencies.

This paper reports on the observations and data collected over 2 years, from faculty development workshops on PBL in three disciplines, namely medicine, dentistry and chemical engineering, which may or may not have involved students. These included designing problems and block construction, specifying and organising learning objectives, facilitating and assessing students’ learning and skills development and resource provision. This paper describes experiences on (a) strategies for training tertiary teachers to become skilled in the methods and approach required to help implement PBL, (b) helping to adapt existing methods used in these institutions to train teachers as skilled facilitators and case designers and (c) developing a flexible model for curriculum development to accommodate the varying levels of individual readiness and acceptance of PBL.

TRAINING TEACHERS IN PROBLEM-BASED LEARNING

Many teachers are unfamiliar with the role as a facilitator to student learning and may sometimes find the task to be difficult. This is because most teachers were educated in a didactic manner and thus opportunities for becoming familiar with this task have to be made available. The Faculty of Medicine and Faculty of Dentistry, University of Malaya, and Faculty of Chemical Engineering, Universiti Teknologi Malaysia try to familiarise their teachers to PBL by organising short courses in PBL with hands-on PBL workshops.

The courses were conducted over 2 to 4 days held in or off campus. Off campus intensive workshops usually included evening sessions. The courses conducted provided hands-on sessions in facilitation and case/problem or block development, working in small groups. These courses may or may not include students. In the facilitation courses where students were not involved, participants not only experienced the facilitator’s role but also the student’s role and the anxieties faced by students. Cases or problems used to stimulate learning were chosen with the criteria that they must include triggers or events that generated some knowledge gap for the learners so that they can identify learning issues.

Training on Facilitation

After an introductory session on the first day, groups of 7-8 participants took up the role of students working through a case or problem, facilitated by one of the trainers. Following that the participants experienced hands-on sessions as a facilitator (by rotation) facilitating their colleagues working through another problem. In extended workshops, the latter activity was continued with the participants facilitating their students working through another case.

Facilitating colleagues working through a case: Figure 1 shows how the participants were seated in a PBL tutorial session to play their role as students or observers. In this session one of the eight participants (P1) took up the role of a facilitator and conducts a problem-based learning session with six participants adopting the role of students. During this period of 20-30 minutes the second participant (P2) sat on one side, next to the trainer, as an observer. At
the end of this period the observer became the next facilitator and P3 now became the observer. This cycle was repeated until 4 participants had their turn in the 1st tutorial session (brainstorming). The cycle was repeated for the remaining 4 participants in tutorial session II (sharing of information) that may be held the next day or a week later. Through this cycle over the two days every participant can experience the role as a student and later as a facilitator. During the role as a facilitator, the participant concerned sat at a position furthest away from the board or flip chart. A study period, an afternoon or a week, was given for the participants to source out information to fill their knowledge gap in between tutorial sessions I and II, using reading materials made available on site, including internet facilities.

Figure 1. Sitting arrangements in a Training Session of a Problem-based Learning tutorial.

Figure 1 shows the sitting arrangements of the participants and the trainer. The participants changed roles by rotation every 20-30 minutes as a facilitator, a similar period as an observer and the rest of the tutorial session as students involved with the discussion of the case/problem.

In this sitting arrangement, the trainer (T):
  - Briefed participants on their roles and the mechanic of rotation to ensure a smooth change over of facilitation
  - Uses “time out” if necessary to explain a few things

In this sitting arrangement, the observer:
  - Observed group dynamics and how the designated facilitators affected the dynamics
  - Noted incidences that promoted discussion and those that stopped discussion

At the end of both tutorial sessions I and II, each participant gave feedback on the facilitation session which they had observed and indicated how the “facilitator” affected the dynamics of the group discussion.

Table 1 shows an example of a summary of a 2-day workshop strategy. The period between Day 1 and Day 2 may be a day or a week apart. For extended courses, which involved students, the participants after experiencing the student’s and facilitator’s role with the trainers, will then experience facilitation of actual students working through another PBL case, by rotation. In this instance while the students sourced out information to learn on their own and in preparation for the discussion in tutorial session II, the participants (teachers) were involved with hands-on case development.
Table 1: An Example of a Summary of a Workshop Strategy (Not Involving Students)

<table>
<thead>
<tr>
<th>Day 1 - Session I</th>
<th>Next 2 hours 30 minutes:</th>
<th>Case/Block Design I - 3 hour session</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 2 hours: Talk and demonstration/hands-on</td>
<td><strong>Hands-on facilitation</strong> of a PBL Tutorial session I - Brainstorming</td>
<td>A. Introduction on Case/Block Design 1. Case classification &amp; how it is handled 2. Issues with case design</td>
</tr>
<tr>
<td><strong>A. Introduction</strong> on 1. PBL approach 2. Tutorial process 3. Case and curriculum planning</td>
<td><strong>Short briefing</strong> by tutor 1. Explain the running of the session • Number each participant • Facilitate agreement of ground rules and rotational roles 2. <strong>Warm-up session</strong> by tutor (20 min), P1 observes group dynamics 3. <strong>Facilitation</strong> by rotation (4 participants) P1 facilitates, P2 observes (~&gt; P4) 20 - 30 min each 4. <strong>Evaluation</strong> of session &amp; feedback on facilitation of each participants</td>
<td>B. <strong>Hands-on</strong> Case/Block Design I Design cases/blocks based on criteria set by each group.</td>
</tr>
<tr>
<td>B. <strong>Working through a case</strong> (1hr 30 min) 1. A demonstration group of participants facilitated by a trainer observed by others or 2. Participants in groups of 7-8 work through a case, each facilitated by a trainer</td>
<td></td>
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<td></td>
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<tr>
<td>Day 2 - Session II</td>
<td>Next 2 hours 30 minutes:</td>
<td>Case/Block Design II - 3 hour session</td>
</tr>
<tr>
<td>First hour – Talks</td>
<td><strong>Hands-on facilitation</strong> of a PBL Tutorial session II – Sharing of information</td>
<td></td>
</tr>
<tr>
<td>A. Talks on Assessment. B. Review on the tutorial process</td>
<td>B R E A K</td>
<td>B R E A K</td>
</tr>
<tr>
<td>B R E A K</td>
<td><strong>Hands-on facilitation</strong> for P5 ~&gt; P8, practice with assessment form</td>
<td>1. Present cases with brainstorming &amp; feedback 2. Dialogue with participants</td>
</tr>
</tbody>
</table>

Training on Case, Problem or Block Design

Designing cases/problems or blocks is one of the most important activities for implementation of PBL. A case or problem is described as “a narration of events that includes enough intriguing events or decision points to induce a discussion group to think and discuss about them” (Snelten-Balendong, 1993). Cases need not be literal accounts of actual incidents (though they may be). However the characters, situations and dilemmas described must seem real so as to prompt meaningful discussions. Thus the teacher or planner needs to prepare the case properly in order to create appropriate knowledge gap and raise learning issues.

The seven principles of case design (Dolmans et al, 1997) were used as the main reference for the workshops on case and block design. Participants in groups of 4 to 6 were either grouped according to their specific discipline or a mixture of disciplines. A group that was formed according to their speciality tended to design more complex cases compared to a group consisted
of a mixture of disciplines. The presence of the non-specialist in the latter group created an opportunity for the recognition and monitoring of the knowledge gap.

Each group was asked to decide on (a) the students’ level of study in the course, (b) the topic for the focus of the case, (c) learning objectives to be identified or expected, and (d) other learning activities (such as laboratory work, field work, patient interaction and so forth) that can be associated with the case/problem. In session I the group wrote the case or designed a block consisting of several cases or triggers. In session II, the group presented the case to the rest of the participants who took up the role of students in trying to identify the expected learning issues using cues picked up from the events or triggers given in the case or problem. The extent of matching of the identified learning issues compared with the expected learning issues decided by the group will indicate the quality of the case design. The learning issues not only addressed scientific foundation but should also include behavioural, social and professional issues. Based on the feedback from this session the cases were then modified to suit the objectives.

FEEDBACKS

During feedback at the end of each tutorial session the group reviewed the process and their experiences with the different “facilitators” with added comments from the observer of each facilitator. These experiences form an important basis for reflection so that abstract conceptualization can be backed by concrete events. During these feedback sessions, educational issues and questions related to methods were frequently discussed, based on notes made during the role play sessions. This corresponds with Kolb’s model (Kolb 1984) of the learning cycle (Figure 2) where he argues that when we undertake to learn something we go through four stages of events. The starting point is concrete experience. We then make observations and reflections on that experience. The third step involves using abstract concepts and generalisation to make sense on the reflections, which lead to testing its implications in new situations. The cycle is completed through linking the outcomes of the experimental phase back to the original concrete experience.

![Figure 2. The Experiential Learning Cycle Adapted from Kolb (1984)](Doing)

Concrete Experience

(Planning)

Active Experimentation

(Reflecting)

Reflective observation

(Thinking)

Abstract conceptualisation

Participants were also invited to reflect on their own, using their own reflection journals, distributed and filled in at different stages of the workshop. They were asked to reflect on the efficacy of the process, their role and feelings within the unfolding PBL simulation and implications for the adoption of PBL within their own classroom setting. It was obvious that knowledge used to pursue or solve the problem was constructed from the participants’ (both teachers’ and students’) past and current experiences and knowledge.
Participants worked with problems in a way that encouraged reasoning skill, and prior knowledge application, which closely resembles those situations in the real world setting. The participants were always reminded that there are no absolute wrong or right answers, the focus should always be to identify the knowledge gap and to decide the action or learning to follow in order to fill that gap. This provided a non-threatening way of introducing change where the encouragement to succeed and the right to fail are both upheld.

DISCUSSION

Institutional Developments after the 1st workshop exposure

Between 2000 and 2004, various developments occurred in different institutions or faculties depending on how the curriculum implementation has been driven. With top-down or committee decisions following discussion and some from of agreement with faculty members, a certain generalised structure of implementation of PBL or cooperative learning (CL) occurred either on a trial basis or introduction in graded doses (Alhady et al 1999, Azila & Sim 2000, Azila 2002, Rahim et al 2002, Abdul-Kadir et al 2003). Where there was a lack of definite decision from central curriculum committees or administrative level, trials of the PBL approach occurred in pockets of experimentation by individual lecturers or groups of lecturers (Khairiyah and Mimi Haryani 2003, Wan Ashri 2002, Khairiah et al 2004) engaged with this learning pedagogy. These implementations or trials were monitored closely to gather information on students’ learning experiences and performance (Azila et al 2001a, Khairiyah and Mimi Haryani 2003, Khairiah et al 2004). Gradually more cases and modules were introduced (Tan et al 2001, Rahim et al 2002).

Subsequently with reports of positive impact on student learning and performance, follow-up workshops were organised to improve skills, to test cases with students for others to observe and also to share reflections on how students had coped with learning on the cases developed in the previous workshops.

Concerns that need to be addressed

Analysis of reflection journals filled by students and teachers after the various activities indicated that there were positive impressions and also concerns. Although students liked the student-centred activity and felt that they could acquire knowledge on their own, including improving skills in communication, interaction with peers, searching and selecting information, there were concerns that need to be addressed at various levels of implementation (Azila et al. 2001b). These concerns included the worry about “free riders”, the question of time, and boundaries (breadth and depth) of knowledge, which can cause anxiety. Facilitators need to address the issue of “free riders”: students who do not really get involved with the learning activity may in the end affect the achievement of the group and their own performance at the end of the course. Worse still is the feeling of unfairness by their group members if group marks were given for the activities involved. Silen (2001) examined the culture of student-centred learning and students’ responses to opportunities for responsibility and independence. She suggested that students move between chaos and cosmos, and postulated the presence of a dialectic relationship between the opportunities for responsibilities offered by the programme and the students’ ability to make use of them. Thus facilitators need to play their role in helping students cope with these responsibilities.

Similarly teachers have their concerns and some do encounter difficulties. Some teachers are questioning whether PBL does stimulate the cognitive and motivational processes, which are thought to take place in the tutorial, because they have not encountered the desired positive outcomes and especially if they have experienced facilitating “dysfunctional or difficult” groups. However, in the opinion of the authors and practitioners of PBL (Dolmans et al. 2001, Savin-Baden 2000), when teachers are confronted with problems during group work they often tend to choose solutions they are familiar with, that is, employing the teacher-directed model. Another
concern is the issue of curriculum “coverage”. Applying PBL to engineering (e.g. bioprocess or chemical engineering) and health sciences (e.g. medical or dental) courses is viewed to have its setbacks. Teachers in these disciplines felt that educational approaches such as PBL, and those creating more conducive environments for critical thinking, are usually more time-consuming compared to the normal didactic delivery of the curriculum in a lecture hall. Due to constraints in the curriculum schedule and the desire to complete the predetermined syllabus, teachers involved deemed it necessary to introduce interventions. To balance this conflicting requirements curriculum planners need to look into the amount of content load that is actually required to be learned and how much of it can be delayed so that they can be learnt during internship, that is, learning in time, as and when needed.

SUMMARY

Educating teachers with educational theories and experience, and sharing the direction of curriculum change will definitely create an environment of understanding, co-operation and compliance. In this context positive developments have occurred with respect to curriculum developments, teaching-learning experience, student learning outcomes and performance. However reflection on the intensity of emotions expressed by the participants, both teachers and students, raises a concern that the emotional dimension of change must be factored into the implementation process of complex educational reforms. Teachers and students engaging in PBL for the first time suffer a period of disorientation and discouragement before becoming comfortable with the process. Concurrently, students need to be primed and guided to ensure that they will be able to cope with the many challenges they have to face in their learning process. Finally, PBL places high demand on the problem used and on the skills of the facilitator, in order to ensure that PBL and cooperative learning in the tutorial groups positively influences student learning or leads to better learning than individual learning (Junedah et al 2003). It is a challenge to all teachers who work with PBL to try to diminish negative experiences of group work in PBL.

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